The use of artificial intelligence for adjudication in South Africa

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List of Abbreviations

AI	Artificial Intelligence
AIL	Artificial Intelligence and Law
CMR	California Management Review
DLJ	Denning Law Journal
ECHR	European Convention on Human Rights
EU	European Union
FSPL	Faculty Scholarship at Penn Law
GDPR	General Data Protection Regulation
HRQ	Human Rights Quarterly
HRIAs	Human Rights Impact Assessments
IEEE	Institute of Electrical and Electronics Engineers
IJC	International Journal of Computer
JBR	Journal of Business Review
LMQRJ	Law Magazine: or Quarterly Review of Jurisprudence
OHYSAI	One Hundred Year Study of Artificial Intelligence
LLR	Loyola Law Review
M	Mind
MS	Marketing Science
NIJ	National Institute of Justice
NLP	Natural Language Processing
NULJ	Nirma University Law Journal
PEERJ	Peer-Reviewed Journal
PO	Plos One
PoPET	Proceedings on Privacy Enhancing Technologies
QJE	Quarterly Journal of Economics
UCLR	University of California Law Review
UDHR	Universal Declaration of Human Rights
UPJIL	University of Pennsylvania Journal of International Law
WYBAJ	Windsor Yearbook of Access to Justice
5G	the fifth generation of cellular networks

1 Introduction

1.1 The adjudicative landscape in South Africa

It is no secret that South African courts are overburdened.[1] This overload of the South African courts system makes access to justice, which is already a constitutional imperative,[2] an even more elusive goal to achieve. The South African court structure is made up of the following courts: The Constitutional Court, the Supreme Court of Appeal, the High Courts, the Magistrates' Courts (and any other court established in terms of an Act of Parliament).[3]

In South Africa, there is an increased need for court services.[4] It stands to reason that because of this growing need for court services, the South African government should investigate possible solutions that will help solve this problem.[5] In a technologically driven world, it would not be hard to imagine that a possible solution to this situation will be one that is primarily based on, or at least driven by, technology.[6]

The current state of affairs in both business and professional life is one of rapid change.[7] The change that is currently taking place in the world is not only limited to a few industries and professions, but it permeates through every fabric of human activity.[8] The legal field is no exception to this rapid rate of change. There is no doubt that the legal field will undergo a massive transformation in the future, as will every other industry. The main concern of this research is the impact that technology will have on the legal field; more specifically, the effect that the use of artificial intelligence (hereinafter referred to as AI) could have on adjudication as used by the judiciary in South Africa.

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[1] McQuoid-Mason 1999 *WYBAJ* 230.
[2] Section 34 of the *Constitution of the Republic South Africa*, 1996.
[3] Section 166 of the *Constitution of the Republic of South Africa*, 1996; also see South African Government 2018 https://www.gov.za/about-government/judicial-system.
[4] South African Government 2018 https://www.gov.za/about-government/judicial-system.
[5] South African Government 2018 https://www.gov.za/about-government/judicial-system.
[6] South African Government 2018 https://www.gov.za/about-government/judicial-system.
[7] Kotter 2011 https://www.forbes.com/sites/johnkotter/2011/07/19/*can-you-handle-an-exponential-rate-of-change*/#33a4eeb14eb0.
[8] The Impact of Rapid Technological Change on Sustainable Development (2019) UNCTAD/DTL/STICT/2019/10.

While it is a widely accepted fact that AI will transform the legal profession in a major way,[9] there is, however, uncertainty as to whether this transformation will be positive, in the sense that it will free up legal professionals and allow them the opportunity to work on higher-level activities, maximising their productivity; or negative, in the sense that it could make legal professionals, as they exist and operate today, obsolete.[10]

AI will not only change the way legal professionals perform their work, it could also change how countries' judicial systems deal with and manage legal matters. For instance, in the United States, AI systems are being used, in an experiment, to make determinations relating to the prospect of granting bail to an applicant or not.[11] The experiment has proved that AI systems can make better bail determinations than humans.[12] If an AI system like that could be implemented in the South African courts' system, it could dramatically alleviate the burden on the courts, at least insofar as granting bail is concerned. Studies suggest that the South African bail system needs improving and there is a possibility that AI technology can help with that.[13]

This research will assess the usefulness (or not) of AI in adjudication and other ancillary legal processes in South Africa by assessing and evaluating the application of AI in the United States, particularly in the field of how AI is improving efficiency when it comes to bail applications. By so doing, instructive lessons can be learned that could be used as a case study illustrating how South Africa could successfully use AI to improve, amongst others, its bail system. This research will also analyse a range of sources with the view of trying to determine how adjudication in South Africa could be improved, should AI systems be implemented; all the while trying to

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[9] Marr 2018 https://www.forbes.com/sites/bernardmarr/2018/05/23/*how-ai-and-machine-learning-are-transforming-law-firms-and-the-legal-sector*/#3b167d7732c3.

[10] Marr 2018 https://www.forbes.com/sites/bernardmarr/2018/05/23/*how-ai-and-machine-learning-are-transforming-law-firms-and-the-legal-sector/*#3b167d7732c3.

[11] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.

[12] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.

[13] Karth *Between a Rock and Hard Place, Bail decisions in three South African courts* 2.

determine whether implementing such AI systems within the legal field in South Africa could improve access to justice.

This research is in line with the current South African government's mandate to continue to keep pace with the current trend of the latest technological developments.[14] The government is in search of processes that are technology driven, that can help improve and modernise the South African judicial system.[15] This research will attempt to provide insight and ultimately guidelines to the judicial system on making use of AI systems, and in the end, to improve efficiency as far as adjudication is concerned.

The above mandate of improving the South African judiciary is in line with the constitutional obligation, which the government has when it comes to ensuring that overall court efficiency improves. The Constitution states:

> Organs of state, through legislative and other measures, must assist and protect the courts to ensure the independence, impartiality, dignity, accessibility and effectiveness of the courts.[16]

Government's continual prioritisation of technological development is congruent with its overall vision of taking advantage of the next wave of technology towards the goal of improving the efficiency of government overall.[17] It is also congruent with its constitutional mandate to continually improve the effectiveness of the judiciary system in South Africa.

This research will also investigate whether the application of AI is something that the South African judiciary and South African legal practitioners should embrace and to which degree they should embrace it, if at all. Furthermore, it will assess whether the application of AI will have a significant impact on the ability to make justice more accessible to the average South African by alleviating the burden on the South African court roll.[18]

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[14] South African Government 2018 https://www.gov.za/about-government/judicial-system.
[15] South African Government 2018 https://www.gov.za/about-government/judicial-system.
[16] Section 165 (4) of the *Constitution of the Republic of South Africa*, 1996.
[17] National Planning Commission *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution* vi.
[18] Pule 2015 https://www.vukuzenzele.gov.za/*new-system-improve-access-justice.*

Additionally, this research will investigate whether the South African judicial system, in its entirety, will be benefitted (or otherwise hampered) by a level of automation, powered by AI. Also, whether this level of automation can help make the South African judiciary more efficient by having algorithms in place that help determine how the country's legal resources should be deployed and used.[19] It will also determine how AI can contribute positively to the human right of access to justice, rather than hampering it. Lastly, this research will make proposals and recommendations on how AI algorithms could be implemented in a country such as South Africa.

1.1.1 The next wave of technology

The next wave of technological developments in Blockchain, AI, Machine Learning, Robotics and 5G are going to revolutionise industries.[20] The legal field is no exception. Studies and experiments into how AI systems can be used in different aspects of the law have already began.[21] From the above-mentioned list of technologies, what has been of particular interest to scholars is the use of AI systems in the law.

Nilsson defines AI as:

> that activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment.[22]

Duin and Bakhshi describe AI, more broadly, as a:

> field of science encompassing not only computer science but also psychology, philosophy, linguistics and other areas. AI is concerned with getting computers to do tasks that would normally require human intelligence.[23]

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[19] Rigano 2019 *NIJ* 37.
[20] Forbs 2018 https://www.forbes.com/sites/forbestechcouncil/2018/12/26/2019-*tech-forecast-11-experts-predict-the-next-wave-of-breakout-technologies*/?sh=5730a9ca59a9; also see Burke 2020 https://www.techradar.com/news/trends-driving-the-next-wave-of-technologies; and Perset, Nishigata and Aranda *Artificial Intelligence in Society* 3.
[21] See Robaldo *et al* 2019 1; also see Katz, Bommarito and Blackman 2017 *PO* 1 and Aletras *et al PEERJ* 1.
[22] Nilsson *The Quest for Artificial Intelligence* 13 as quoted in Stone *et al* 2016 *OHYSAI* 12.
[23] Duin and Bakhshi 2017 https://www2.deloitte.com/nl/nl/pages/deloitte-analytics/articles/part-1-artificial-intelligence-defined.html?id=nl:2sm:3tw:eng_da_bus:ai1.

Furthermore, inside the scope of AI there exists a whole host of technologies, such as Natural Language Processing (hereinafter referred to as NLP), Markov Decision Process, Neural Networks, Support Vector Machine, Heuristics and machine learning.[24] From this list, it is mostly machine learning and NLP that will probably have the most impact and applicability in law, particularly in adjudication.[25]

What machine learning brings to AI systems (more on this later) is the ability to allow AI systems to improve the performance of their algorithms by continuously adding new data on top of their existing training data.[26] The combination of AI and machine learning is what makes it possible for an algorithm to not only learn through continuous repetition, but also allows for the ability to understand, in context, what the algorithm is learning.[27] On the other hand, NLP (more on this later) allow AI systems the ability to interpret and understand languages.[28]

As will be discussed in more detail below, AI systems (through a combination of NLP and machine learning) have proven that they can be effective in various aspects of the legal field. Most notably, they have proven that they can help improve judges' decision-making ability.[29] They have also proved that they can predict, with relative accuracy, the future decisions that will be made by courts and judicial officers themselves.[30]

However (as will be discussed later), there are downsides to these technologies. The first downside is the fact that since AI systems are fundamentally computer programs that are programmed by humans, who may be biased, these AI systems could subsequently carryout those biases in their operation and negatively impact

[24] Duin and Bakhshi 2017 https://www2.deloitte.com/nl/nl/pages/deloitte-analytics/articles/part-1-artificial-intelligence-defined.html?id=nl:2sm:3tw:eng_da_bus:ai1; see also Duin and Bakhshi 2017 https://www2.deloitte.com/nl/nl/pages/data-analytics/articles/part-2-artificial-intelligence-techniques-explained.html.
[25] See Aletras *et al PEERJ*; and Kleinberg *et al* 2018 *QJE*; and also Katz, Bommarito and Blackman 2017 *PO.*
[26] Marian-Webster date unknown https://www.merriam-webster.com/dictionary/machine%20learning.
[27] Duin and Bakhshi 2017 https://www2.deloitte.com/nl/nl/pages/deloitte-analytics/articles/part-1-artificial-intelligence-defined.html?id=nl:2sm:3tw:eng_da_bus:ai1.
[28] Duin and Bakhshi 2017 https://www2.deloitte.com/nl/nl/pages/data-analytics/articles/part-2-artificial-intelligence-techniques-explained.html.
[29] Kleinberg *et al* 2018 *QJE* 240.
[30] Aletras *et al PEERJ* 1.

society.[31] These biases could relate to people's gender or race, and they could subsequently lead to unfair treatment or discrimination.[32]

Furthermore, AI systems can also negatively affect people's human rights.[33] As will be discussed below, the human rights that are mostly affected by AI are the rights to equality and privacy.[34]

1.2 Problem statement and background to study

The effect that AI might have on adjudication, as used by the judiciary, is not yet clear and is thus at risk of being misunderstood. On the one hand, this lack of understanding might result in the perception that AI is a threat to the South African judiciary and legal system. On the other hand, it might result in practitioners being over-optimistic about its application and, therefore, not regulating it sufficiently, resulting in several unforeseen negative consequences.

Although still in its infancy, the use of AI for judicial purposes is already being implemented in the judicial and legal systems of the European Union[35] and the United States of America.[36] In these two jurisdictions, AI is being implemented in different ways. It is clear, however, despite the difference in use, that the United States of America and nations in the EU are using AI to determine whether its use could make their legal systems more efficient.

It is no secret that the United States and the European Union are more technologically advanced than many other jurisdictions, including South Africa.[37] It is,

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[31] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 12; also see Kraus 2019 https://www.americanbar.org/groups/judicial/publications/*appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/.*

[32] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 12.

[33] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 11.

[34] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 11.

[35] European Commission 2020 https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf*.*

[36] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.

[37] Radu 2020

therefore, safe to infer that should the application of AI be successful in those jurisdictions, other jurisdictions might (if similarly developed in all respects, also political and social) soon follow in their adoption of this technology to the point that it possibly reaches mass adoption. If the application of AI could significantly improve the effectiveness of the judiciary and aspects of legal practice, then the South African government and legal practitioners should consider testing and experimenting on ways in which they could start implementing this technology.

In any given industry, the incumbents of that industry are often oblivious to the disruption or dislocation that new technology can cause the industry.[38] This lack of foresight by industry incumbents could result in them going out of business.[39] This could, as a result of AI, also occur within the legal profession. Fagella says the following about the benefits, and the potential pushback, of AI in legal practice:

> The most acknowledged benefit of AI tools in legal practice seems to be improving efficiency. AI software employs algorithms that speed up document processing while detecting for errors and other issues. This seems somewhat counterintuitive as the legal profession has long relied on "billable hours", and it often does not behove a lawyer to take less time in completing a task or document. For this reason, merely eliminating manual (or boring) tasks will likely not be strong enough to drive AI adoption. Rather, the pressure to adopt AI will likely come from peer pressure. Legal firms who adopt AI and are able to move faster may be more likely to pass those savings immediately on to their clients, and firms with no ability to automate may find themselves relatively overpriced for legal services that other firms have largely automated away.[40]

It is not certain when the adoption of AI in the legal field will take place.[41] There are law firms that have adopted AI systems to automate some of their tasks.[42] It is highly probable that many more firms will follow suit as time progresses. This is based on the theory of Geoffrey Moore, who is a seasoned expert on the adoption of technology by the public.[43] He claims that at the beginning of what he calls the technology adoption cycle, only a few (he refers to these people as early adopters)

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https://www.usnews.com/news/best-countries/slideshows*/top-10-countries-for-technological-expertise-ranked-by-perception*?slide=11.

[38] Sood and Tellis 2011 *MS* 339.

[39] Sood and Tellis 2011 *MS* 339.

[40] Fagella 2020 https://emerj.com/ai-sector-overviews/*ai-in-law-legal-practice-current-applications*/.

[41] Fagella 2020 https://emerj.com/ai-sector-overviews/*ai-in-law-legal-practice-current-applications*/.

[42] Fagella 2020 https://emerj.com/ai-sector-overviews/*ai-in-law-legal-practice-current-applications*/.

[43] Moore *Crossing the Chasm* 13.

start using the new technology, and as time progresses more and more people (which he refers to as the early majority) join the trend, until the technology has reached mass adoption.[44]

So far, the application of AI by various law firms around the world has been in the areas of corporate law, contractual law, legal research and assessing the probability of success of pursuing a particular course of legal action.[45] This is achieve through machine learning, by processing the data available and then listing (according to most likely occurrence) the potential probabilities that might occur. It is not clear when South African law firms will adopt this technology. The fact is that South Africa is not even in the top ten on the list of countries that are advanced when it comes to technology.[46] Therefore, the application of AI systems in the South African judicial system and legal fraternity might take a while. In terms of Moore's technology adoption cycle, South Africa may be one of those countries that form part of the late majority, thereby adopting the technology after most countries have already adopted it.

Beyond use by private law firms, AI has been tested by the United States government to determine whether AI systems can, once they have been populated with enough data, make better decisions when it comes to bail applications.[47] It was determined that AI systems can, on average, produce better results than human judges in matters relating to bail applications, thereby preventing bail being granted to potential repeat offenders who might pose a threat to society.[48] Since AI, once fed with sufficient data, can make very accurate statistical predictions, it might have the ability to alleviate an already overburdened court roll.

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[44] Moore *Crossing the Chasm* 13.
[45] Fagella 2020 https://emerj.com/ai-sector-overviews/*ai-in-law-legal-practice-current-applications*/.
[46] Radu 2020 https://www.usnews.com/news/*best-countries/slideshows/top-10-countries-technological-expertise-ranked-by-perception*?slide=11.
[47] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[48] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.

Since South Africa is a constitutional democracy[49], the application of AI will have to be in such a way that it does not harm the fundamental rights of people. This might pose a challenge because AI can only make decisions based on data that has been fed into the system (such as a person's age, race, socio-economic background) and it might prove to be biased, therefore resulting in unfair discrimination.[50] This might be the big challenge of applying AI in a country like South African, more so probably than the cost implications involved in its application. The solution to this could be that AI systems should not be left to operate independently or autonomously, and they should be managed and controlled by well-trained personnel.[51]

1.3 Research question

To what extent can the use of AI systems improve adjudication as used by the judiciary in South Africa?

1.4 Premises, assumptions and hypothesis

1.4.1 Assumptions

The following are theoretic assumptions (i.e., general views held by people) regarding AI in law, particularly in adjudication as used by the judiciary. By understanding what research has already proved about AI, it will provide a sound foundation to begin this research.

This research is founded on the knowledge and background that AI systems are already being implemented in various aspects of the law at present.[52] The main area of concern when it comes to the use of AI within the law, as far as this research is concerned, relates to the use of AI by the judiciary for adjudication. As previously noted, AI systems are already being used in the United States when it comes to

[49] Section 2 of the *Constitution of the Republic of South Africa*, 1996.
[50] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 12.
[51] See McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 13; and World Economic Forum *How to Prevent Discriminatory Outcomes in Machine Learning*; and also Burn-Murdoch 2013 https://www.theguardian.com/news/datablog/2013/aug/14/problem-with-algorithms-magnifying-misbehaviour.
[52] Fagella 2020 https://emerj.com/ai-sector-overviews/*ai-in-law-legal-practice-current-applications*/.

determining whether to grant bail to bail applicants.[53] AI algorithms have proved that, on average, they can make more accurate bail determinations than human judges.[54] This proves that AI, at present, is already at an extremely advanced stage. Therefore, it makes sense to consider whether AI systems should be implemented in South Africa and used by the judiciary for the purposes of improving adjudication, provided that the technology is mature and transparent enough.

However, despite the current state of advancement of AI algorithms, they are not yet effective enough to be used without reservation in adjudication and their imperfection lies in the fact that AI algorithms are inherently biased.[55] This inherent handicap stems from the fact that AI systems have to be fed data and information; therefore, they make decisions based on the data with which they have been programmed.[56] In a legal sense, this data would include information such as a person's race, socio-economic status, previous convictions and age, and this might result in AI systems being discriminatory in their judgements.[57] This dilemma could cause the use of AI in the process of adjudication (as far as the above-mentioned inconsistencies still being present) to clash with human rights and the Constitution.

This inherent disadvantage of AI can, however, be overcome. For example, it can be overcome using AI machine learning.[58] Machine learning can be described as a functional component that can be added to an AI system to provide it with the ability to learn automatically on its own without any external input.[59] Machine learning could, therefore, make it possible for AI systems to be deployed in the use of adjudication, with less fear of the system being biased or discriminatory due to the inherent biases of their human programmers.

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[53] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[54] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[55] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 25; and Isaac and Dixon 2017 https://theconversation.com/why-big-data-analysis-of-police-activity-is-inherently-biased-72640.
[56] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 12.
[57] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 26.
[58] Expert System 2020 https://expertsystem.com/*machine-learning-definition/.*
[59] Expert System 2020 https://expertsystem.com/*machine-learning-definition/.*

1.4.2 Research aim

The primary aim of this research is to investigate the extent to which the implementation of AI systems could contribute to adjudication, as used by the judiciary in South Africa. Also, to provide guidance as to whether AI should be embraced or rejected by the legal community, or whether some middle ground should be reached.

1.4.3 Research objectives

The objective of this research is to analyse and evaluate the benefits of implementing (or disadvantages of using) AI systems in adjudication as used by the judiciary in South Africa. It will also assess and evaluate opposing legal arguments with regards to the application of AI within adjudication, by evaluating its possible impact on human rights and the impact of the lack of biased and subjective human input. This will be done against the evaluation of data on the application of AI systems in various aspects of the legal field, using case studies from amongst others, the United States of America and the European Union.

1.5 Research methodology

The research method or methods that will be used in this research will be determined by the research objective or objectives that are being addressed at a particular point in the paper.[60] The predominant research method that will be used in this research will be "secondary data analysis".[61] This will be a desktop study that will be based on a literature review of articles, cases and the relevant literature, including primary and secondary sources.

The reason behind the use of the secondary data analysis research method is that other scholars and organisations have already started writing and doing experiments about the impact that AI could have and already has had on areas such as adjudication, as used by the judiciary. This research will, therefore, investigate the various findings from the data analysed by others to try and determine whether artificial intelligence can help advance (or subtract from) adjudication, as used by the judiciary. While this study will refer to various case studies from foreign

[60] Virginia Tech 2018 https://guides.lib.vt.edu/*researchmethods/design-method.*
[61] Virginia Tech 2018 https://guides.lib.vt.edu/*researchmethods/design-method.*

jurisdictions, including the USA and the European Union, it will also refer to other jurisdictions where applicable. The USA and the European Union have been chosen due to their progressive use of AI in pilot projects.

1.6 Limitations of study

Since this research was a desktop study that mainly relied on the literature review of articles, cases and the relevant literature, including primary and secondary sources, it did not make use of experiments, interviews and surveys. This is in many ways a limiting factor because through empirical research more (practical) findings could have been made that might have influenced the outcome of the research. Through the use of interviews, people's views could have been sought, which could have indicated what people, particularly judicial officers and other legal practitioners, think of the concept of using AI systems with the goal of improving adjudication.

Another limiting factor of this study is the fact that this paper is written through the viewpoint of a legal scholar, and not that of a computer programmer. As a result of this, there may have been some limiting factors in the research because of the lack of proper technical understanding of technologies such as AI, machine learning and NLP.

1.7 Framework of dissertation

This research begins with the first chapter being the introduction, which will not only introduce the topic to the reader, but also introduce key aspects that are related to the topic. Furthermore, it will lay the foundation for the rest of the discussion by illustrating and briefly discussing the constitutional obligation on the part of the government to improve the effectiveness of the judicial system.

Chapter two discusses the current state of the application of AI in various aspects of the law (with reference to the judiciary of the United States of America as a case study). It will analyse and evaluate the technologies behind AI systems that enable them to be a potentially useful tool in adjudication. This chapter will point out that AI systems have indeed proven themselves to have the potential to help judges improve their decisions. Lastly, it focuses on pointing out that AI systems are most useful when they are paired and used in conjunction with human expertise.

The third chapter discusses the relationship between AI and human rights. In this chapter, the current state of the relationship between AI and human rights will be discussed. It will also discuss the effects of big data on human rights protection and promotion. This chapter also discusses how big data can be potentially used to help in the process of promoting and protecting human rights. Lastly, it discusses how AI and human rights can be reconciled, and how the use of AI systems should always aim at promoting and uplifting human rights.

Chapter four deals with the application of AI in adjudication as used by the judiciary in South Africa. It will also illustrate practical examples of where AI systems have been used to relatively successful degrees in adjudicative processes. Furthermore, it discusses the importance of transparency and simplicity of AI systems, should they be used in adjudication. It also provides guidelines of how AI systems can be kept accountable and easy to use – and the importance thereof.

Chapter five will be the final chapter. It provides a summary of the research findings and points out the limits of the study. This chapter provides some recommendations of exactly how AI systems should be used in adjudication in South Africa. Lastly, it provides a conclusion on the research conducted, which evaluates the entire discussions that were carried out and draws some final thoughts on them.

2 Historical Overview

2.1 A brief history of Artificial Intelligence

Einstein was once quoted saying that if an idea does not, at first, seem a little absurd then there is little hope for such an idea.[62] This is most certainly true for artificial intelligence (hereinafter referred to as AI) because in the beginning, the idea that an advanced computer system could have the same capacity for thought as a human, must have seemed entirely ludicrous at first. It is presumed that the concept of AI first began as an abstract idea in the science fiction book called *Runaround*, written by author Asimov, which was published in the 1940s.[63] It is from this book, and books like this, that an entire generation of computer scientists and inventors got their inspiration.[64]

During the same period as the publication of Asimov's book, Mr Turning, through commission by the British government, was working to create a computer-based secret message decryption service that he would later call *The Bombe*.[65] This computer was the first of its kind and was able to decode secret messages, known as the Enigma codes that were sent between members of the German army during World War II.[66] At that point, decoding these messages was an impossible task and not even the best mathematicians of the day could do it, that is, until *The Bombe* was developed.[67]

After creating *The Bombe*, Mr Turning began to imagine an advanced computer system that can have intellectual thoughts of its own and subsequently take action on those thoughts.[68] This led him to write a paper titled *Computer Intelligence and Machinery*[69], which investigated whether machines could have the capacity for thought, and thus, officially launched the scientific study of AI in 1950.[70] In this paper, Mr Turning was hypothesising whether it would be possible to create

[62] Goodreads date unknown https://www.goodreads.com/quotes/267305.
[63] Haenlein and Kaplan 2019 *CMR* 6.
[64] Haenlein and Kaplan 2019 *CMR* 6.
[65] Haenlein and Kaplan 2019 *CMR* 6.
[66] Haenlein and Kaplan 2019 *CMR* 6.
[67] Haenlein and Kaplan 2019 *CMR* 6.
[68] Turning 1950 *M* 449.
[69] Turning 1950 *M* 449.
[70] Turning 1950 *M* 433.

machines that can think for themselves once they have been adequately programmed or instructed.[71] He concluded that it should be possible, in future, for machines to exist that have the same capacity for learning as humans do, and for them to ultimately be able to compete intellectually with humans in all aspects of thought.[72]

Although the term AI was officially coined in the 1950s, research points out that in the Greek, Chinese and Egyptian cultures, stories and legends about autonomous machines were already being told.[73] After the official introduction of the term AI into the lexicon, advocates of AI were very optimistic about the rate at which it would develop and find application within society.[74]

The term AI was subsequently made official at an academic conference in 1956 at Dartmouth College in the United States of America by a group of academics, even though it might have been mentioned in other places before then.[75] This was an academic gathering that was funded by the prestigious Rockefeller Foundation.[76] This academic gathering centred around bringing top computer scientists together to brainstorm and share ideas regarding a multitude of issues, chief among them being how they could begin investigating the creation of AI systems that have the ability to replicate human thought processes.[77]

The development and adoption of AI was not as quick as the experts who first coined the term would have envisioned.[78] This was due to a series of dry spells that AI went through.[79] One of the main reasons for these dry spells is the fact that for AI to be successfully applicable, there needs to exist other, more advanced,

[71] Turning 1950 *M* 459.
[72] Turning 1950 *M* 460.
[73] Lewis 2014 https://www.livescience.com/49007-history-of-artificial-intelligence.html.
[74] Crevier *The Tumultuous Search for Artificial Intelligence* 175.
[75] Lewis 2014 https://www.livescience.com/49007-history-of-artificial-intelligence.html.
[76] Haenlein and Kaplan 2019 *CMR* 7.
[77] Haenlein and Kaplan 2019 *CMR* 7.
[78] Lewis 2014 https://www.livescience.com/49007-history-of-artificial-intelligence.html.
[79] Lewis 2014 https://www.livescience.com/49007-history-of-artificial-intelligence.html.

technology to support its application.[80] Another reason for these dry spells can be attributed to the fact that governments, academic institutions and private investors were averse to investing in the development and research of AI.[81] These dry spells that AI went through are in direct contrast to what is happening right now, where governments, academic institutions as well as private investors are actively investing in the development and research of AI.[82]

This dry spell period continued throughout the remainder of the 20th century, it was only after the year 2000 that developments in AI started picking up and gained traction.[83] There are several reasons why the development of AI accelerated after the turn of the millennium in a manner that it never did prior to 2000. Chief among these reasons is the fact that prior to 2000, the technology necessary for the advancement and development of AI was non-existent, and that technology such as cloud computing, machine learning and advanced computer networks were now available and thus made the development of AI possible.[84]

Although the development of AI only began to accelerate after the year 2000, improvements in computing power and computer storage capacity, which occurred in the mid-1990s, helped pave the way for the rapid development of AI that began after 2000 until the present day.[85] As mentioned above, it was the acceleration of technologies such as cloud computing and advanced networks that helped advance AI, however, it was only after the development of machine learning combined with the rate of technological progress of data capturing tools such as sensors, that AI really began to mature.[86]

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[80] Perset, Nishigata and Aranda *Artificial Intelligence in Society* 15 it is only after developments in machine learning that AI systems began to improve in their ability to make accurate predictions; see Stone *et al* 2016 *OHYSAI* 4 also point out that AI is a series of computational technologies that makes use of other technologies to operate effectively.

[81] Lewis 2014
https://www.livescience.com/49007-history-of-artificial-intelligence.html.

[82] Perset, Nishigata and Aranda *Artificial Intelligence in Society* 121.

[83] Stone *et al* 2016 *OHYSAI* 14.

[84] Stone *et al* 2016 *OHYSAI* 14.

[85] Perset, Nishigata and Aranda *Artificial Intelligence in Society* 20.

[86] Perset, Nishigata and Aranda *Artificial Intelligence in Society* 21.

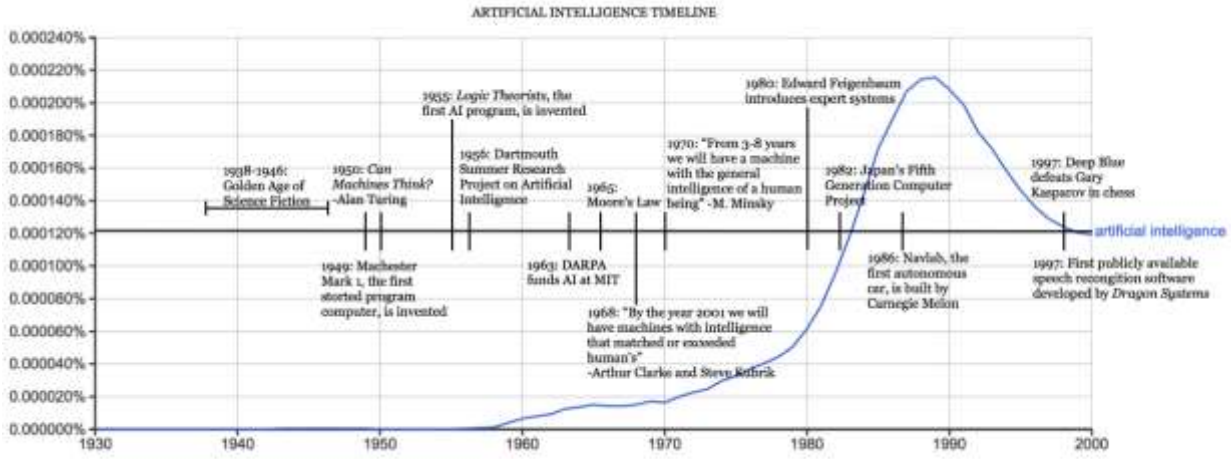

Figure 1

87

2.1.1 How AI actually works

When people generally talk about AI what they are really referring to, whether they know it or not, is a computer-based system that can, as a result of machine learning, make highly accurate predictions.[88] Additionally, the word "intelligence" in the phrase AI actually does not refer to complete intelligence in the true sense of the word but rather to an absolutely critical component thereof, which is the ability to make predictions.[89] This means that when people interact with AI, and it is able to provide them answers and information, they are really interacting with is an advanced prediction machine. The point at which humans will be able to absolutely rely on AI is still unknown. However, the current state of AI is very advanced from what it used to be.

For AI systems to be effective when it comes to making predictions, they must be fed quality data.[90] Needless to say, after the concern regarding accuracy of the

[87] Anyoha 2017 http://sitn.hms.harvard.edu/flash/2017/history-artificial-intelligence/ cited in Perset, Nishigata and Aranda *Artificial Intelligence in Society* 20.

[88] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 1-5.

[89] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 1-5.

[90] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51; see Lander and Beigelmacher 2020 https://www.cloudfactory.com/training-data-guide who point out, that without quality data AI systems can be declared useless. Therefore, when it comes to creating good AI systems quality data is of paramount importance because using poor data will get poor predictions; see Yi *et al* 2014 *IEEE* 6 who mention and explains the immense value of big data.

predictions, the next concern is the quality of the data. Therefore, one can conclude that AI systems are only as good as the quality of the data that has been inputted. That means data is extremely valuable.[91] In fact, data is such a crucial and valuable component of AI that it has been termed by some as "the new oil".[92]

After analysis of the above information, it becomes tempting to conclude that the AI that exists today is, in fact, not AI but rather advanced statistical technology.[93] This would be correct except for one crucial point, and that is the fact that the AI machines in existence today are considered AI because of their ability to learn from data.[94] This is what separates AI systems from being an advanced statistical technology. The ability to enable a computer algorithm to "learn" is what makes AI systems in existence today so special.

AI systems that exist at the moment can be classified as highly sophisticated prediction machines.[95] The following is a diagram that illustrates how such a system operates:

[96]

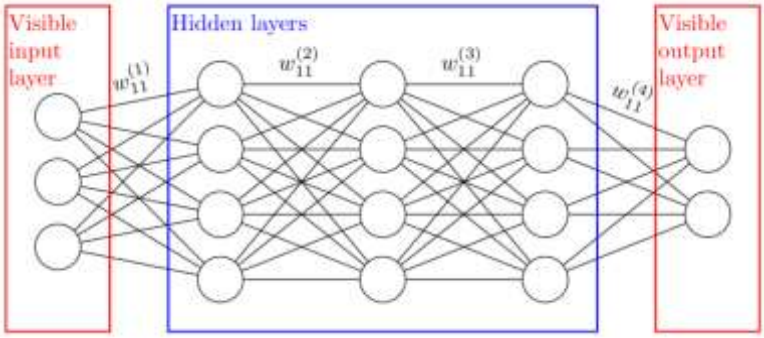

Figure 2

[91] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[92] Toonders 2014 https://www.wired.com/insights/2014/07/*data-new-oil-digital-economy/*; see Yi *et al* 2014 *IEEE* 6 mention that big data has a lot of intrinsic value which many organisations are beginning to release its value and many organisations are developing means to acquire and use it; see also Sivarajah *et al* 2016 *JBR 263.*
[93] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[94] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[95] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 1-5.
[96] Adcock *et al Advances in quantum machine learning* 11.

The above diagram illustrates how a three-layer deep learning neural network works. The prediction process has three components to it. The first is the data input stage where information is fed into the computer system.[97] The second, and arguably the most important, phase is referred to as the training data phase, where the information that has been fed into the computer system is used to create an algorithm – this is where the learning takes place.[98] That then leads to the final stage in the process, which is known as the feedback process; this is where the user receives predictions, otherwise also known as feedback data.[99]

Once the data has been fed after the first stage, the algorithm then simulates all the different likely, and also unlikely, outcomes that can occur from the data that it has been fed during the second stage.[100] This is where the algorithm gears itself, through machine learning, towards accurate prediction. In order for prediction machines or AI systems to successfully make accurate predictions, they need to know how the data with which they have been fed relates to the desired outcome.[101] They also need to know which type of data does not at all relate to the desired outcome.[102] "This comparison enables the prediction".[103]

2.1.2 Types of AI

There are different categories of AI, known as "narrow AI", "general AI" and "artificial superintelligence".[104] The AI that exists today is narrow AI, which is, of course, the least advanced of the three.[105] Narrow AI, like the name suggests, is AI that can only operate for specific purposes, such as internet searches or voice

[97] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[98] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[99] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[100] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[101] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[102] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[103] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[104] O'Carroll 2017 https://codebots.com/*artificial-intelligence/the-3-types-of-ai-is-the-third-even-possible.*
[105] O'Carroll 2017 https://codebots.com/*artificial-intelligence/the-3-types-of-ai-is-the-third-even-possible.*

recognition and once it has been fed enough data it can effectively perform the tasks for which it was designed.[106]

Since the 1990s, AI technological developments increased and major breakthroughs in the field of AI began to occur.[107] These breakthroughs continued to accelerate, even to this day and have occurred in multiple AI sub-disciplines, mainly NLP, language learning and computer vision.[108] They have occurred in the legal field, where advanced narrow AI systems are used in bail hearings to determine which applicants should receive bail or not[109], and they have also been used in the medical field, in the detection of metastatic breast cancer.[110] As mentioned above, narrow AI is the least advanced of all the AI systems, but despite that it has proved to be technologically advanced and useful.

The next type of AI is called "general AI" and this type of AI is more advanced than "narrow AI"; in fact, just as its name suggests, its intelligence is not limited to one specific domain, therefore, it is the closest form of AI to human intelligence.[111] However, it is unknown when this type of AI will come into existence. It is said that because this form of AI is so advanced, an individual would not be able to differentiate between it or a normal human being after interacting with it.[112]

The next and final category of AI systems is called artificial superintelligence; this is the AI that surpasses the intelligence of human beings.[113] This is the most threatening, and the most controversial, of the three types of AI, because

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[106] O'Carroll 2017 https://codebots.com/*artificial-intelligence/the-3-types-of-ai-is-the-third-even-possible.*

[107] Perset, Nishigata and Aranda *Artificial Intelligence in Society* 20 and 21; see also O'Carroll 2017 https://codebots.com/artificial-intelligence/the-3-types-of-ai-is-the-third-even-possible.

[108] Perset, Nishigata and Aranda *Artificial Intelligence in Society* 21.

[109] Kleinberg *et al* 2018 *QJE* 239.

[110] Wang *et al* 2016.

[111] O'Carroll 2017 https://codebots.com/*artificial-intelligence/the-3-types-of-ai-is-the-third-even-possible* general AI is also known as deep AI and it the type of AI that is closest to mirroring human intelligence. This type of AI acts and thinks in a way that is identical to that of humans and as a results passes the Turing test; see Turing 1950 *M* 433 and 434 where the what is now known as the Turing test was outlined by Mr Turing as a way to test the intelligence of a AI system. General AI, therefore, is the first among the types of AI that pass the Turing test.

[112] O'Carroll 2017 https://codebots.com/*artificial-intelligence/the-3-types-of-ai-is-the-third-even-possible;* also see Turing 1950 *M* 433 and 434.

[113] O'Carroll 2017 https://codebots.com/*artificial-intelligence/the-3-types-of-ai-is-the-third-even-possible.*

theoretically, artificial superintelligences will be the most intelligent beings on the planet and they will know it.[114]

This is the type of AI that marks the point of singularity.[115] Vinge defines the point of singularity as the point where a computational technology exists that has greater intellectual power and ability than humans.[116] In theory, AI superintelligence is not only smarter and better at almost all tasks that humans perform, but also exceptionally better than humans at almost all things.[117]

After analysis of the above information, it becomes apparent that for humans to successfully utilise AI systems for the betterment of humanity, it is not necessary to reach the point of artificial superintelligence. At present, with just narrow AI, humans have been able to produce tremendous breakthroughs in fields such as law and medicine. Therefore, just improving on narrow AI should be sufficient.

2.1.2.1 Machine learning

Machine learning is an important branch of AI that provides AI systems with the functional ability to make predictions from data that has been fed into the AI algorithm.[118] Without machine leaning, AI systems will not have the ability to predict outcomes based on statistical data fed into the algorithm but they will also be unable to improve their prediction accuracy.[119] Therefore, machine learning is an integral component of AI systems.

There are many definitions for machine learning, however, the most comprehensive is the following:

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[114] O'Carroll 2017 https://codebots.com/*artificial-intelligence/the-3-types-of-ai-is-the-third-even-possible.*
[115] Goertzel 2007 *AI* 1164.
[116] Vinge 1993 https://edoras.sdsu.edu/~vinge/misc/singularity.html according to Vinge the point of singularity occurs when a computer intelligence is created that has the ability to be self-aware and conscious of itself in the same way humans are.
[117]O'Carroll 2017 https://codebots.com/artificial-intelligence/the-3-types-of-ai-the-third-even-possible.
[118] Perset, Nishigata and Aranda *Artificial Intelligence in Society* 15.
[119] Perset, Nishigata and Aranda *Artificial Intelligence in Society* 15.

> Machine learning at its most basic is the practice of using algorithms to parse data, learn from it, and then make a determination or prediction about something in the world.[120]

Simply put, machine learning involves the process of getting AI systems to learn, so that they can be able to make predictions that continually (as a result of the learning component) improve in accuracy.[121] In order to help AI systems learn, machine learning makes use of a variety of learning methods.[122] These are the decision tree model; the gaussian mixture model; the dropout neural network; and finally, the merging chrominance and luminance using Convolution Neural Networks.[123]

For the above-mentioned machine learning models to successfully complete their designated functions, they need to be fed quality data (in sufficient amounts).[124] Without good quality data, machine learning algorithms will flounder.[125] That is why (as will be discussed later) for AI systems to be successfully applicable, they rely (in a symbiotic manner) on the existence and operation of other technologies.[126]

Therefore, when it comes to developing powerful, machine learning algorithms data is of supreme importance.[127] In fact, data is of such importance that even technologically advanced machine learning algorithms have no real use without it.[128] Furthermore, as AI systems increase in existence, the value and importance of data keeps rising too.[129]

2.1.3 Big data

Most often the term big data is used to refer to a host of different concepts that relate, in some way, to the processing and collecting of vast amounts of data, mainly through digital means.[130] Big data can concisely be defined as:

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[120] Copeland 2016 https://blogs.nvidia.com/blog/2016/07/29/whats-difference-artificial-intelligence-machine-learning-deep-learning-ai/; also see Faggella 2020 https://emerj.com/ai-glossary-terms/what-is-machine-learning/; and Mitchell *Machine Learning* 2.
[121] Faggella 2020 https://emerj.com/ai-glossary-terms/what-is-machine-learning/.
[122] Faggella 2020 https://emerj.com/ai-glossary-terms/what-is-machine-learning/.
[123] Faggella 2020 https://emerj.com/ai-glossary-terms/what-is-machine-learning/.
[124] Lander and Beigelmacher 2020 https://www.cloudfactory.com/training-data-guide.
[125] Lander and Beigelmacher 2020 https://www.cloudfactory.com/training-data-guide.
[126] Perset, Nishigata and Aranda *Artificial Intelligence in Society* 21.
[127] Lander and Beigelmacher 2020 https://www.cloudfactory.com/training-data-guide.
[128] Lander and Beigelmacher 2020 https://www.cloudfactory.com/training-data-guide.
[129]Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51
[130] Favaretto *et al* 2020 *PO* 1.

> the explosion in the quantity (and sometimes, quality) of available and potentially relevant data, largely the result of recent and unprecedented advancements in data recording and storage technology.[131]

Big data, in essence, are large data sets[132] that comprise of smaller units of personal data.[133] The General Data Protection Regulation (hereinafter referred to as the GDPR) defines personal data as the following:

> 'personal data' means any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person.[134]

In 2020 and beyond, a number of big companies and government organisations are and will be in a position to gather data in vast amounts than has been the case in previous years.[135] However, big data in and of itself has no use or value, it is only in processing and analysing big data towards a specific end that makes data useful[136] and, therefore, highly valuable.[137] Similarly, big data is also without value if there is no software to break it down.[138]

Machine learning, which is a subcomponent of AI[139] and sometimes used to refer to AI itself, is an important tool for analysing data.[140] Machine learning is an integral part of AI systems because it gives them the ability to make and improve (through learning from historical data, called training data) the accuracy of predictions.[141] Since machine learning systems need data, it thus becomes a foundational aspect of high quality predictions.[142] Data is so vital to AI systems that some have considered,

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[131] Diebold "Big data dynamic factor models for macroeconomic measurement and forecasting" 115-122 as cited in Favaretto *et al* 2020 *PO* 2.
[132] Manyika *et al Big data: the next frontier for innovation, competition and productivity* 1.
[133] A 4 of the General Data Protection Regulation (2016).
[134] A 4 of the General Data Protection Regulation (2016).
[135] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[136] Gandomi and Haider 2014 *IJIM* 140.
[137] Yi et al 2014 *IEEE* 6.
[138] Melnichuk 2020 https://ncube.com/blog/big-data-and-ai.
[139] Perset, Nishigata and Aranda *Artificial Intelligence in Society* 15.
[140] OECD *The Impact of Big Data and Artificial Intelligence (AI) in the Insurance Sector* 3.
[141] Perset, Nishigata and Aranda *Artificial Intelligence in Society* 15.
[142] Lander and Beigelmacher 2020 https://www.cloudfactory.com/training-data-guide.

or at least treated it, as digital oil.[143] Therefore, when it comes to the issue of data, the old computational adage, *garbage in, garbage out*, becomes true.[144]

Kleinberg *et al,* in their experiment to determine whether machine learning systems can enhance human decision making, particularly when it comes to bail determinations, found that AI systems can indeed improve human decision making tremendously.[145] Much of the success of their experiment, as noted above, had to do with having access to large amounts of quality data. Indeed, they did, and in total, they amassed 1 460 462 cases from part of the machine learning system's training data.[146]

In a similar study conducted by Katz, Bommarito and Blackman, machine learning algorithms were used to predict the judicial decisions of judges on the bench of the Supreme Court of the United States of America.[147] This experiment, much like the one mentioned above, was mainly successful because the machine learning algorithm was fed both quality and quantity data.[148] The data that the algorithm was fed came from legal data dating back over two hundred years.[149]

Big data, if used correctly, can help increase efficiency in a multitude of disciplines, including the law.[150] However, there are a number of downsides to big data (which will be covered at a later stage).

2.1.3.1 Training data

Training data can be defined as the information that is used to train the machine learning systems to make predictions.[151] Here is an illustration of how the training data process operates:

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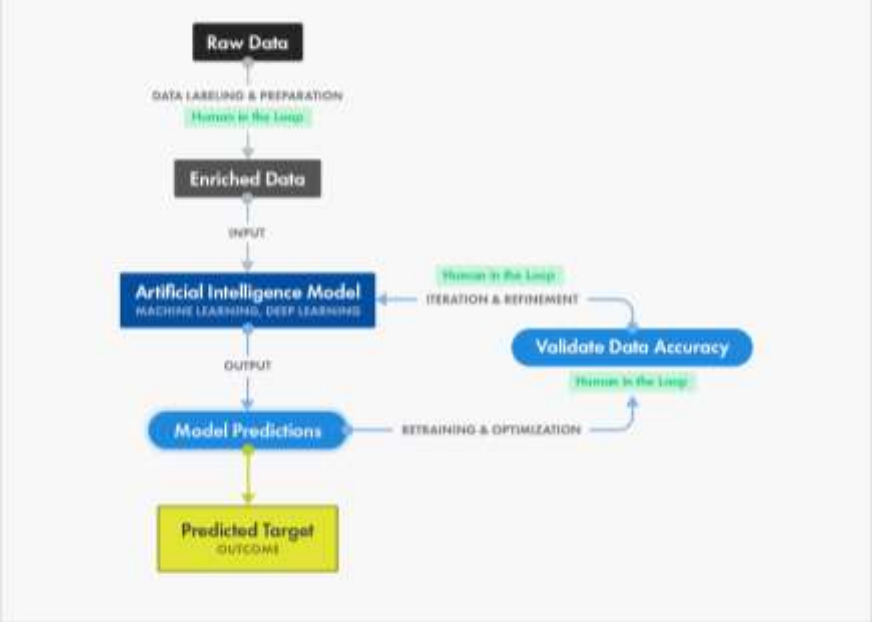
[143] Yi *et al* 2014 *IEEE* 6.
[144] Lander and Beigelmacher 2020 https://www.cloudfactory.com/training-data-guide.
[145] Kleinberg *et al* 2018 *QJE* 240.
[146] Kleinberg et al 2018 *QJE* 247.
[147] Katz, Bommarito and Blackman 2017 *PO* 1.
[148] Katz, Bommarito and Blackman 2017 *PO* 4.
[149] Katz, Bommarito and Blackman 2017 *PO* 4;
also see Spaeth *et al* 2020 http://Supremecourtdatabase.org.
[150] Manyika *et al Big data: The next frontier for innovation, competition, and productivity* 2.
[151] Lander and Beigelmacher 2020 https://www.cloudfactory.com/training-data-guide.



[152]

Figure 3

Above is an illustration of AI software that is tasked with processing and dealing with the data it has been fed.[153] AI systems improve their predictions on the base of the quality and quantity of data fed into them.[154] This happens because training data is not unvarying and improves through testing, iterations and updates.[155]

Of the 1 460 462 cases that were in the existing data pool in the experiment mentioned above, only 758 027 made it into the training data pool.[156] By reducing the data, keeping it aside and then crosschecking the results of the training data against those of the data that has been set aside,[157] the quality of the training data is improved.[158] The quality of the training data in Kleinberg *et al* was able to improve

[152] Lander and Beigelmacher 2020 https://www.cloudfactory.com/training-data-guide.
[153] Melnichuk 2014 https://ncube.com/blog/big-data-and-ai#:~:text=Simply%20put%2C%20it's%20because%20big,without%20software%20to%20analyze%20it.
[154] Melnichuk 2014 https://ncube.com/blog/big-data-and-ai#:~:text=Simply%20put%2C%20it's%20because%20big,without%20software%20to%20analyze%20it.
[155] Lander and Beigelmacher 2020 https://www.cloudfactory.com/training-data-guide.
[156] Kleinberg *et al* 2018 *QJE* 247 the authors reduced the data because they wanted a fresh data set which the algorithm has not been exposed to in order to accurately assess its prediction accuracy.
[157] Kleinberg *et al* 2018 *QJE* 247.
[158] Lander and Beigelmacher 2020 https://www.cloudfactory.com/training-data-guide.

as they were tested in the real world and then the results were cross-checked against the data that was not included in the training data set.[159]

2.2 A brief history of the law and AI

Many legal scholars may be surprised to learn that the discussion regarding the relationship between the law and AI is one that dates back to the 1600s.[160] The issue of AI within the law was first, hypothetically, raised by an anonymous legal scholar in 1848 while making reference to the fact that the inability to have juries of consistent intellectual quality made it difficult to avoid discrepancies in the decisions made by different juries of varying intellectual quality.[161] The scholar, when making this remark, was obviously pointing to the fact that it would be beneficial for the adjudicative process to make use of juries that can provide logical and consistent outcomes rather than inconsistent and irrational outcomes. It is accurate to conclude that this legal scholar was ahead of his time, his basic premise was not completely wrong.

The application of AI systems in the law has been examined by legal scholars from the 1960s.[162] Krausová points out the various uses of AI that the first series of academic papers began to investigate:

> The first documents foresee utilisation of AI for converting trial transcripts into a computer-readable form for more efficient information processing, for processing information provided by a client to an attorney and determining the probability of winning a case, for determining the probable amount of damages if they would be awarded, for analysis of statutory legislation, or for processing evidentiary material as well as case law. According to search results in the legal research database HeinOnline.org the interest of legal science in AI significantly increased in 1980s, dropped in 2000 and rapidly increased again in 2010s.[163]

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[159] Lander and Beigelmacher 2020 https://www.cloudfactory.com/training-data-guide; also see Kleinberg *et al* 2018 *QJE* 247 the authors explain that by leaving some data out of the initial training data set allows the algorithm to not simply be accurate (and as a result provide misleading outcomes) since it has already been exposed to the information from the beginning. It makes it easier to objectively evaluate the results of the algorithm and then improve and update the training data accordingly.

[160] Anon 1848 *LMQRJ* 90.

[161] Anon 1848 *LMQRJ* 90 this article was written in the 1800s, therefore, it is difficult to ascertain who the author was.

[162] Krausová 2017 *IJC* 55.

[163] Krausová 2017 *IJC* 55.

Bearing the above extract in mind it becomes apparent that AI does indeed present itself as a useful tool that could help improve the law and legal practice in general.[164] What also becomes apparent after considering the above discussion is the fact that the discussion regarding the use of AI in the law is not a new one and it could be argued that it has only now begun to intensify.[165] Krausová also points out the fact that even though extensive research has been conducted regarding the relationship between the law and AI, this research investigates certain key aspects of the relationship individually.[166] This information is yet to exist in a single comprehensive academic paper (or a series of related papers) that not only describes (in a manner clear to legal scholars) the intricacies of AI, but more importantly, their applicability within the law; it also provides a holistic view of the effects of the disciplines coming together.[167]

The possible uses of AI within the law are quite various. This paper, however, is concerned with trying to determine the use of AI for the specific purpose of improving adjudication in South African courts. From the outset, it is clear that AI represents a potential tool that can be useful in the resolving of legal issues.[168] The two potential uses of AI for the purpose of improving adjudication includes being able to retrieve and present court cases (in real time) that might be of significance in a particular case as a result of the precedent set in those cases, and also the use of AI as "knowledge-based systems" or "expert systems" that have the capacity to come with their own conclusions after evaluating data stored in them.[169] Susskind defines knowledge-based systems as systems that have a similar functionality to humans, which is the function to store information and then apply it to a range of scenarios as required.[170] This is the kind of system that will make it possible for AI systems to be actively involved in the actual adjudicative process.

[164] Krausová 2017 *IJC* 56.
[165] Krausová 2017 *IJC* 55.
[166] Krausová 2017 *IJC* 56.
[167] Krausová 2017 *IJC* 55.
[168] Krausová 2017 *IJC* 56.
[169] Susskind 1990 *DLJ* 105.
[170] Susskind 1990 *DLJ* 105.

The article cited above was written in 1990.[171] Of course by that time, the arguments put forth by Susskind and legal scholars like him were, for the most part, purely hypothetical in nature. Today, however, AI is already being used in the legal field in the United States, where AI systems are being used to make determinations relating to the prospect of granting bail to an applicant or not.[172] This is a testament not only to the rapid development of AI as technology, but also of its ability to be successfully applicable in the law.

One of the main benefits that AI systems can bring to the law is the improvement of legal reasoning.[173] The reason why this is possible is because AI systems can greatly enhance the process of searching and sorting through vast amounts of information that have been stored inside computer systems as well as making predictions based on that data.[174] Combining this processing capability with the power that AI systems have results in a powerful super computer that has the capacity to make quick and accurate decisions (of course the accuracy of the decisions will depend on the quality of the data that has been inputted into the system).[175] This means that during adjudication, AI systems will not only be able to suggest cases that are most relevant to the case at hand, in terms of the precedent set in those cases, but they will also be able to provide the presiding officer with a range of potential outcomes that can be followed.[176]

The information cited above was written by Sunstien in 2001.[177] At the time of writing his article, he points out that computer systems at that stage were not able to reason analogically and were, therefore, incapable of successfully making valid legal arguments.[178] It has been 19 years since Sunstien's article and AI systems have developed at an incredible rate since then. Upon evaluation of his main argument, which is the fact that since computers cannot reason analogically, they

[171] Susskind 1990 *DLJ* 105.
[172] Kleinberg *et al* 2018 *QJE* 239.
[173] Krausová 2017 *IJC* 56.
[174] Sunstein 2001 *UCLR* 31.
[175] Krausová 2017 *IJC* 57.
[176] Sunstein 2001 *UCLR* 33; also see https://jutastatevolve.co.za/.
[177] Sunstein 2001 *UCLR* 34.
[178] Sunstein 2001 *UCLR* 34 points out that in future, computers will be able to have frameworks for understanding various legal principles and the capability to choose and apply the correct principle to a given situation.

cannot be used in deciding legal outcomes.[179] His line of reasoning suggests that should it happen that computers are able to reason or process facts analogically, they would then be capable of analogical reasoning as it occurs in the law.

Even if AI systems could reason analogically as far as the law is concerned, their application in adjudication should not be immediate and without reservation because when a court presides over a legal matter, it may at times use reasons that are not absolute to arrive at its decision.[180] Since AI systems rely on absolute values to make their predictions, they might not, on their own, be effective tools for making judicial outcomes.[181]

Therefore, just because the AI system is an expert system that can make reasonably accurate predictions, it does not mean that it should replace human wisdom and ability, particularly in relation to adjudication. What is already quite evident though, is the fact that AI systems could assist humans greatly during the adjudicative process by making the process more efficient and possibly much quicker.

2.3 A brief history of the application of AI within the law

To many people the law may seem as only a compilation of rules and norms that are applied to a particular situation when necessary.[182] This view portrays the law as an exact science. This view is, of course, not accurate since the law is not an exact science.[183] Lashbrooke emphasises the point by illustrating the following:

> If the law were a science, all that the student would have to do is learn the rules and mechanically apply them or, better yet, program the rules and let computers resolve legal disputes. Computers are faster, tireless and impartial. However, we know this is not possible yet, because the law is not static but is dynamic. Since it is in a constant state of flux, something must be wrong with the concept of the law as a science. It is in this context that the legal realists emerged.[184]

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[179] Sunstein 2001 *UCLR* 34.
[180] Lashbrooke Jr 1988 *LLR* 303.
[181] In Wang *et al* 2016 the use of an AI algorithm was tested against a skilled and experienced pathologist in accurately determining the existence of Meta static breast cancer in patients. The pathologist beat the AI algorithm at the task, but the authors proved that by combining the expertise of the pathologist and the effectiveness of the AI system the error of the pathologist dropped significantly. Perhaps the same will hold true in adjudication, where AI systems are used as auxiliaries helping decrease the judges' error rate.
[182] Lashbrooke Jr 1988 *LLR* 288.
[183] Lashbrooke Jr 1988 *LLR* 291.
[184] Lashbrooke Jr 1988 *LLR* 291.

Upon evaluation of the above extract, it becomes clear that by just having an expert system that can process data and reach conclusions based on that data would not be sufficient in the legal field.[185] This is true, particularly during the adjudicative process, where varying factors need to be considered at all times.[186] Another thing that also becomes apparent after evaluating the above extract is the fact that the author, buy using the word "yet", does not rule out the possibility for expert systems to someday have the capability to not only make decisions but to also take into account various other factors and interests that need to be considered.[187]

It is worth pointing out that the article from which the above information was sited, was written in 1988.[188] It goes without saying that AI technology has developed at a rapid rate since then and it could possibly be at the point where it could be successfully applied within various aspects of the law, including adjudication (of course not without reservation and oversight).[189] Today, AI systems are being applied in various areas of the law. For instance, in the United States, AI systems are being used to make determinations relating to the prospect of granting bail to an applicant or not.[190] In that experiment, AI systems have proved that they can make better bail determinations than human judges and officials.[191]

One of the benefits that AI systems will bring to the adjudicative process is that of improved empirical analysis, therefore, helping participants in the adjudicative process reach outcomes that are based on sound legal reasoning.[192] The main reason why this will possibly happen is because AI systems are machines, and inherently, they have no biases, except those that find their way into the programming due to the fault of the programmer.[193] This, of course, will be one of the main challenges that the application of AI will face in a country as diverse as South Africa, where the courts deal with weighing relative reasons that are not

[185] Lashbrooke Jr 1988 *LLR* 303 the reason being the simple fact that the legal field is not static and AI systems cannot deal effectively with ambiguity.
[186] Lashbrooke Jr 1988 *LLR* 303.
[187] Lashbrooke Jr 1988 *LLR* 291.
[188] Lashbrooke Jr 1988 *LLR* 291.
[189] Kleinberg *et al* 2018 *QJE* 239.
[190] Kleinberg *et al* 2018 *QJE* 239.
[191] Kleinberg *et al* 2018 *QJE* 241.
[192] Sunstein 2001 *UCLR* 34.
[193] McGregor 2018 https://www.hrbdt.ac.uk/.

absolute, when deciding a matter.[194] The solution to this could be that AI systems should not be left to operate independently or autonomously, and they should be managed and controlled by well-trained personnel.[195]

Another benefit that AI systems could possibly bring to the adjudicative process is in helping courts improve their decisions when it comes to deciding the outcome of matters before them.[196] It is a scientifically proven fact that humans have a very poor ability when it comes to making accurate predictions.[197] AI systems on the other hand are experts at making very accurate predictions.[198] Humans are so poor at prediction that even after evaluating probabilities, they still come to the incorrect predictive outcome.[199] AI systems are masters at prediction, provided they have an extensive data bank from which to draw.[200]

Humans can, for example, be tricked simply by how a sentence is phrased and arrive at different conclusions as a result of framing the same sentence in a different way.[201] Not even experts are immune to this shortcoming.[202] AI systems are much better equipped than humans when it comes to considering a range of complex information and then having to make a decision on the basis of such information.[203] The major drawback in using AI predictions is that in some instances, particularly legal issues that require adjudication to be resolved, when concluding a matter the

[194] Lashbrooke Jr 1988 *LLR* 303
[195] McGregor 2018 https://www.hrbdt.ac.uk/.
[196] Aletras *et al PEERJ* 1 provides evidence and explanations as to how an AI system, fuelled by data can make accurate predictions as to what the European Court of Human Rights decisions will be. Kleinberg *et al* 2018 *QJE* 240 present research results that indicate that AI algorithmic prediction can help improve the quality of judicial decisions. Also see Medvedeva, Vols and Wieling *AIL* 239.
[197] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[198] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[199] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[200] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[201] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[202] Khanaman 2011 *Thinking, Fast and Slow*.
[203] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 53-69 Kahneman in *Thinking Fast, Fast and Slow* infers that if it possible to determine outcomes using a formula instead of humans then the use of that formula should, instead of human predictive ability, be highly considered.

court might have to use, as part of its reasoning, values that are not absolute and that according to the AI system are not logical.[204]

Just because AI systems can make accurate predictions and inferences does not mean they should completely take over the adjudication process, or any legal process for that matter. Even though, on average, AI systems perform better than humans, when assessed, they are at risk of extending the biases of the people who program the system;[205] therefore, inadequate data entry results in faulty results.[206]

AI systems are so advanced that they can be used to assess the reason why presiding officers make wrong decisions.[207] This goes to show just how advanced and how applicable AI systems are within the law at this stage. There are, however, instances where AI systems perform poorly when it comes to prediction.[208] Since AI systems make predictions based on the statistical data it has been fed, there are instances where statistical analysis fails.[209] These are instances where new events occur that fall outside the scope of the statistical data.[210]

Agrawal, Gans and Goldfarb point out the following:

> perhaps the biggest weakness of prediction machines is that they sometimes provide wrong decisions that they are confident are right.[211]

Even though, as pointed out earlier, humans are not the best when it comes to prediction, in the face of uncertain circumstances humans do not believe they know the outcome.[212] AI systems, as pointed out above, have that shortfall. What will help

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[204] Lashbrooke Jr *LLR* 303 points out that AI systems cannot deal as well with ambiguity as humans can. This fact, therefore, makes them poor at the legal decision-making process since there are many instances when ambiguity results during a legal trial.
[205] Risse 2019 *HRQ* 2.
[206] Kilkenny and Robinson 2018 *HIMJ* 103.
[207] Kleinberg *et al* 2018 *QJE* 241.
[208] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[209] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[210] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[211] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[212] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.

overcome this barrier is machine and human collaboration, where AI systems are used together with humans to come up with the best possible answers.[213]

AI systems are not only used in bail situations, they are also used by lawyers in various other aspects of the law. They are already being used by legal professionals to improve the speed of legal research.[214] It is no secret that a huge part of the job of most legal professionals involves extensive and continuous research. JP Morgan, for example, has developed an AI system that allows the firm's lawyers to sort through vast amounts of information using only a fraction of the time.[215]

Academic research proves that extensive research, in merger and acquisition deals, significantly improves shareholder return on investment.[216] The premise holds true in the legal field as well, the more effective and efficient the research process is for lawyers, the more they are able to perform the job more efficiently, thereby giving them the ability to serve their clients better. Therefore, AI systems, such as the one already being used by JP Morgan, will most probably be highly sought out by legal professionals in the future.

2.3.1 Natural Language Processing

NLP is a sub-field of AI and it involves enabling AI systems to process as well as understand human languages.[217] Advances in this field have begun to make it possible to implement AI systems in court- and other legal processes, with very good results.[218] As a result of increased computational power and an increase in the rate of acquisition and capacity to process data, computers are now able to process and understand human languages.[219]

NLP and machine learning technology will, in large part, make it possible for AI systems to automatically analyse large volumes of legal text material and also make

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[213] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[214] Fagella 2020 https://emerj.com/*ai-sector-overviews/ai-in-law-legal-practice-current-applications/*.
[215] Fagella 2020 https://emerj.com/ai-sector-overviews/*ai-in-law-legal-practice-current-applications*/.
[216] Sellers 2013 *New research shows longer due diligence in M&A linked to significant increase in deal success for acquirers, but lower takeover premiums for sellers* 1.
[217] López Yse 2019 https://towardsdatascience.com/your-guide-to-natural-language-processing-nlp-48ea2511f6e1.
[218] Aletras *et al PEERJ* 2.
[219] López Yse 2019 https://towardsdatascience.com/your-guide-to-natural-language-processing-nlp-48ea2511f6e1.

accurate predictions regarding decisions that courts will make.[220] Ensuring that AI systems can understand human language is not an easy feat.[221] However, there are AI systems that currently exist that are being used to analyse legal material and then make predictions based on that legal data (more on this later).[222]

Since the law, as a discipline, comprises mostly written material, if not completely, it stands to reason that NLP systems will become effective tools at helping AI systems make better predictions when it comes to legal matters.[223]

2.4 Working together

AI systems are at an extremely advanced stage in their development. This should not mean that AI systems should replace their human counterparts, rather AI systems should be used together with human reasoning and intellect so that the two can complement each other's shortfalls.[224] As pointed out above, AI systems are good at prediction; they can predict with high accuracy without misweighting certain information.[225] However, they do not have the capability of dealing with novel situations or scenarios, and this is one of the instances where they will need human intervention and assistance.[226]

It has been proven that judges, while in the process of deliberating, sometimes weigh information incorrectly when relating to a particular case, which results in them reaching the wrong outcome.[227] Even though judges are experts when it comes to the law and its processes, they are still human and as Kahneman points out in his book, not even experts are immune to miss-weighing information. This inherent handicap, which all humans possess, makes judicial impartiality an even

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[220] Aletras *et al PEERJ* 1.
[221] Garbabe 2018 https://becominghuman.ai/a-simple-introduction-to-natural-language-processing-ea66a1747b32?gi=69313be74a84.
[222] Aletras *et al PEERJ* 1.
[223] Aletras *et al PEERJ* 1; also see Garbabe 2018 https://becominghuman.ai/a-simple-introduction-to-natural-language-processing ea66a1747b32?gi=69313be74a84.
[224] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[225] Kleinberg *et al* 2018 *QJE* 241.
[226] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.
[227] Kleinberg *et al* 2018 *QJE* 241.

more difficult ideal to achieve;[228] reason being that no matter how skilled and well experienced judges are, they are not completely objective. This is where AI systems could prove to be very helpful in the adjudicative process; at this point in time, it is possible to use AI systems as detection tools that can ascertain why judicial officers reach incorrect outcomes.[229]

Upon evaluation of the above information, it is reasonable to conclude that an AI and human decision-making combination would be quite formidable. A medical research experiment that involved evaluating whether a deep learning system could make better metastatic breast cancer diagnoses than a human pathologist proved that the human error rate when it comes to making diagnoses decreases[230] by 85 percent when using both deep learning AI systems as well as human expertise.[231] This medical research experiment proved that even though AI algorithms are not as accurate as human pathologists when it comes to the detection of metastatic breast cancer, the combination of both machine learning and human expertise can dramatically reduce the pathologist error rate significantly, thereby giving them an accuracy rate of 99.5 percent.[232]

A similar outcome, as the one illustrated above, is likely to occur in the legal field, more specifically when it comes to bail hearings and adjudication; for the simple fact that AI systems and humans are superior at different facets of prediction.[233] Therefore, their combination will offset both their individual weakness and allow for an extremely high prediction accuracy rate as well as an extremely low misprediction rate. It goes without saying that such a boost in efficiency and accuracy will immensely improve the South African court system and as a result, improve access to justice.

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[228] Khanaman 2011 *Thinking, Fast and Slow*.
[229] Kleinberg *et al* 2018 *QJE* 241.
[230] Wang *et al* 2016.
[231] Wang *et al* 2016.
[232] Wang *et al* 2016.
[233] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 56-58.

2.5 Conclusion

This section discussed the current state of application of AI in the legal system (with reference to the judiciary of the United States of America as a case study). Upon evaluation of the above information, a few things become apparent. Since the inception of AI as an academic discipline, its development has come a long way and has improved tremendously. Furthermore, research into how the law can benefit from the use of AI has already been conducted by a number of scholars (with some promising results). Additionally, for AI systems to be successfully applicable there needs to be a host of other supporting technologies in existence, such as machine learning (which is reliant on data), NLP and cloud computing. Together, these technologies give AI systems the ability to make predictions that increase in accuracy and, therefore, make it possible for AI systems to be applicable in adjudication and other legal processes.

3 Human rights and AI

3.1 A brief history of human rights

The first half of the 20th century was characterized by two devastating world wars. At the end of the First World War, an organisation called the League of Nations was formed.[234] This organisation was the predecessor for the United Nations (hereinafter referred to as the UN).[235] The goal of this organisation was to ensure and maintain international diplomacy; however, it failed at this task because the Second World War broke out on its watch.[236]

After the Second World War a group of world leaders thought it necessary to come together in San Francisco[237] with the intention of forming an organisation that would see to it that world peace and international security are upheld and maintained.[238] This organisation was formed in 1945 and it was called the UN.[239] The UN, as part of its priority of maintaining international peace and security, made the protection and promotion of human rights and human dignity an important part of its agenda.[240]

Human rights are a series of basic rights that all humans automatically have simply through the virtue of being human.[241] They are contained in a document called the *Universal Declaration of Human Rights* (hereinafter referred to as UDHR).[242] They serve as a benchmark of how all humans should be treated. The UDHR was adopted by the United Nations in 1948.[243] Human rights are so important that they even find representation in chapter two of the South African *Constitution*.[244] The most notable section in the *Constitution* that emphasises the importance and prominence of human rights as well as human dignity in South Africa is section one.[245] It states the following:

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[234] History 2017 https://www.history.com/topics/world-war-i/league-of-nations.
[235] History 2017 https://www.history.com/topics/world-war-i/league-of-nations.
[236] History 2017 https://www.history.com/topics/world-war-i/league-of-nations.
[237] Morsink *The Universal Declaration of Human Rights: Origins, Drafting, and Intent* 1.
[238] United Nations date unknown https://www.un.org/un70/en/content/history/index.html.
[239] United Nations date unknown https://www.un.org/un70/en/content/history/index.html.
[240] United Nations date unknown https://www.un.org/un70/en/content/history/index.html.
[241] A 2 of the *Universal Declaration of Human Rights* (1948).
[242] *The Universal Declaration of Human Rights* (1948).
[243] United Nations date unknown https://www.un.org/en/*universal-declaration-human-rights*|.
[244] *Constitution of the Republic of South Africa*, 1996.
[245] Section 1 of the *Constitution of the Republic of South Africa*, 1996.

> The Republic of South Africa is one, sovereign, democratic state founded on the following values:
>
> (a) Human dignity, the achievement of equality and the advancement of human rights and freedoms.[246]

The fact that the first section in the Constitution mentions the importance of human rights makes their importance in the South African society quite clear. The *Constitution* also makes it clear that when courts and other similar entities interpret the law in South Africa, they must do so in a manner that promotes the objectives of the *Constitution*.[247] After evaluating the above-mentioned section, one can conclude that the protection of human rights and human dignity are among the main priorities of the South African *Constitution* and present government.

The most important of all human rights is the right to equality, human dignity, freedom of speech, belief and movement, and freedom from fear.[248] It goes without saying that the preservation of these human rights and human dignity is something that should be taken very seriously (also the infringement thereof) by all people, especially lawyers and legal students. That is why the use of AI systems within the law, particularly in adjudication, has to not only be evaluated on the basis of the potential benefits and improvements it can bring but also in terms of the potential harm and risk it poses to human dignity and human rights protection in general.

The influence that AI systems will have on human rights will be one of the most significant events that the world will face from 2020 and beyond.[249] That is why it is of paramount importance that investigations, academic discussions and research be conducted with the specific aim of seeking the correct balance between protecting people's human rights and using technology to drive humanity forward.[250]

3.2 Brief overview of AI's effect on human rights

The Council of Europe made the following statement in their recommendation paper to member states with regards to the relationship between human rights and AI:

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[246] Section 1 (a) of the *Constitution of the Republic of South Africa*, 1996.
[247] Section 39 (2) of the *Constitution of the Republic of South Africa*, 1996.
[248] Universal Declaration of Human Rights (1948).
[249] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[250] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.

> The impact of Artificial Intelligence (AI) on human rights is one of the most crucial factors that will define the period in which we live.[251]

Assuming that the above statement is accurate, it is thus important for both states and private sector participants to have discussions on the possible impact of AI systems on human rights protection.

AI certainly presents itself as a useful tool that could help improve the law and legal practice in general.[252] There is also no doubt that the application of AI in law, particularly in adjudication, will have an effect on human rights. The full extent of this effect is still unknown.[253] Ideally, the use of AI within the law and adjudication will be such that it helps uphold human rights and the preservation of human dignity. However, as it stands, the relationship between human rights and AI is not a good one overall.[254]

In many instances, the application of AI in society results in the infringement of the most important and fundamental human rights, such as the rights to equality and freedom of speech, as will be covered in the discussion below.[255] This cannot be allowed to continue because AI is increasingly becoming an integral part of almost every aspect of people's daily lives.[256] Therefore, the need to reconcile AI technology with human rights protection is a pressing one.[257]

Besides the fact that AI does indeed present itself as a useful tool, for both application in the law and outside of it, it also poses a number of huge challenges to human rights.[258] These challenges range from unfair discrimination, defamation and infringement on equality.[259] However, there are instances where AI is performing well when to comes to the protection and promotion of human rights.

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[251] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[252] Krausová 2017 *IJC* 56.
[253] Latonero *Governing Artificial Intelligence: Upholding Human Rights and Dignity* 2.
[254] Raso *et al Artificial Intelligence & Human Rights: Opportunities & Risks* 4.
[255] Raso *et al Artificial Intelligence & Human Rights: Opportunities & Risks* 4.
[256] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[257] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[258] Risse 2019 *HRQ* 1.
[259] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 195-206.

The number of challenges that AI poses to human rights is likely to increase because the use of AI in people's daily lives is becoming more prevalent and habitual.[260] Since AI systems that are in existence today are basically computer-based systems that can, as a result of machine learning, make highly accurate predictions.[261] These systems need to be fed sufficient quantities of quality data in order to have a substantive enough knowledge base to make accurate predictions.[262] Since humans are not completely rational and are susceptible to biases, the data that finds its way into AI systems can, and probably will at times, reflect some of those biases, therefore posing a direct threat to human rights.[263]

3.2.1 The current impact of AI on human rights

At present, there have been instances where AI has been found infringing on human rights.[264] In most instances, the infringement of human rights by sophisticated AI algorithms is not deliberate, in fact, in most instances it is an unintended consequence.[265] AI systems operate from large amounts of data, which have been fed into their system; AI systems then make their predictions from this data using it as training data.[266] This training data can at times be insufficient[267], and this deficiency then results in the advanced machines making biased predictions. What could also end up happening is that because AI performs a function called machine learning, it may learn about existing societal prejudices and, therefore, exacerbate them through their application.[268] This is something that must be avoided completely.

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[260] Risse 2019 *HRQ* 1.
[261] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 1-5.
[262] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[263] Risse 2019 *HRQ* 2.
[264] Latonero *Governing Artificial Intelligence: Upholding Human Rights and Dignity* 2.
[265] See Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E where the author points out that AI systems in themselves so not pose an inherent threat to human rights, but it is rather their misuse that leads to AI systems infringing on human rights.
[266] Campolo *et al AI Now 2017 Report* 14.
[267] Google Patents *Machine learning with incomplete data sets* 12.
[268] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 195-206.

One of the most notable of these instances, where AI adversely affected human rights, occurred when a Facebook-owned AI algorithm was found guilty by an independent investigation committee of the UN of excessive incitement of hate speech and violence in Myanmar.[269] This independent research unit, which was commissioned by the UN, conducted a thorough investigation into the conflict that occurred in Myanmar, which subsequently led to the death of many people.[270] The independent investigative unit found that hate-speech and the incitement of violence that was promoted on Facebook, and subsequently left unchecked by the operators and administrators of the platform, was in part responsible for the horrific outcome.[271]

In this particular instance, AI systems had an absolutely negative impact on human rights by contributing, through the promotion of hate speech campaigns, to the death of many innocent people in Myanmar.[272] The Facebook-owned and -operated AI algorithm infringed on the right to freedom of speech and belief, which the people of Myanmar are entitled to by perpetuating false news that had negatively influenced their ability to freely think for themselves and come to their own conclusions.[273]

Another instance where AI systems have been found guilty of infringing on human rights occurred in a study conducted by Sweeney.[274] Sweeny's investigation into the discriminatory effects of AI systems began, surprisingly, with a Google search[275] her name: Latanya Sweeny. This yielded a few search results, among them were results indicative of her being arrested when in fact she has never been arrested in her entire life.[276] This led her to conduct research on whether Google searches that include names predominantly given to black people at birth are more likely (than

[269] Darusman 2018 https://www.ohchr.org/EN/HRBodies/HRC/Pages/NewsDetail.aspx?NewsID=22798&LangID=E.
[270] Darusman 2018 https://www.ohchr.org/EN/HRBodies/HRC/Pages/NewsDetail.aspx?NewsID=22798&LangID=E.
[271] Darusman 2018 https://www.ohchr.org/EN/HRBodies/HRC/Pages/NewsDetail.aspx?NewsID=22798&LangID=E.
[272] Darusman 2018 https://www.ohchr.org/EN/HRBodies/HRC/Pages/NewsDetail.aspx?NewsID=22798&LangID=E.
[273] Risse 2019 *HRQ* 11.
[274] Sweeney 2013 https://arxiv.org/ftp/arxiv/papers/1301/1301.6822.pdf.
[275] Sweeney 2013 https://arxiv.org/ftp/arxiv/papers/1301/1301.6822.pdf.
[276] Sweeney 2013 https://arxiv.org/ftp/arxiv/papers/1301/1301.6822.pdf.

names that are predominantly given to white people at birth) to produce search results in the form of Google advertisements that suggest that a specific person has been arrested, even though that person never has.[277]

In this instance, Google's AdSense algorithm is guilty of infringing on article 12 of the UDHR.[278] Alongside the protection of people's privacy, article 12 also protects the right that people have to not have their honour and reputation interfered with.[279] It also makes provision for the fact that the law in the countries that people find themselves in, must protect their honour and reputation.[280] Therefore, the findings in Sweeney's article suggest that Google's algorithm not only infringed on people's right to have their honour and reputation respected in terms of article 12 of the UDHR, but it also infringed on people's right to have their honour and reputation respected in terms of the law in the United States.[281]

Her research found that Google's AdSense was guilty of associating search results of people who have names that are predominantly given to black people at birth with advertising results that suggest arrests.[282] The fact that a Google search for a person's name may result in a search result (in the form of a Goggle ad) suggesting that that person has been arrested (when in fact that is not the case) is not only defamatory but also very likely to result in that person being unfairly treated for no real reason.[283] Since machine learning enables AI systems to learn what might happen from existing data sets, just as in the case of Google, these algorithms could pick up existing societal prejudices and unknowingly start perpetuating them if left unchecked.[284]

The fact that Google's AdSense algorithm associated the names that are predominantly given to black people with search results suggesting that they have

[277] Sweeney 2013 https://arxiv.org/ftp/arxiv/papers/1301/1301.6822.pdf.
[278] A 12 of the Universal Declaration of Human Rights (1948).
[279] A 12 of the Universal Declaration of Human Rights (1948).
[280] A 12 of the Universal Declaration of Human Rights (1948).
[281] Sweeney 2013 https://arxiv.org/ftp/arxiv/papers/1301/1301.6822.pdf.
[282] Sweeney 2013 https://arxiv.org/ftp/arxiv/papers/1301/1301.6822.pdf.
[283] Sweeney 2013 https://arxiv.org/ftp/arxiv/papers/1301/1301.6822.pdf.
[284] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 195-206.

been arrested is not an indictment of Google as a company.[285] Rather, it should serve as a point of serious reflection on what happens when powerful AI systems are left unchecked and to their own devices. It should also serve as a cause for investigation by companies and organisations that make use of sophisticated AI algorithms to ensure that these negative outcomes are avoided.[286]

In another study involving Google and Google's AdSense algorithm, Tschant and Datta conducted an experiment where they set up a computer program that can simulate user behavior on websites and present itself as either male or female.[287] The goal of this experiment was to try and determine whether Google's advertising delivery system discriminates based on sex.[288] The researchers found that, on average, the Google advertising delivery system did indeed discriminate on the simulated females when it comes to employment-related advertising.[289] The algorithm showed simulated better male employment opportunities, as opposed to simulated females, simply because they appeared to be male.[290] This amounts to unfair discrimination based on gender and is also a violation of the right to equality.

It is most likely that these algorithms do not set out with the intention of being discriminatory. It could, therefore, be argued that the resulting discrimination in the above-mentioned instances are not a result of acts of malice on the part of the organisation but rather results from omission on the part of the organisation. This then means that organisations that make use of sophisticated AI systems need to have evaluating and monitoring systems in place, that are there exclusively to protect against the abuse of human rights by AI.[291]

[285] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 195-206.
[286] Datta, Tschant and Datta *PoPET* 92.
[287] Datta, Tschant and Datta *PoPET* 93.
[288] Datta, Tschant and Datta *PoPET* 93.
[289] Datta, Tschant and Datta *PoPET* 93.
[290] Datta, Tschant and Datta *PoPET* 93.
[291] Campolo *et al AI Now 2017 Report* 1.

3.2.2 Big data and human rights

As explained above, for AI systems to be successfully applicable, they require vast amounts of data.[292] Therefore, in the discussion of AI, the issue of data acquisition is of prime importance. Many companies and government organisations around the world have the unprecedented ability to collect vast amounts of data at very cost-effective prices and at very rapid rates.[293]

The rapid rate at which both private firms and government organisations are able to collect and process people's data through AI systems is creating a threat to the human rights of people, the likes of which is unprecedented.[294] Big data driven AI systems pose a specific threat to people's right to privacy and human dignity[295] in terms of the UDHR.[296] It is because of this looming threat that the European Union (hereinafter referred to as the EU) adopted the GDPR.[297]

The GDPR was enacted by the EU to ensure that people's personal data is fairly and lawfully processed and in a manner that is transparent and free of opacity.[298] The GDPR comes after many concerns about outdated data protection and regulations that regulate the manner in which big data-reliant companies and government departments were collecting and processing people's personal data.[299] Another factor that may have contributed to members of the EU adopting the GDPR is the fact that the use of AI systems that are reliant on vast amounts of data to function effectively have a tendency to negatively impact the human rights of the less fortunate and most vulnerable members of society.[300]

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[292] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[293] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[294] *Report of the Office of the UN High Commissioner for Human Rights on The Right to Privacy in the Digital Age* GA res 39/29, UN Doc A/HRC/39/29 (2018) par 1.
[295] *Report of the Office of the UN High Commissioner for Human Rights on The Right to Privacy in the Digital Age* GA res 39/29, UN Doc A/HRC/39/29 (2018) par 1
[296] A 1 of the *Universal Declaration of Human Rights* (1948).
[297] General Data Protection Regulation (2016).
[298] A 5 of the General Data Protection Regulation (2016).
[299] Rossow 2018 https://www.forbes.com/sites/andrewrossow/2018/05/25/the-birth-of-gdpr-what-is-it-and-what-you-need-to-know/#5f111e5355e5.
[300] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.

A similar piece of legislation to the GDPR exists in South Africa; it is called the *Protection of Personal Information Act*.[301] This *Act*, just like the GDPR, exists to protect people's right to privacy as enshrined in the *Constitution*.[302] The *Act* aims at protecting people's privacy by ensuring that their personal data is processed and collected in manner that is lawful and in accordance with internationally accepted standards of processing and collecting people's personal information.[303]

Although the rules contained in the GDPR are only applicable within the EU, international companies doing business in the EU also need to comply with them.[304] Therefore, the reach as well as the influence of the GDPR has expanded beyond the borders of the EU.[305] It has also set a high standard for other nations that are not in the EU to follow, with regards to the manner in which states should protect and regulate the use and processing to their citizens' personal digital data to ensure the protection and promotion of human rights.[306]

3.2.3 How big data can help protect human rights

It is no surprise to know that human rights face threats from a multiplicity of things. The discussion above illustrated that up until the year 2020, the effect of AI on human rights has, unfortunately, been a negative one.[307] The truth is that there is nothing inherently wrong with AI and big data-reliant systems that automatically make them *bona fide* threats to human rights.[308] Using the right approach, they could be powerful tools that can be used to protect and uphold human rights.

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[301] *The Protection of Personal Information Act* 4 of 2013.
[302] Section 2 (a) of *The Protection of Personal Information Act* 4 of 2013.
[303] Section 2 of *The Protection of Personal Information Act* 4 of 2013.
[304] Rossow 2018 https://www.forbes.com/sites/andrewrossow/2018/05/25/the-birth-of-gdpr-what-is-it-and-what-you-need-to-know/#5f111e5355e5.
[305] Rossow 2018 https://www.forbes.com/sites/andrewrossow/2018/05/25/the-birth-of-gdpr-what-is-it-and-what-you-need-to-know/#5f111e5355e5.
[306] Rossow 2018 https://www.forbes.com/sites/andrewrossow/2018/05/25/the-birth-of-gdpr-what-is-it-and-what-you-need-to-know/#5f111e5355e5.
[307] Raso *et al Artificial Intelligence & Human Rights: Opportunities & Risks* 4.
[308] Alston 2018
vhttps://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.

Manyika *et al,*[309] as cited in *Can Big Data Revolutionize Human Rights Law,*[310] is of the view that given the power of big data, it is an underutilised tool in the fight against the abuse of human rights.[311] In his paper Sarfaty, he states the following:

> Analytic tools can be used to filter large amounts of data to identify signals of potential threats and thereby predict violations such as mass atrocities.[312]

As a result of machine learning, AI systems, after having been fed sufficient data, can make predictions with a high degree of accuracy.[313] According to Sarfaty, this ability, coupled with the fact that big data-reliant firms and organisations have the ability to easily and cheaply acquire data[314], should be able to allow AI systems to predict human rights violations.[315]

Sarfaty also makes it clear in his article that allowing AI systems to play an active role in the protection of human rights might result in the owners of the AI systems (which are mostly privately businesses) having significantly more power and authority than they already do.[316] He also makes it clear that by using big data systems to protect human rights, most notably the right to privacy, they will be negatively impacted in the process.[317] Therefore, in his opinion, the use of big data systems towards the protection of human rights will not happen without a trade-off.[318]

However, it should be possible to use big data systems to help promote human rights without the occurrence of trade-offs. An example of big data systems being used to promote human rights without trade-off is in the field of health care.[319] In a study conducted by McKinsey Global Institute and McKinsey's Business Technology Office, results showed that by effectively using big data systems, the United States

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[309] Manyika *et al Big data: the next frontier for innovation, competition and productivity* 1.
[310] Sarfaty *UPJIL* 82.
[311] Sarfaty *UPJIL* 82.
[312] Sarfaty *UPJIL* 83.
[313] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 1-5.
[314] Agrawal, Gans and *Goldfarb Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[315] Sarfaty *UPJIL* 83.
[316] Sarfaty *UPJIL* 88.
[317] Sarfaty *UPJIL* 88.
[318] Sarfaty *UPJIL* 88.
[319] Manyika *et al Big data: The next frontier for innovation, competition, and productivity* 2.

health system could massively improve its efficiency and also improve the quality of health care provided to the people.[320]

The study conducted by McKinsey Global Institute and McKinsey's Business Technology Office highlighted the fact that for big data to be able to help advance health care, it must be used effectively and efficiently.[321] The study does not define what is meant by the effective and efficient use of big data, however, it can be inferred that it means that big data should be used in such a way that it does not infringe on people's human rights.

Therefore, in the context of the study mentioned above, the effective and efficient use of big data systems would mean that they do not infringe on two fundamental human rights.[322] The first one is the right to equality, which makes it clear that no human being should be unfairly discriminated against and that all people are born equal.[323] The second one is the right to privacy, which makes it clear that no human being should have their privacy breached without warrant.[324]

As rightly pointed out in the study conducted by McKinsey Global Institute and McKinsey's Business Technology Office, the effective and efficient use of big data systems can yield enormously positive results.[325] Often, when it comes to human rights, the focus is mainly on the promotion and protection thereof.[326] Perhaps, when it comes to upholding human rights, the primary focus should be in the prevention of abuse and infringement of human rights and secondly, on the promotion and protection thereof.[327]

There may be a small difference from a technical standpoint between preventing human rights violations and protecting them. Additionally, the case may be made

[320] Manyika *et al Big data: The next frontier for innovation, competition, and productivity* 2.
[321] Manyika *et al Big data: The next frontier for innovation, competition, and productivity* 2.
[322] Manyika *et al Big data: The next frontier for innovation, competition, and productivity* 52.
[323] A 7 Universal Declaration of Human Rights (1948).
[324] A 12 Universal Declaration of Human Rights (1948).
[325] Manyika *et al Big data: The next frontier for innovation, competition, and productivity* 2.
[326] Sarfaty *UPJIL* 76; See Ramcharan *Preventive Human Rights Strategies*; Sicilianos *The Prevention of Human Rights Violations (International Studies in Human Rights)*.
[327] Sarfaty *UPJIL* 76.

that protection of human rights leads to the prevention of their violation.[328] However, Sarfaty makes the case that prevention should be the main objective.[329]

Where AI systems and big data can help in this regard is through the ability of AI systems to use and sort through large volumes of data to arrive at accurate predictions regarding particular issues.[330] It is this predictive ability, together with the ability to assimilate information from a wide range of sources, including but not limited to, sensors and social media applications that could help in detecting patterns that could lead to human rights violations.[331] This could be a major breakthrough in the fight to protect and uphold human rights.

Sarfaty points out the following regarding potential infringement, mostly on the right to privacy,[332] that AI and big data systems might have on human rights:

> While some may argue that such violations are a necessary trade-off in exchange for the prevention of gross human rights abuses, such as slavery or human trafficking, a balance must be struck.[333]

There cannot be a trade-off because that would suggest that some human rights are more important than others, which might undermine the credibility of the UDHR. Part of the solution to this issue lies in educating people about how the processing and use of their data could help prevent human rights violations.[334] Since regulations like the GDPR regulate and protect the use and processing of people's personal digital data[335], people should be given the option as to whether or not they want to have their data collected and assimilated to the end of preventing human rights violations.

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[328] Sarfaty *UPJIL* 76.
[329] Sarfaty *UPJIL* 76.
[330] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 5-1.
[331] Sarfaty *UPJIL* 77.
[332] A 12 of the Declaration of Human Rights (1948).
[333] Sarfaty *UPJIL* 89.
[334] Manyika *et al Big data: The next frontier for innovation, competition, and productivity* 13.
[335] A 1 of the General Data Protection Regulation (2016).

3.3 The inherent conflict between AI and human rights

From a theoretical point of view, AI systems that can help make life more efficient by having the ability sort through vast amounts of data at lightning speed[336] seems to be a great concept.[337] Additionally, having an impartial system take over a task that was previously performed by humans (who by virtue of being human are susceptible to biases and at times irrational behaviour) also sounds like a great idea.[338] The problem is that these highly sophisticated AI systems are created by human beings who have preconceived notions that are likely to be amplified in the AI systems they have created; hence, this will have an adverse impact on the human rights of a lot of people since AI systems are usually built to be used at scale.[339]

On the other hand, AI systems have proven themselves to be effective tools that can not only help advance humanity in general but can also help contribute to a more efficient and effective judicial system. For instance, as discussed above, they have proven to be very effective at bail determination, more so in fact than human judges who have many years of legal experience.[340] They have also proven that they can help significantly decrease pathologist error rate when it comes to identifying and diagnosing metastatic breast cancer.[341] AI systems are currently also being used to detect whether an individual has COVID-19 as a result of the sound of their cough.[342]

One of the first inherent conflicts that AI systems have with human rights is the fact that because AI systems are created by human beings who have their own subjective views about the world and how things should be, their subjective views

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[336] O'Neil *Weapons of math destruction: How big data increases inequality and threatens democracy* 1-14.
[337] Jain and Jain 2019 *NULJ* 21.
[338] O'Neil *Weapons of math destruction: How big data increases inequality and threatens democracy* 1-14.
[339] O'Neil *Weapons of math destruction: How big data increases inequality and threatens democracy* 1-14.
[340] Kleinberg *et al* 2018 *QJE* 240.
[341] Wang *et al* 2016.
[342] Scudellari 2020 https://spectrum.ieee.org/the-human-os/artificial-intelligence/medical-ai/ai-recognizes-covid-19-in-the-sound-of-a-cough.

might find their way into society.[343] These subjective views might contain personal prejudices that the developers of the AI programs have, which can result in people being unfairly discriminated against.[344] Additionally, because AI systems need large quantiles of data in order to have a sufficient knowledge base from which they can make predictions, this data (as a result of limited availability of sufficient data and the manner it was collected and evaluated) may contain bits of information that represent (negatively) one race or gender.[345]

Once this data is fed into the AI systems, it could result in people from a specific group being unfairly marginalised and discriminated against.[346] This does not mean that AI systems need to be boycotted and stopped, but rather that regulatory and legal frameworks should be in place to ensure that this does not happen.[347]

Another conflict between human rights and AI became evident when the United Nations Special Rapporteur investigated the results of using big data-based decisions when it comes to issues that relate to social security in the United Kingdom.[348] The investigation yielded a number of findings, chief among them being that the human rights of poor people are most at risk when it comes to using AI-fuelled automation in issues relating to how the government performs its functions.[349]

The same investigation conducted by UN Special Rapporteur found that transparency is also an issue when it comes to the application of AI systems by the United Kingdom government.[350] In this investigation, Alston is of the view that opacity surrounding the function and purpose of AI systems implemented by the

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[343] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 12.
[344] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 12.
[345] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 12.
[346] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 12.
[347] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[348] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 12.
[349] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[350] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.

government are a major source of complaints and misunderstanding that arises in society when it comes to the understanding of AI systems.[351] In their defence, government organisations claim that the opacity around the functions of AI systems is in the protection of the copyright and the intellectual property of the private companies that are contracted to program and create these systems.[352]

The right to privacy is another human right that is often infringed upon by AI systems and big data.[353] The UDHR states the following with regard to privacy:

> No one shall be subjected to arbitrary interference with his privacy, family, home or correspondence, nor to attacks upon his honour and reputation. Everyone has the right to the protection of the law against such interference or attacks.[354]

The threat to people's privacy is probably the most controversial part of the discussion of AI and human rights. As a result of seamless integration and communication between the applications that most people use daily, information (some of which can be confidential) is shared easily between these platforms.[355] The efficiency of collecting, processing and interpreting people's information allows the owners of the AI systems privileged insights into people's lives.[356] These insights are usually gathered without the consent of the users of the platforms, making this a direct infringement on people's right to privacy.[357]

It goes without saying that the use of AI systems combined with the enabling power of big data can help improve human lives incredibly.[358] However, at the same time they pose a huge risk, if not managed correctly, to infringe greatly on the

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[351] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[352] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[353] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 14.
[354] A 12 of the Universal Declaration of Human Rights (1948).
[355] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 14.
[356] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 14.
[357] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 14.
[358] *Report of the Office of the UN High Commissioner for Human Rights on The Right to Privacy in the Digital Age* GA res 39/29, UN Doc A/HRC/39/29 (2018) par 1.

fundamental and most important human rights.[359] This prompted the UN and the European Union to adopt a series of resolutions that are geared towards the protection of people's data privacy. The most notable of these resolutions is the GDPR, which as noted above, is a body of rules that seeks to protect the unwarranted collection and processing of people's personal digital data.[360]

3.4 Reconciling AI and human rights

It is accurate, considering the discussion above, to conclude that at this stage, the application of AI systems in society, does more harm (on average) to people's human rights than it does to protect and uphold them.[361] This, of course, cannot be allowed to go on any further since AI systems and applications will continue to increasingly find their way into people's daily lives.[362] AI systems and human rights have to be reconciled, particularly if AI systems are going to be applied in adjudication.

The UN's General Assembly and the EU have done outstanding work in developing a range of resolutions and regulatory frameworks to try and regulate the impact of AI systems on the human rights of people. The most prominent of the resolutions made by both the UN and EU, as mentioned above, is the GDPR and it seeks to ensure the following objectives:

> 1. This Regulation lays down rules relating to the protection of natural persons with regard to the processing of personal data and rules relating to the free movement of personal data;
>
> 2. This Regulation protects fundamental rights and freedoms of natural persons and in particular their right to the protection of personal data;
>
> 3. The free movement of personal data within the Union shall be neither restricted nor prohibited for reasons; and
>
> 4. Connected with the protection of natural persons with regard to the processing of personal data.[363]

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[359] *Report of the Office of the UN High Commissioner for Human Rights on The Right to Privacy in the Digital Age* GA res 39/29, UN Doc A/HRC/39/29 (2018) par 1.
[360] A 1 of the General Data Protection Regulation (2016).
[361] Raso *et al Artificial Intelligence & Human Rights: Opportunities & Risks* 4.
[362] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[363] A 1 of the *General Data Protection Regulation* (2016).

The GDPR is not necessarily focused on regulating AI but rather the use and manner in which people's personal digital data can be and should be used.[364] However, since AI systems require data to function indirectly, by regulating how people's data is used, the GDPR does indeed regulate AI systems.[365] Therefore, the GDPR lays a foundation upon which business and organisations can deploy AI systems for use by the public.

As discussed above, one of the main issues of contention between human rights and AI is the fact that the use and operation of AI systems are often opaque to lay persons, often as a result of trying to protect the intellectual property of the owners of the AI systems.[366] The main reasons given for the lack of transparency regarding the workings of AI systems is the fact that by revealing information about the manner in which they function, the intellectual property rights of the owners of the AI systems might be threatened.[367] This is not a good enough reason for the lack of transparency regarding AI systems.

There needs to more transparency on the side of both business and government regarding the objectives of AI systems and the manner in which they carry out their objectives.[368] Such transparency will not only go a long way towards helping ease people's anxiety and lack of understanding regarding AI systems,[369] but it will also help promote AI literacy.[370] Organisations should, therefore, focus on educating the users of AI systems (that are powered by big data) about the benefits as well as the potential dangers that come with using such technology.[371]

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[364] A 4 of the *General Data Protection Regulation* (2016).
[365] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 43-51.
[366] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[367] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[368] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[369] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[370] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[371] Manyika *et al Big data: the next frontier for innovation, competition and productivity* 13.

Businesses and privately owned organisations are usually at the cutting edge when it comes to deploying as well as implementing AI systems; thus, in the quest to reconcile AI and human rights, the role that private enterprises play must be examined and evaluated.[372] Therefore, when trying to examine the manner in which businesses and other organisations implement AI systems[373], it is important to consult the United Nations Guiding Principles on Business and Human Rights.[374]

The UN Guiding Principles on Business and Human Rights states the following with regards to the regulation of business activities in a manner that guards against the abuse of human rights:

> States must protect against human rights abuse within their territory and/or jurisdiction by third parties, including business enterprises. This requires taking appropriate steps to prevent, investigate, punish and redress such abuse through effective policies, legislation, regulations and adjudication.[375]

According to the above section, states must make sure that when businesses implement AI systems, they do so in a manner that protects and upholds human rights. That means that states should have national legislation in place that regulates the use, operation and impact of AI systems on their citizens.[376] This legislative process should not only be a compilation of written texts that prescribe how AI should be applied and managed by companies, but it should be a comprehensive tool that can be used to evaluate how the application of AI systems affect people's human rights.[377]

In fact, AI systems should not be used in society if there is no regulatory framework in place that can impartially assess and evaluate the impact of AI on people's human rights.[378] According to the Council of Europe, governments, and one can also add businesses to the list, must put in place what they call human rights impact assessments (hereinafter referred to as HRIAs) that exist to evaluate the impact of

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[372] Raso *et al Artificial Intelligence & Human Rights: Opportunities & Risks* 4.
[373] Raso *et al Artificial Intelligence & Human Rights: Opportunities & Risks* 4.
[374] *United Nations Guiding Principles on Business and Human Rights* (2011).
[375] *United Nations Guiding Principles on Business and Human Rights* (2011).
[376] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[377] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[378] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.

AI systems on people's human rights.[379] This will ensure that the use and application of AI systems in society is done in a manner that is cognisant of the importance of protecting and upholding human rights.

Another way in which AI systems and human rights can be reconciled is through the promotion of AI literacy among the general public.[380] The first step in promoting AI literacy involves first tackling the issue of transparency and opacity. The operations and objectives of AI systems must be announced and made public by the owners (that being the government or private enterprises).[381] This disclosure should be made even though it might threaten the monetary interest (in the case of private businesses) of the owners of the intellectual property behind AI systems.

The second step in making sure that people are AI literate is making sure that there are government as well as privately owned organisations that aim to help people understand how AI can impact their human rights.[382] States should also promote AI literacy in schools to ensure that people start getting educated at a young age about the use and impact of AI on their human rights.[383] By promoting AI literacy, governments and private enterprises will not only be safeguarding human rights against abuse, but also, and perhaps equally as important, they will be ensuring that people are properly equipped to use this new technology, allowing them the ability to get more from it as a result.

3.5 AI advancing Human Rights

After analysing the discussion above, it would seem as if AI systems are powerful tools that have the potential to advance (if used correctly) humanity in a number of fields. Up until 2020, the application of AI systems has unfortunately done more to

[379] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[380] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[381] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[382] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[383] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.

harm human rights than they have done to uphold and protect them.[384] This, of course, can and should change. Alongside the realisation that AI systems are powerful tools that can help advance human life in general, what is also apparent is that once AI systems stop their infringement of human rights, they will also become powerful tools to help protect and advance human rights. This is proving to be true, as AI systems are being applied and tested in the European Court of Human Rights (hereinafter referred to as the ECtHR), which is the custodian of human rights in Europe.[385]

3.5.1 AI in the European Court of Human Rights

AI systems have the potential to be used successfully towards the promotion and protection of human rights. A glimpse of this potential was illustrated in the use of AI algorithms in the ECtHR to make predictions with regards to the court's decision.[386] As a result, in the latest advances of technologies such as NLP and machine learning, a group of experts have been able to develop an AI system that can, with remarkable accuracy predict the decisions made by the ECtHR.[387]

The ECtHR deals with issues brought forth by either states or natural persons relating to the violation of human rights.[388] The ECtHR's power derives from the European Convention on Human Rights (hereinafter referred to as the ECHR).[389] The court is tasked with upholding and presiding over matters that relate to the articles contained in the ECHR.[390] Matters can be brought before the court by individual and states.[391]

Using their AI system, Aletras *et al* have proved the following:

> (1) the textual content, and (2) the different parts of a case are important factors that influence the outcome reached by the Court.[392]

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[384] Raso *et al Artificial Intelligence & Human Rights: Opportunities & Risks* 4.
[385] Aletras *et al PEERJ* 1.
[386] Aletras *et al PEERJ* 1.
[387] Aletras *et al PEERJ* 1.
[388] Aletras *et al PEERJ* 3; also see European Court of Human Rights *The ECHR in 50 Questions* 7.
[389] A 19 of the *European Convention on Human Rights* (1953).
[390] A 32 of the *European Convention on Human Rights* (1953).
[391] Aletras *et al PEERJ* 2.
[392] Aletras *et al PEERJ* 2.

By employing the above fundamentals, the AI system that was used is able to predict the ECtHR's decisions with a 79% accuracy rate.[393] The results of their experiment have proved that the facts of the case are the single most important aspect that allows for their AI system's accuracy.[394]

Medvedeva, Vols and Wieling conducted a similar study, where they took data from the ECtHR and created an AI algorithm, and just as in the experiment discussed above, they were able to predict the court's decision with remarkable accuracy.[395] In their study, they were able to predict the decisions of the ECtHR with an accuracy rate of 75%.[396] It is clear from these two experiments that AI systems can be used in such a way that they do not infringe upon human rights; in fact, these experiments have proved that AI systems can be used in such a way that they can help promote human rights.

3.6 Conclusion

This section discussed the relationship between AI and human rights. It also assessed and evaluated the current impact that AI systems have had, as of 2020, on human rights protection and upliftment. Upon evaluation of the above discussion, it becomes apparent that to date, AI systems have had a negative impact on human right's protection and upliftment. The human rights that are affected the most by AI systems are the right to equality and the right to privacy. What also becomes apparent, after analysing the above discussion, is the fact that AI systems can be used to protect human rights, and that human rights and AI can be reconciled. AI systems can be used in such a way that the infringement on human rights can be avoided. Furthermore, AI systems can be sued to predict judicial outcomes in the ECtHR. This shows that AI systems can have a positive relationship with human rights, but for this to happen, organisations that deploy AI systems in public need to do so while taking full cognisance of people's human rights.

[393] Aletras *et al PEERJ* 2.
[394] Aletras *et al PEERJ* 2.
[395] Medvedeva, Vols and Wieling *AIL* 239.
[396] Medvedeva, Vols and Wieling *AIL* 263.

4 Applying AI systems in adjudication in South Africa

4.1 AI systems in adjudication

The South African government has acknowledged that it must prepare for the fourth industrial revolution.[397] To ensure that the country is in a position to reap the full benefit of AI, NLP and machine learning, the government has established a Presidential Commission that is tasked with helping government develop a strategy for harnessing the next wave of technological advancements;[398] which is going to impact almost every industry.[399] The law is certainly one of those industries since AI technology has already started being implemented in various aspects of the profession.[400] The goal of this research is to determine whether AI systems can be used in adjudication for the specific purpose of improving both the process and the outcome.

It should be stated from the outset that the purpose of using AI systems in the adjudicative process is toward the end of helping improve the decisions that judges make regarding the outcome of legal matters.[401] What also deserves mentioning at this stage, is the fact that the use of AI systems in the adjudicative process ought to be used as auxiliaries to judges and presiding officers, and their use should not spark fear of machines taking over legal processes and the jobs of legal practitioners.[402] The opacity and lack of transparency surrounding the functions and existence of AI systems are perhaps the leading causes of the negative misconceptions that people have about AI systems.[403]

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[397] Brookings 2020 https://www.brookings.edu/blog/africa-in-focus/2020/01/10/a-national-strategy-for-harnessing-the-fourth-industrial-revolution-the-case-of-south-africa/.

[398] Brookings 2020 https://www.brookings.edu/blog/africa-in-focus/2020/01/10/a-national-strategy-for-harnessing-the-fourth-industrial-revolution-the-case-of-south-africa/.

[399] Stone *et al* 2016 *OHYSAI* 5; and Brookings 2020 https://www.brookings.edu/blog/africa-in-focus/2020/01/10/a-national-strategy-for-harnessing-the-fourth-industrial-revolution-the-case-of-south-africa/.

[400] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/.

[401] Kleinberg *et al* 2018 *QJE* 240.

[402] See Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 53-69 where the authors discuss that the combination of both machine intelligence and human expertise improves the overall accuracy of prediction. This, of course, has beneficial outcomes in any field where such results can be obtained, including the law.

[403] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.

Government should, therefore, make it a priority to educate people and be transparent about the existence and the manner in which AI systems operate in the adjudicative process.[404] By so doing, they will have gone a long way towards the process of increasing people's literacy with regards to AI systems and they will have also helped reduce the misconceptions that people have about AI systems.[405]

In 2001, Sunstein wrote a seminal article in which he considered, among other things, the issues of whether computer programs can engage in legal reasoning.[406] In his article he claims that the only thing that computer programs can do, as far as legal reasoning is concerned, is to perform advanced search results of cases that are relevant at a particular time.[407] It has been nineteen years since Sunstein's article.[408] Therefore, his hypothesis might have been correct nineteen years ago, but it is no longer the case today.

Today, because of advances in machine learning and NLP, AI algorithms are in existence, that can predict the decisions courts will make with remarkable accuracy.[409] Additionally, it has been proven that AI algorithms can help judges in court make better decisions[410] and, therefore, as a result, improve the overall functioning of the courts. However, widespread adoption of AI algorithms in adjudication should not suddenly happen overnight since they have proved themselves as possible useful tools in the adjudicative process; there needs to be a framework in place that government has put together towards the goal of integrating AI systems in the adjudicative process in South Africa (more on this later).

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[404] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.

[405] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E; see also Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64 that provides guidelines on how member states to the Council of Europe should educate their citizens on AI systems.

[406] Sunstein 2001 *UCLR* 34.

[407] Sunstein 2001 *UCLR* 31 additionally points out that the capability of computer programs to sort through and suggest relevant cases is the only utility computer program can bring to the process of legal reasoning, much like LexisNexis and Westlaw.

[408] This paper was written in 2020.

[409] Aletras *et al PEERJ* 1.

[410] Kleinberg *et al* 2018 *QJE* 240.

The use of AI algorithms in the law is no longer something to be hypothesised about, but rather something that can already be used to predict, using machine learning and simultaneously having access to large volumes of data, decisions that judges will make.[411] AI systems, as mentioned above, have proven that they can improve judicial decision making. Therefore, their application in actual adjudication and other court processes (with time) should move past mere consideration and towards (gradual) implementation. The discussion should move towards contemplation of exactly how AI systems will be used in adjudication and how they can be used to ensure the best possible outcome for all parties involved in court issues.

If it is true that AI algorithms can improve judicial decisions, then the consideration of their application in adjudication is an issue of paramount importance in South Africa. The *Constitution* states the following:

> Everyone has the right to have any dispute that can be resolved by the application of law decided in a fair public hearing before a court or, where appropriate, another independent and impartial tribunal or forum.[412]

Therefore, after evaluating the information above, it is possible to conclude that since AI algorithms have the potential of improving the decisions judges make during legal matters, their application in adjudication as used by courts in South Africa will promote and improve access to justice.[413]

The *Constitution* also states the following:

> Organs of state, through legislative and other measures, must assist and protect the courts to ensure the independence, impartiality, dignity, accessibility and effectiveness of the courts.[414]

Upon evaluation of the above section, it becomes clear that after establishing the fact that AI systems can help improve adjudication, it is the duty of the state to

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[411] Katz, Bommarito and Blackman 2017 *PO* 1; also see Anon 1848 *LMQRJ* 90 where the author hypotheses about the possibility of AI in the law. Experiments such as Katz, Bommarito and Blackman 2017 *PO* 1 show that it is no longer necessary to hypothesize about that which is already, even though not completely and perfectly, existing.

[412] Section 34 of the *Constitution of the Republic of South Africa*, 1996.

[413] Section 34 of the *Constitution of the Republic of South Africa*, 1996; also see Nyenti 2013 *DEJURE* 903 where the author explains how the concept of access to justice has evolved and encompasses more than just access to courts. He goes on to mention that access to justice also includes access to an efficient legal system.

[414] Section 165 (4) of the *Constitution of the Republic of South Africa*, 1996.

figure out the means of how this technology can be used to improve the effectiveness of South African courts. Perhaps alongside discussing how AI systems can be implemented in adjudication as used by courts in South Africa, this research could spark the need for the state to start launching investigations, just as many other nations are doing around the world, as to how to implement AI, particularly, in adjudication.[415]

4.1.1 AI in the Supreme Court of the United States

The Supreme Court is the highest court in the United States of America.[416] This court hears three types of cases;[417] the first being matters that involve one state against another (these types of cases are extremely rare);[418] cases that involve ambassadors, all types of ministers and consuls;[419] then finally (and the most numerous), cases that involve review requests of court decisions made at federal or district level.[420]

Katz, Bommarito and Blackman created an AI algorithm with the specific aim of trying to detect whether it can accurately predict the decisions of Supreme Court judges.[421] As discussed above, the effectiveness (i.e., the accuracy of the predictions) of AI depends in large part on the quantity and the quality of the data fed into the system. In the case of the AI algorithm dealing with the Supreme Court, it had large quantities of data that were fed into it, that were of a very high quality.[422] The AI system was fed data in the form of court cases dating back to the 1800s.[423]

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[415] The Supreme Court Historical Society date unknown https://supremecourthistory.org/htcw_casesthecourthears.html.
[416] A 3 of the Constitution of the United States of America (1789).
[417] The Supreme Court Historical Society date unknown https://supremecourthistory.org/htcw_casesthecourthears.html.
[418] The Supreme Court Historical Society date unknown https://supremecourthistory.org/htcw_casesthecourthears.html.
[419] The Supreme Court Historical Society date unknown https://supremecourthistory.org/htcw_casesthecourthears.html.
[420] The Supreme Court Historical Society date unknown https://supremecourthistory.org/htcw_casesthecourthears.html.
[421] Katz, Bommarito and Blackman 2017 *PO* 1.
[422] Katz, Bommarito and Blackman 2017 *PO* 2; see also Spaeth *et al* 2020 http://Supremecourtdatabase.org.
[423] Katz, Bommarito and Blackman 2017 *PO* 2; see also Spaeth *et al* 2020 http://Supremecourtdatabase.org.

The combination of quantity and quality information, together with a well-designed AI algorithm, allowed Katz, Bommarito and Blackman to be able to predict the Supreme Court's decisions accurately, more than two-thirds of the time.[424] Even though the AI algorithm predicts accurately more than two-thirds of the time, it is still incorrect about one-third of the time. Despite this shortcoming, AI algorithms have proved that they can, by helping provide accurate predictions, be effective tools in the adjudicative process.

Klienberg *et al* proved in their study that AI systems can be useful tools that can assist judges to make better decisions by helping them weigh (correctly) all factors and data relevant to the case.[425] Beyond that they also proved that judges have shortfalls that, up until the creation of sophisticated AI systems, have not been able to be resolved.[426] Klienberg *et al* point out the following:

> First, judges are releasing many defendants the algorithm ex ante identifies as very high risk. For example, the riskiest 1% of defendants, when released, fail to appear for court at a 56.3% rate and are rearrested at a 62.7% rate. Yet judges release 48.5% of them.[427]

The outcome of a bail hearing is a serious matter that could have far-reaching results on the lives of the applicants;[428] therefore, having judges that are prone, for whatever reason, to misprediction puts the applicants at a disadvantage.[429] In South Africa, as noted above, section 165 (4) of the Constitution clearly states that the state, through the use of various methods, improves the efficiency of the country's judicial system.[430] Therefore, since AI systems can help improve courts' decision making, and allow them to operate more effectively and efficiently, they should be incorporated into the judicial system.

The AI algorithm built by Katz, Bommarito and Blackman has what the authors refer to as out-of-sample applicability; the data that it needs in order to make the most

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[424] Katz, Bommarito and Blackman 2017 *PO* 8.
[425] Kleinberg *et al* 2018 *QJE* 240, AI systems can also be used to detect why judges make wrong decisions.
[426] Kleinberg *et al* 2018 *QJE* 240 points out just how many mistakes judges make when making bail determinations and what also becomes apparent at the same time is the fact that AI systems can indeed help judges avoid these mistakes.
[427] Kleinberg *et al* 2018 *QJE* 240.
[428] Kleinberg *et al* 2018 *QJE* 239.
[429] Kleinberg *et al* 2018 *QJE* 280.
[430] The *Constitution of the Republic of South Africa*, 1996.

accurate predictions possible, is information that is already publicly available.[431] This means that their algorithm makes relatively accurate predictions in real-life scenarios on the basis of information available to all parties and, therefore, does not need to have knowledge, even in small amounts, about the outcome of the matter to make its prediction.[432] Of course, this is a major breakthrough.

As noted above, the state must make the existence of such systems and the manner in which such systems operate clear to the public.[433] Procedures also need to be in place that easily allow the public to query the reasoning or logic of the prediction machines and this process should be conducted fairly and openly.[434] When it comes to being used in legal processes, AI systems must to a certain degree, be completely intelligible.[435] The House of Lords, in the United Kingdom, appointed a committee to investigate certain aspects of AI and one of the issues the committee picked up is one of transparency.[436] The committee found that by making AI systems more transparent, people would be in a position to better understand them and, therefore, as a result, not be confused by their predictions.[437]

The AI system developed by Katz, Bommarito and Blackman was a giant leap towards the application of AI in the law.[438] The success of their algorithm came from using three core principles,[439] which are generality, consistency and out-of-sample applicability,[440] all of which are discussed below.

The first principle was what they refer to as *generality*, which refers to the AI system's ability to handle changes that happen in the court as far as personnel are

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[431] Katz, Bommarito and Blackman 2017 *PO* 3 and 4.
[432] Katz, Bommarito and Blackman 2017 *PO* 3 and 4.
[433] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E, in his report Professor Alston points out that through the use of automation systems to improve the operations, the United Kingdom government made a mistake by not disclosing the existence of AI systems as well as the way in which they operate specifically because the government wants to protect the intellectual property interests of the firms that built the systems. This cannot be allowed to happen when AI systems are used in adjudication.
[434] Doshi-Velez *et al Accountability of AI Under the Law: The Role of Explanation* 3 and 4.
[435] House of Lords *AI in the UK: ready, willing and able?* 38.
[436] House of Lords *AI in the UK: ready, willing and able?* 38.
[437] House of Lords *AI in the UK: ready, willing and able?* 38.
[438] Katz, Bommarito and Blackman 2017 *PO* 4.
[439] Katz, Bommarito and Blackman 2017 *PO* 2.
[440] Katz, Bommarito and Blackman 2017 *PO* 2.

concerned, and that changes in the court's personnel should not affect the algorithm's accuracy and functionality.[441] The second principle is *consistency* and it involves the AI system being able to provide consistency when it comes to its predictions over time and is, therefore, in this regard similar to the generality principle.[442] The third and final principle is what the authors refer to as *out-of-sample applicability*, which is for practical purposes, the most important of all the principles. This principle is about the algorithm being used to make, on average, reasonably accurate predictions in real-life situations.[443]

Through their third principle, out-of-sample applicability, they make use of information and data that is publicly available.[444] Their algorithm does not need any insider information in order to make accurate predictions about the Supreme Court's decisions. This goes a long way towards helping the algorithm be more transparent.[445] The author's algorithm has, as a result of these principles, a 70.2% prediction accuracy rate of the Supreme Court's decisions, using only training data that comprises data from the Supreme Court dating back to the early 1800s.[446]

The role that the Supreme Court plays in society in the United States of America is one of great importance, much like the role the Constitutional Court plays in South Africa; therefore, the decisions the court makes have widespread consequences.[447] The fact that an AI system can be built that can predict, with an accuracy rate of two-thirds, the decisions of such a court shows how advanced they are and that they are ready to be used in legal processes.

When applying such an AI in adjudication in South Africa, judges can use it as a cross-checking tool. That would mean, before a judge is about to rule on a certain issue and after analysing the fact presented by both parties, the judge should then look at the AI system's prediction and compare it with their own decision. This will

[441] Katz, Bommarito and Blackman 2017 *PO* 3.
[442] Katz, Bommarito and Blackman 2017 *PO* 3.
[443] Katz, Bommarito and Blackman 2017 *PO* 4.
[444] Katz, Bommarito and Blackman 2017 *PO* 4.
[445] Katz, Bommarito and Blackman 2017 *PO* 4.
[446] Katz, Bommarito and Blackman 2017 *PO* 8.
[447] Sim, Routledge and Smith *The Utility of Text: The Case of Amicus Briefs and the Supreme Court* 1.

allow the judge to arrive at a more accurate conclusion since AI systems have proven they are able to help improve on the decisions that judges make.[448]

4.1.2 AI in the European Court of Human Rights

AI algorithms have not only been used to predict judge's decisions in the Supreme Court in the United States, but they have also been used to make similar predictions in Europe.[449] A similar experiment to the one conducted by Katz, Bommarito and Blackman was conducted in the ECtHR by Aletras *et al.* This experiment was centered around creating an algorithm that was focused on detecting sequences and patterns that determine and influence the judge's decisions in the ECtHR.[450]

As briefly mentioned above, the ECtHR is the court that is established in terms of the ECHR.[451] Its duty is to ensure that the articles in the Convention are adhered to by states.[452] Just as the Supreme Court in the United States plays an important societal role, so does the ECtHR in the European community. Therefore, the fact that AI systems have been tested for (and they have passed the test – on the basis of the results they yield in both instances) use and effectiveness in the above-mentioned courts, emphasises the fact that AI systems have reached a point of maturity. Since its inception in 1959, the ECtHR has heard more than 882 038 cases.[453] This court can hear matters brought forth by individuals, companies and states themselves.[454]

The algorithm created by Aletras *et al* has an accuracy rate of 79 percent.[455] This is quite an impressive feat considering that Katz, Bommarito and Blackman's algorithm had an accuracy rate of 70.2% but it had significantly more training data from which to work. The algorithm has a relatively high prediction accuracy rate because it takes advantage of recent advances in NLP.[456] Unlike the United States Supreme Court,

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[448] Kleinberg et al 2018 *QJE* 241.
[449] Aletras *et al* 2016 *PEERJ* 1.
[450] Aletras *et al* 2016 *PEERJ* 1, point out that when trying to predict the ECtHR's decision the most important variable is the formal facts that exist in text form.
[451] A 19 of The European Convention of Human Rights (1953).
[452] A 19 of The European Convention of Human Rights (1953).
[453] European Court of Human Rights *Overview 1959-2019* 5.
[454] A 34 of The European Convention of Human Rights (1953).
[455] Aletras *et al* 2016 *PEERJ* 2.
[456] Aletras *et al* 2016 *PEERJ* 2.

mentioned above, the ECtHR has only been in existence since 1959.[457] This means that the algorithm created by Aletras *et al* did not require as much training data as the one created by Katz, Bommarito and Blackman – even though it was slightly more accurate.[458]

The AI system created by Aletras *et al* is slightly different, although it is aimed at performing the same function than the one created by Katz, Bommarito and Blackman. The one created by the latter focused on getting large volumes of quality training data that were in the form of historical court cases that the Supreme Court had heard dating back more than 200 years.[459] The AI system subsequently used that data to make relatively accurate predictions about the future decisions of the court, which can be used successfully in real-life court situations.[460]

The algorithm created by Aletras *et al* takes advantage of technological advances in NLP and machine learning to produce somewhat accurate predictions on what decisions the court will make regarding a particular matter.[461] They reported the following results after their experiment:

> (1) the textual content, and (2) the different parts of a case are important factors that influence the outcome reached by the Court.[462]

They are adamant that their findings corroborate the above results.[463] As explained above, NLP gives AI systems the ability to analyse written text and be able to understand it.[464] Therefore, the AI system created by Aletras *et al* does not need to rely on a vast training data set, as the one created by Katz, Bommarito and

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[457] European Court of Human Rights *Overview 1959-2019* 1; also see A 19 of the *European Convention on Human Rights* (1953).
[458] Katz, Bommarito and Blackman 2017 *PO* 2, the AI algorithm in this experiment had been fed training data that dated back to the 1800s. In the case of the Aletras *et al* experiment the availability of extensive training data like that is not possible since the ECtHR has only been in existence since 1959.
[459] Katz, Bommarito and Blackman 2017 *PO* 2;
also see Spaeth *et al* 2020 http://Supremecourtdatabase.org.
[460] Katz, Bommarito and Blackman 2017 *PO* 4.
[461] Aletras *et al* 2016 *PEERJ* 1 and 2.
[462] Aletras *et al* 2016 *PEERJ* 2.
[463] Aletras *et al* 2016 *PEERJ* 2.
[464] López Yse 2019
https://towardsdatascience.com/your-guide-to-natural-language-processing-nlp-48ea2511f6e1.

Blackman does, since it can use NLP and machine learning to analyse and draw inference from any legal material in front of it.[465]

The AI system created by Aletras *et al* is quite different to the system created by Katz, Bommarito and Blackman, however, they are all aimed at performing the same function, which is the accurate prediction of courts' decisions. Both AI systems provide fairly accurate predictions about future court decisions. Both have different lessons that can be used, from which to learn. The Aletras *et al* AI system has proved that NLP (combined with machine learning) can be used to analyse and draw relatively accurate predictions from legal text material.[466] Additionally, it has proved that when it comes to predicting court decisions using AI systems, the textual legal data and the facts of the case are two of the most important variables that determine the accuracy of the prediction.[467] The Katz, Bommarito and Blackman experiment has proved that an AI system that can predict somewhat accurately the court's decision and have real-life applicability.[468]

It is on the back of the above information that one can reasonably conclude that AI systems can indeed be used in the adjudicative process in South Africa. However, it should be made clear at this point that even though AI systems are being tested in courts, there is no court in the United States and in Europe (as of 2020) that uses AI systems to make rulings and judgements (with the exception of digital dispute resolution platforms).[469]

The use of AI systems in adjudication should be a phased process. Additionally, it should be mentioned that the goal of proposing the use of AI systems in South African adjudication is not towards the end of automating the entire adjudicative process and thereby eliminating human involvement. Rather, AI systems in adjudication should completely play a supportive role in that they help judges arrive

[465] Aletras *et al* 2016*PEERJ* 1 and 2.
[466] Aletras *et al* 2016 *PEERJ* 1 and 2.
[467] Aletras *et al* 2016 *PEERJ* 2.
[468] Katz, Bommarito and Blackman 2017 *PO* 3 and 4.
[469] Coglianese and Ben Dor 2020 *FSPL* 5; see also *The Japan Times* 2019 https://www.japantimes.co.jp/news/2019/12/07/asia-pacific/crime-legal-asia-pacific/ai-judges-verdicts-via-chat-app-brave-new-world-chinas-digital-courts/ where there is a discussion of the use of an AI court to resolve disputes. However, since China does not form part of the scope of this paper its legal system will not be used as an example.

at better decisions consistently.[470] Therefore, they should be auxiliary tools at the judges' disposal.

4.2 Ensuring transparency

Just because AI systems have proved, as illustrated above, that they can be effective and useful tools in court processes, especially in adjudication, does not mean they should be adopted quickly and without reservation. In fact, there should be reservations to using AI in adjudication. The main reservation that should be held against the use of AI systems in adjudication, even as an auxiliary to judges, is that AI systems are not yet transparent enough.[471]

One should be able to see the reasoning behind the AI systems' decisions, especially if they are to be used in adjudication.[472] Explanations as to the reason for the decision needs to be provided even if it affects the economic interests of the creators of the AI system.[473] It is foreseen that without the ability to be transparent, AI systems will not be able to be successfully implemented in adjudication in South Africa. Therefore, AI systems should not be used in adjudication without them being able to be completely transparent.[474]

In some situations, transparency can make all the difference,[475] particularly in adjudication and legal matters. One of the main reasons given by organisations about the lack of transparency regarding the function and at times even their existence is that AI systems constitute part of their intellectual property of the

[470] Kleinberg et al 2018 *QJE* 241, where the authors point out that AI systems can improve the judge's decision.
[471] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[472] Satell and Sutton 2019 https://hbr.org/2019/10/we-need-ai-that-is-explainable-auditable-and-transparent.
[473] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E, professor Alston explains how the lack of transparency on the part of the United Kingdom government about the existence and operation of AI systems is a result of the government trying to protect the economic interests of the firms that built the AI technology.
[474] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/.
[475] See O'Neil *Weapons of math destruction: How big data increases inequality and threatens democracy* 122, where she cites an example of an usher telling an individual that they cannot be seated within the first ten rows, upon hearing the news the individual might feel that this is unfair and discriminatory – and rightly so, but upon hearing that those rows are reserved for people who use wheelchairs, the individual might not think the usher is really unfair.

organisation and, therefore, deserve protection.[476] Since at their most fundamental level, AI systems are computer programs (that are considered intellectual property in South Africa), the ownership of such intellectual property in South Africa is protected in terms of the *Copyright Act.*[477] The *Copyright Act* provides exceptions in certain instances where the use of a work that enjoys copyright protection does not automatically result in there being an infringement on its copyright protection.[478] Therefore, companies and organisations in South Africa should not use the reason that the AI systems enjoy copyright protection as an excuse to not have transparent AI systems.

Additionally, since AI systems require data to be fed into them to operate, they are moulded by the data they are fed.[479] As discussed above, if the data is of a poor quality or even if the data is of good quality but the people programming the algorithm of the AI system have some underlying biases, the AI system, in its results and through its application, will reproduce them.[480] Therefore, by making sure that AI systems are transparent, it will ensure that such biases are brought to light and can be addressed, and subsequently eliminated.[481]

The data that has been fed into the AI system has to continually be updated and checked to ensure that when the systems interpret the data, it is not misinterpreted.[482] The programmers and developers of the AI system have to ensure that it is created in such a way that it can provide understandable explanations for

[476] O'Neil *Weapons of math destruction: How big data increases inequality and threatens democracy* 22; see also Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[477] Section 23 (2) (d) of the *Copyright Act* 98 of 1978.
[478] Section 12 (1) of the *Copyright Act* 98 of 1978.
[479] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/.
[480] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/.
[481] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/.
[482] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/.

the outcome it has chosen.[483] This will go a long way in proving that AI systems can be applicable in adjudication because people will not have to worry about them being opaque.

The transparency of AI systems should not only relate to the reasoning behind the AI system's decision making, but it should also include transparency when it comes to the data being used.[484] The government must ensure that this is applied through legislation and policy. An example of law that regulates the transparency of AI systems in court processes is in the State of Idaho, United States.[485]

This law enacted by the legislative authority in Idaho is directed at regulating pretrial risk assessment algorithms in criminal matters.[486] This law entitles accused suspects in a criminal trial where AI risk assessment tools have been used to request that all the predictions made by the algorithm be reviewed and reassessed.[487] The South African legislature needs to learn from this and start drafting legislation that will regulate AI transparency in court and other legal processes. The government already recognises its duty when it comes to the need to create a regulatory framework that will regulate the use of AI and machine learning, and other digital technology.[488] Although it is yet early days, the government must still publish an Act of Parliament regulating the use of AI systems.

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[483] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/.

[484] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/; also see A 5 of the General Data Protection Regulation (2018).

[485] Section 19-1910 of Title 19 Criminal Procedure 2019, and also see Coglianese and Ben Dor 2020 *FSPL* 10; also see Section 70 (2) of the *Protection of Personal Information Act* 4 of 2013, that points out when people's data is being collected and processed they must be made aware (with no charge to them) of the fact that the personal information is being processed and gathered and they must be given the option to opt out if they so choose.

[486] Section 19-1910 of Title 19 Criminal Procedure 2019.

[487] Section 19-1910 of Title 19 Criminal Procedure 2019.

[488] National Planning Commission *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution* 78.

4.2.1 Keeping AI systems accountable

As mentioned above, for AI systems to be fully effective tools in adjudication and any other legal process, they have to be transparent.[489] Transparency of AI systems will go a long way in ensuring that AI systems are held accountable. For example, if AI systems (after making a decision) expatiate on the reasoning behind their decision, it will allow parties the ability to evaluate the decision and either agree, or if not, be in a better position to contest it since the party would already know the *rationale* behind its decision.[490]

To ensure that AI systems are accountable, they have to be developed in line with a moral compass indicative of a future where technology is used to help advance humanity.[491] Another way to ensure accountability that is slightly more practical is through the use of explanations.[492] This is a method that involves unveiling information relating to a particular prediction made by the AI system, without making the inner working of the algorithm public.[493]

By making use of explanations, AI systems can be kept transparent while still protecting the intellectual property of the owners of the AI system.[494] Additionally, through the use of explanations, inaccuracies can be limited, trustworthiness can be increased and ultimately, accountability of AI systems will be upheld.[495] Explanations offer themselves as wonderful tools in the process of trying to ensure accountability as far as AI systems are concerned, and there is a growing need for such tools

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[489] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/, states that if these AI systems cannot be operated in a way that ensures total transparency then they are not worthy of use in judicial matters.

[490] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/.

[491] Setchi, Dehkordi and Khan 2020 *PCS* 3057; also see Doran, Schulz and Besold *What Does Explainable AI Really Mean? a New Conceptualization of Perspectives* 1.

[492] Doshi-Velez *et al Accountability of AI Under the Law: The Role of Explanation* 2.

[493] Doshi-Velez *et al Accountability of AI Under the Law: The Role of Explanation* 2.

[494] Doshi-Velez *et al Accountability of AI Under the Law: The Role of Explanation* 2.

[495] Doshi-Velez *et al Accountability of AI Under the Law: The Role of Explanation* 2.

because accountability tools and systems have not kept up with the rapid rate at which AI systems have been developed.[496]

Sometimes, even receiving information relating to the code of the algorithm might not be as useful as anticipated, as far as keeping AI systems accountable is concerned.[497] The reason is that the code does not include any information about the training data that was fed into the AI system nor what the exact data process was that ultimately led to the decision.[498] That is why it is important to use explanations, since they do not require access to the code of the algorithm (subsequently protecting the intellectual property rights of the owners of the AI system) but they are able to provide clarity on the decision-making process.[499]

After evaluating the above information, it becomes clear that the mere access to AI systems' root code will not necessarily play a helpful role in ensuring transparency of AI and subsequently allow for them to be held accountable.[500] Therefore, the best alternative in the quest to keep and ensure accountability of AI systems in the adjudicative process, and other similar legal processes, is through the use of explanations.[501] This is where explanations will prove to be very useful. They make it possible to pinpoint specific factors that are decisive of the final outcome and allow for the ability to scrutinise those factors, and ultimately the decision made; as a result, this helps to ensure that AI systems remain useful and accountable.[502]

The use of explanations used for keeping AI systems accountable will help strike a perfect balance between the interests of the designers and owners of the AI systems, and the people who will be affected by AI system's decisions.[503] This will happen since explanations do not require the revelation of information relating to

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[496] Kroll *et al* 2017 *UPLA* 633.
[497] House of Lords *AI in the UK: ready, willing and able?* 38, the reason for this fact is simple. Since access to the code and inner functioning of AI systems will only reveal the actual source code and will, therefore, not reveal why it made a certain prediction or even what data it used in the decision-making process; see also Doshi-Velez *et al Accountability of AI Under the Law: The Role of Explanation* 4.
[498] House of Lords *AI in the UK: ready, willing and able?* 38.
[499] Doshi-Velez *et al Accountability of AI Under the Law: The Role of Explanation* 2.
[500] Doshi-Velez *et al Accountability of AI Under the Law 4: The Role of Explanation* 4; and House of Lords *AI in the UK: ready, willing and able?* 38; also see Kroll *et al* 2017 *UPLA* 633.
[501] Doshi-Velez *et al Accountability of AI Under the Law* 3 and 4.
[502] Doshi-Velez *et al Accountability of AI Under the Law* 5.
[503] Doshi-Velez *et al Accountability of AI Under the Law* 2 and 4.

the source code of the AI algorithm; the intellectual property of the owners is protected and consequently, cannot be used as an excuse by organisations for not revealing the results of their AI systems (as has previously been the case).[504]

As mentioned above, accountability tools and software have not been able, for several reasons, to keep up with the rate at which AI systems have been developed and deployed in various fields.[505] Therefore, it stands to reason that a new set of innovative cutting edge tools are required to ensure that the application of AI systems in any field, particularly during adjudication, is done in accordance with acceptable legal standards of fairness.[506] These tools will go a long way towards ensuring that the interests of all parties, in instances where AI systems are deployed, are upheld and protected.[507]

AI systems should be designed by their programmers with the above facts and principles kept in mind.[508] In fact, when it comes to developing AI systems that will be used in adjudication and other legal processes, there should be standards set by the government, by which the AI system developers must abide when developing the system.[509]

4.3 Legal framework for implementing AI systems in adjudication

After analysing the above discussion, what becomes apparent is that AI systems can be useful tools in the adjudicative process, and in other related legal processes. However, what also becomes apparent is that AI systems, if not carefully regulated and implemented, can lead to catastrophic outcomes in the form of unfair and biased decisions. Therefore, along with ensuring that AI systems are transparent and accountable, the government needs to implement a legislative framework that

[504] Doshi-Velez *et al Accountability of AI Under the Law 4: The Role of Explanation* 4; and House of Lords *AI in the UK: ready, willing and able?* 38; also see Kroll *et al* 2017 *UPLA* 633; and O'Neil *Weapons of math destruction: How big data increases inequality and threatens democracy* 22.
[505] Kroll *et al* 2017 *UPLA* 633.
[506] Kroll *et al* 2017 *UPLA* 633.
[507] Kroll *et al* 2017 *UPLA* 633.
[508] Kroll *et al* 2017 *UPLA* 698.
[509] Kroll *et al* 2017 *UPLA* 696.

will regulate the use and application of AI systems in all fields, particularly in adjudication.[510]

The South African government and governments across the globe, have to invest resources into the development of such frameworks. As briefly mentioned above, the government does in fact acknowledge the revolutionary potential of technology such as machine learning, NLP and AI systems.[511] The South African government has, however, acknowledged its responsibility to develop policy that regulates these technologies in a way that is holistic and comprehensive.[512]

However, simply acknowledging its responsibility to develop policy and legislation for regulating AI systems, and related technologies, is not enough. The government has to develop a plan that it can practically implement. This is where the United Kingdom government can serve as an example. It has developed a strategy called the *Government Transformation Strategy*; and the goal is to help the government take full advantage of transformative technologies, such as machine learning, internet of things and AI systems.[513]

This strategy clearly outlines the government's commitment towards harnessing the transformative powers of digital technology such as AI systems.[514] This strategy also outlines the United Kingdom's approach to people's personal data, which is a very important issue (as discussed above).[515] The United Kingdom government has even enacted legislation towards this objective. In 2018, it adopted the *Data Protection Act*.[516] This *Act* is geared towards regulating the accumulation and the processing of

[510] See National Planning Commission *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution* 78.
[511] National Planning Commission *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution* vi.
[512] National Planning Commission *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution* vi.
[513] Government of the United Kingdom 2017 https://www.gov.uk/government/publications/government-transformation-strategy-2017-to-2020/government-transformation-strategy.
[514] Government of the United Kingdom 2017 https://www.gov.uk/government/publications/government-transformation-strategy-2017-to-2020/government-transformation-strategy.
[515] Government of the United Kingdom 2017 https://www.gov.uk/government/publications/government-transformation-strategy-2017-to-2020/government-transformation-strategy.
[516] The *Data Protection Act* 2018.

people's personal information in the United Kingdom in the same way that the GDPR regulates the accumulation and processing of people's data in Europe.[517]

Without a legal framework that fundamentally sets out how AI systems should be used in South Africa, it will be very difficult to ensure that they are used in a manner that is representative of fair legal standards.[518] This legal framework should not only outline how AI systems should be used, and how people's data should be processed, but it should also ensure that when it comes to the use of AI systems in the adjudicative process, there should be a clear procedure that people can follow to appeal or contest decisions.

An example of legislation that regulates the use of AI systems in legal proceedings, is the statute enacted by the Idaho legislature.[519] This piece of legislation is a great example of a comprehensive legislative tool that regulates the transparency of AI systems that are used in court processes – in this case, pretrial risk assessment matters – and also sets out grounds on which parties can request that the decision of the AI system be reassessed and explained.[520] Having legislation such as this one available, makes it possible to harness the full potential of AI systems in adjudication and other court processes, while at the same time ensuring that their transparency and accountability is regulated by statute.

4.4 Keeping it simple

Beyond being useful tools that can be regulated to be transparent and accountable, AI systems also need to be simple enough that normal judicial- and other legal practitioners can use them. The fact that AI systems in adjudicative and other related legal processes should be simple to use is imperative. This task will mainly lie (although it must be guided and assessed continually by the legislator and government policy makers)[521] with the programmer who creates the AI system.[522]

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[517] The *Data Protection Act* 2018.
[518] Kroll *et al* 2017 *UPLA* 633.
[519] Idaho Code Section 19-1910 of Title 19 Criminal Procedure 2019; also see Coglianese and Ben Dor 2020 *FSPL* 11.
[520] Idaho Code Section 19-1910 of Title 19 Criminal Procedure 2019.
[521] Kroll *et al* 2017 *UPLA* 696.
[522] Kraus 2019

It deserves mentioning that no legislation or policy can provide programming specifications to ensure that when computer programmers are developing AI systems, they completely remove all software bugs and ambiguities,[523] since the computer programmers that develop AI systems cannot take up the role of policy maker or that of legislature, when it comes to determining which principles of legal fairness should be included in the development of the system.[524] The first step towards keeping AI systems simple is for programmers to ensure that the systems are designed in a way that offers clear explanations.[525]

These explanations should be designed in such a way that they are in a plain and understandable language, like English, for example (as opposed to computer programming languages that require technical expertise to be understood).[526] Since AI systems are dynamic, in that they are constantly improving (this occurs as a result of machine leaning, as discussed above), the result of having clear and understandable explanations will further help educate policy makers and legislators as to the changes or the updates that the system needs; thereby, continually working to improve the operation of the AI systems.[527]

The process of ensuring that the AI systems which will be used in adjudication are simple to use will require cooperation and collaboration from computer developers, policy makers and the legislator.[528] Since the rate at which AI systems are being developed is quite rapid,[529] legislators and policy makers need to ensure that they are ready and agile enough to be in a position to place regulatory laws and

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https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/.

[523] Kroll *et al* 2017 *UPLA* 696.

[524] Kroll *et al* 2017 *UPLA* 696.

[525] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/; also see Doshi-Velez *et al Accountability of AI Under the Law* 2.

[526] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/.

[527] Kroll *et al* 2017 *UPLA* 696, this process will involve a lot of iterations made to the AI systems after the fact. This of course is a good thing since it will ensure that the AI system is continually improving.

[528] Kroll *et al* 2017 *UPLA* 695.

[529] Kroll *et al* 2017 *UPLA* 633.

frameworks in place that will govern not only the use of AI systems in adjudication but also their developmental process.[530]

Another way of ensuring that AI systems are easy to use during adjudication and other related court processes is through government initiatives to promote AI literacy among people, particularly those people who will regularly be in contact with these systems.[531] The process of promoting AI literacy is a comprehensive one.[532] With regard to the above-mentioned fact, that the process of making sure that AI systems are simple to use, the Council of Europe hold the following viewpoint:[533]

> Those involved directly or indirectly in the development or application of AI systems need to have the necessary knowledge and understanding of how it functions and be informed about its impact on human rights.[534]

The process of ensuring that all relevant parties are involved in the development process of AI systems will go a long way towards ensuring that those systems are simple to use in adjudication, and other similar and related legal processes. The government needs to set up an agency that will be tasked with carrying through this educative process.[535]

By promoting AI literacy, the government will ensure that the use of AI systems in adjudication becomes a little simpler because people will have a better understanding of the technology, and therefore, not be intimidated by it.[536] This will also help to ensure that the misconceptions that people might have generally had about AI systems are cleared up.[537]

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[530] Kroll *et al* 2017 *UPLA* 696.
[531] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[532] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[533] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[534] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[535] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[536] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[537] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.

The good news is that the South African government has already acknowledged the importance of educating people and helping them become ready to interact with technology such as AI systems.[538] The government, besides acknowledging this responsibility, has done a poor job so far when it comes to promoting AI literacy.[539] One way of addressing this problem is by establishing a government agency that is tasked with the promotion of AI literacy in South Africa.[540] This agency should also focus on informing people about the potential that AI systems (particularly when used in adjudication) have to protect their right and also how they could infringe on their rights.[541]

4.5 Conclusion

This section dealt with the application of AI systems in adjudication as used by the judiciary in South Africa. Upon evaluation of the above discussion, it becomes apparent that technologies such as NLP and machine learning have reached a point of maturity that makes it possible for AI systems to be used in adjudication in South Africa. However, for this to happen AI systems need to be completely transparent. Furthermore, they must be able to provide explanations as to the reasoning behind their decisions and they must be easy to use. For this to be possible, the legislature in South Africa needs to implement a regulatory framework that will ensure that the application and use of AI systems in adjudication in South Africa is in accordance with the *Constitution*.

What also becomes apparent is that AI systems should be used as aids to judges and other judicial officers in adjudication. This means that AI systems should play a supportive role and help judges arrive at correct decisions more frequently than they would have without such systems. By combining human expertise with AI systems' predictive ability, the adjudicative process in South Africa is most likely going to improve.

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[538] National Planning Commission *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution* 53.
[539] National Planning Commission *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution* 53 and 54.
[540] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[541] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.

5 Evaluations of Findings

This research paper assessed and evaluated the usefulness of AI systems for the specific purpose of adjudication in South Africa. This process was carried through by observing and analysing the application of AI systems in legal processes in the USA (as they were used to make bail applications and to predict the judges' decision in the Supreme Court) and in Europe (specifically as they were used in the ECtHR). The observation and analysis yielded a number of results.

The first among these results is the fact that AI systems do indeed have the ability to help improve adjudication in South Africa (and other legal systems around the world) simply because AI systems can help judges arrive at better and more accurate decisions, more often.[542] Another result that the research revealed was the fact that AI systems are not able to make predictions with a fair amount of accuracy when it comes to new situations that are outside their training data set.[543] Therefore, even though AI systems can help improve judges' decision making, they still have some fundamental shortcomings.

What this means is that AI systems should be used in conjunction with human judges in the adjudicative process. In this way, judges will be able to control the adjudicative process while still having the benefit of an improved decision-making ability that is given to them through the use of AI systems.[544] The combination of AI systems and human expertise may, overall, perform better than human experts on their own or AI systems on their own, respectively.[545]

Another thing that this research pointed out is the fact that if big data and AI systems are left unchecked, they have the potential to threaten and harm people's

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[542] Kleinberg *et al* 2018 *QJE* 240.

[543] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 53-69, points out that in instances where new situations arise that are unknown to humans and, therefore, subsequently unknown to AI systems' (since a programmer could not include in the AI's programming data which they have no knowledge of) training data AI systems tend to perform poorly in such instances. AI systems fail dismally when it comes to making predictions in situations like this and humans tend to perform better, as a result of the fact that humans can be aware when they do not know something and prediction machines not so much.

[544] Wang *et al* 2016, the authors proved that by combining AI systems with experts dramatically decreases the experts error rate and, therefore, improving overall efficiency and effectiveness.

[545] See Wang *et al* 2016, and also see Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 53-69.

human rights.[546] Additionally, the people that will most likely be negatively affected by these systems are people in society who already belong to vulnerable groups.[547] What the research pointed out in this regard is that through legislative and other means, AI and big data systems can be regulated and controlled to help ensure that their use is constructive and supportive of human rights as opposed to harming them.[548]

Therefore, through legislative and other regulatory frameworks, AI systems can be used in adjudication in South Africa (and in other jurisdictions around the world). Additionally, through the above-mentioned means, AI systems can be used in a way that ensures that they are accountable and transparent.[549] Furthermore, research points out that for effective transparency of AI systems, it is not necessary to have access to the code of the AI system.[550] In fact, having such access may be of little to no value to the examiner of the decision of the AI system (in this case a judicial officer).[551] This means that AI systems can be used in adjudication while ensuring that they remain transparent and open, and their transparency will not necessarily result in the intellectual property of the owners' of these systems being infringed.[552]

An additional strategy that can be used to ensure transparency and accountability of AI systems is promoting AI education and literacy.[553] This is a process that involves different phases. The first phase involves ensuring that people are made clearly

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[546] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 5.
[547] McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 5; also see Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[548] See General Data Protection Regulation (2016); also see The *Data Protection Act* 2018; and Idaho Code Section 19-1910 of Title 19 Criminal Procedure 2019.
[549] See Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/; see also National Planning Commission *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution* 78 and Doshi-Velez *et al Accountability of AI Under the Law: The Role of Explanation* 2.
[550] Doshi-Velez *et al Accountability of AI Under the Law: The Role of Explanation* 4; and House of Lords *AI in the UK: ready, willing and able?* 38.
[551] House of Lords *AI in the UK: ready, willing and able?* 38.
[552] See and Idaho Code Section 19-1910 of Title 19 Criminal Procedure 2019, and
[553] Council of Europe 2019; and also House of Lords *AI in the UK: ready, willing and able?* 38. https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.

aware about the existence and the use of AI systems.[554] The lack of transparency of AI systems has been shown to be among the leading causes for the misunderstanding and misconceptions that people have when it comes to the use of AI systems.[555]

5.1 Summary

The data that was used in this research on the use of AI systems in court was from the United States and Europe. Before the actual findings of the research are brought forward, a few remarks first need to be made. What immediately becomes apparent after viewing the data from the United States and Europe is that the United States and countries in Europe have already started to develop legislative and other regulatory frameworks that are geared towards managing and regulating the use of AI systems in a number of fields, the law being one of them.[556]

The South African government has recognised the need and importance of developing similar regulatory and legislative frameworks. To that end, the South African government, through the National Planning Commission, presented the *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution* in July 2020.[557] This draft paper points out that the government recognises its duty to develop a strategy that can help it take full advantage of technologies such as machine learning, NLP and AI systems.[558]

Since AI systems are increasingly finding their way into people's everyday lives, the South African government needs to quickly adopt a legislative and regulatory

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[554] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[555] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[556] See House of Lords *AI in the UK: ready, willing and able?*; see Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64; see General Data Protection Regulation (2016); also see *Data Protection Act* 2018; and Idaho Code Section 19-1910 of Title 19 Criminal Procedure 2019; European Commission 2020 https://ec.europa.eu/digital-single-market/en/artificial-intelligence#main-content; and the European Commission 2020 https://ec.europa.eu/digital-single-market/en/news/white-paper-artificial-intelligence-european-approach-excellence-and-trust.
[557] National Planning Commission *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution*.
[558] National Planning Commission *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution* i.

framework.[559] The adoption of such a regulatory framework needs to be swift in order to keep up with the fact that AI technology is developing at a rapid rate in relation to the law and protocols that govern them.[560]

5.2.1 AI systems in bail applications

The first real breakthrough in the use of AI in legal processes came in the experiment conducted by Kleinberg *et al.*[561] As discussed above,[562] this experiment centred around trying to determine whether AI algorithms can make better bail determinations than judges.[563] It also focused on trying to ascertain whether AI systems can help judges make better decisions when it comes to bail determinations.[564]

The authors' hypothesis was that since an applicant's bail application rests on the judges' ability to weigh certain factors against each other and then make a decision as to whether the applicant is a flight risk or not,[565] the process of determining whether an applicant should receive bail is purely a predictive process.[566] It is on this basis that the authors concluded that in theory, an AI algorithm should be more than able to perform such predictions.[567]

The experiment pointed out that judges are in need of some type of decision-making aids,[568] particularly when it comes to deciding bail applications and possibly when it

[559] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[560] Kroll *et al* 2017 *UPLA* 633.
[561] Kleinberg *et al* 2018 *QJE.*
[562] See Chapter 2.
[563] Kleinberg *et al* 2018 *QJE* 239.
[564] Kleinberg *et al* 2018 *QJE* 241.
[565] Kleinberg *et al* 2018 *QJE* 239.
[566] Kleinberg *et al* 2018 *QJE* 239.
[567] Kleinberg *et al* 2018 *QJE* 239 and 45.
[568] See Kleinberg *et al* 2018 *QJE* 240 who point out: First, judges are releasing many defendants the algorithm ex ante identifies as very high risk. For example, the riskiest 1% of defendants, when released, fail to appear for court at a 56.3% rate and are rearrested at a 62.7% rate. Yet judges release 48.5% of them. Second, stricter judges do not jail the riskiest defendants first; instead, they appear to draw additional detainees from throughout the predicted risk distribution. If additional defendants were selected instead according to predicted risk, stricter judges could produce outcomes that appear to dominate their current decisions: they could jail 48.2% as many people with the same reduction in crime, or for the same detention rate, they could have a 75.8% larger crime reduction.

comes to other matters too;[569] particularly when such aids will not only help improve judges' decision-making ability, but will also help identify the reasons why judges make poor decisions.[570] The authors are of the viewpoint that AI systems in judicial proceeding are to be used in conjunction with judicial officers rather than assume the entire role of presiding over matters themselves.[571] That is indeed the correct approach.

In the same manner as, one would make use of hearing aids when one has a hearing problem[572], so too should judicial officers make use of decision-making aiding tools when deciding judicial proceedings. Therefore, its stands to reason that AI systems, on the basis of the above-mentioned factors, have the ability – through helping improve judicial decision making – to help improve the adjudicative process in South Africa.

5.2.2 Using AI systems to predict judicial outcomes

When it comes to judicial processes, AI systems have more than one application. In the above experiment they were used to determine whether they can improve judicial decision making and it was proved that they indeed can.[573] AI systems can also be used to make predictions regarding what decisions a court will make next.[574]

In an experiment conducted by Katz, Bommarito and Blackman it was established that by using data spanning from 1816 to 2015, an AI algorithm was built that can fairly accurately predict the decisions of the Supreme Court in the United Sates.[575] Again, this experiment, much like the one conducted by Kleinberg *et al,* proved that sufficient training data is required for AI systems to operate effectively.[576] Aided with sufficient training data, the AI system developed by the authors was able to have a

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[569] Kleinberg *et al* 2018 *QJE* 241, the authors point that their experiment is centred on trying to make the case of the potential advantages that come with using AI systems as aids in the judicial decision-making process.
[570] Kleinberg *et al* 2018 *QJE* 241.
[571] Kleinberg *et al* 2018 *QJE* 241.
[572] National Institute of Deafness and Other Communication Disorders 2017 https://www.nidcd.nih.gov/health/hearing-aids.
[573] Kleinberg *et al* 2018 *QJE* 240.
[574] See Aletras *et al* 2016 *PEERJ* and Medvedeva, Vols and Wieling 2019 *AIL*, and Katz, Bommarito and Blackman 2017 *PO.*
[575] Katz, Bommarito and Blackman 2017 *PO* 1.
[576] Katz, Bommarito and Blackman 2017 *PO* 1, here the authors made use of data dating back to the 1800s. This was made possible because of Spaeth *et al* 2020 http://Supremecourtdatabase.org.

prediction accuracy rate of 70.2% when it comes to case predictions and a 71.9% accuracy when it comes to predicting the Justice's decision.[577]

What this experiment also proved was that it is possible through statistical analysis to use previous court cases to help predict future decisions that a court will make.[578] Additionally, the experiment proved that it is possible to create such a system with the ability for it to be functional and useable in real-life situations.[579] The authors refer to this ability as out-of-sample applicability and it basically means that this AI system can make fairly accurate predictions of both the Justices of the Supreme Court and the Court's decision.[580]

Through the algorithms' out-of-sample functionality, this AI system has proved that it can be used in real-life situations. This indicates that AI systems have a place in legal process, particularly in adjudication. Again, what should be made clear is that the use of AI systems should first and foremost be used as auxiliaries to judges. Therefore, the combination of AI systems with experienced and skilled judges will result in improving judicial outcomes and, therefore, improve the adjudicative process as a whole.

Similar experiments to the one conducted by Katz, Bommarito and Blackman were conducted by two separate groups of authors. These experiments involve using AI systems to determine whether they can predict, with a fair degree of accuracy, the decisions of the ECtHR.[581] The first group of researchers are Aletras *et al*;[582] what distinguishes the AI system of these authors with that of Katz, Bommarito and Blackman is the fact that, in order to make its predictions, the one of Aletras *et al*, relies on NLP and machine learning to detect patterns in the textual data that drive the ECtHR's decisions.[583] So, instead of taking in large quantities of data in order to make predictions, the AI system developed by Aletras *et al* is designed in such a way that it can make its predictions through using textual data, which is derived from

[577] Katz, Bommarito and Blackman 2017 *PO* 8.
[578] Katz, Bommarito and Blackman 2017 *PO* 2.
[579] Katz, Bommarito and Blackman 2017 *PO* 3 and 4.
[580] Katz, Bommarito and Blackman 2017 *PO* 8.
[581] See Aletras *et al* 2016 *PEERJ*; and Medvedeva, Vols and Wieling 2019 *AIL*.
[582] Aletras *et al* 2016 *PEERJ.*
[583] Aletras *et al* 2016 *PEERJ* 2.

information relating to different facts of a particular case.[584] The prediction accuracy of this AI system is 79%.[585]

The authors of the above AI system are of the view that an AI system like theirs should be used to assist judges and other legal professionals.[586] Therefore, the use of AI systems in adjudication is not by any means an indictment on the skill level or experience of judicial officers; it is simply an acknowledgement that even experts are prone to error.[587] Therefore, as a way of mitigating such error, AI systems should be used as aids alongside judges, in the adjudicative process and other similar legal processes.[588]

The next experiment was conducted by Medvedeva, Vols and Wieling, and just like Aletras *et al*, they made use of NLP and advanced machine learning systems to process actual text data resulting from court cases in the ECtHR, with the aim of predicting the court's decision.[589] The goal of this algorithm was to automatically predict the ECtHR's decisions.[590] This AI system has an accuracy rate of 75%.[591]

The ability for AI systems and human experts to combine (and as a result, significantly decrease the error rate of human experts) was proved in a study conducted by Wang *et al,* called *Deep Learning for Identifying Metastatic Breast Cancer.*[592] In this experiment, authors paired an AI system that can detect metastatic breast cancer against a seasoned pathologist and the goal was to determine which of the two would perform better.[593] The pathologist outperformed the AI system.[594] However, the interesting thing in this experiment is not the fact that the human pathologist outperformed the AI system,[595] but that since the errors that the AI system made were totally different from the ones that the pathologist

[584] Aletras *et al* 2016 *PEERJ* 2.
[585] Aletras *et al* 2016 *PEERJ* 2.
[586] Aletras *et al* 2016 *PEERJ* 1.
[587] Khanaman 2011 *Thinking, Fast and Slow*.
[588] See Wang *et al* 2016.
[589] Medvedeva, Vols and Wieling 2019 *AIL* 237.
[590] Medvedeva, Vols and Wieling 2019 *AIL* 242.
[591] Medvedeva, Vols and Wieling 2019 *AIL* 263.
[592] Wang *et al* 2016.
[593] Wang *et al* 2016.
[594] Wang *et al* 2016.
[595] Wang *et al* 2016.

made, the combination of the AI system and the pathologist results in a significant decrease in the error rate of the pathologist.[596]

There are instances where AI systems outperform humans when it comes to making better and more accurate predictions (particularly when the prediction involves factoring a number of variables together).[597] Similarly, there are instances where humans perform much better than AI systems.[598] These are instances where AI systems make predictions, which they adamantly portray to be accurate, while they are utterly incorrect.[599] These mostly involve instances that are unknown to humans and are, as a result not in the AI system's training data; therefore, the AI system does not have any knowledge of it.[600] What makes matters worse in these instances, is the fact that AI systems are incapable of knowing that their predictions are incorrect as a result of insufficient data.[601] Humans on the other hand, have the ability to be self-conscious and aware when they face situations of which they have no knowledge; this allows them to respond better to such situations.[602]

Since AI systems and humans make different kinds of mistakes and errors when it comes to prediction, their combination will allow for weaknesses to be offset against one another and subsequently enable humans (through the process of being aided by AI systems) to make better predictions.[603] The improvement in prediction, in large part, will come from the reduction in the human prediction error rate.[604] This

[596] Wang *et al* 2016.
[597] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 53-69; also see Kleinberg *et al* 2018 *QJE* 240.
[598] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 53-69.
[599] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 53-69.
[600] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 53-69.
[601] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 53-69.
[602] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 53-69.
[603] Wang *et al* 2016.
[604] Wang *et al* 2016 where the combination of both the human pathologist and the AI system produce a reduction in the error rate of the pathologist from 3% to under 1%, that means that the combination of AI and human intelligence in this instance helped decrease the human error rate by 83%; see also Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 53-69.

proves that the combination of AI systems' prediction ability together with human intelligence will help bring out the best possible predictive outcomes.[605]

Even the study conducted by Wang *et al* in the medical profession, is instructive to the legal profession. The same holds true for the law and in particular, adjudication. AI systems have shown that they can help improve the judges' decision-making ability and at the same time they have proved that they can identify causes as to why judges mis-predict; subsequently; they help improve their decision-making ability.[606] Therefore, AI systems can help improve the overall process by assisting judges during the adjudicative process.

5.2 Research outcomes

After surveying the existing literature landscape, what becomes apparent is that quite a few authors have indeed conducted research into the use and application of AI in different aspects of the law. Most, if not all, of the research that has been conducted on the use of AI systems in legal processes can be found in the United States and Europe. This of course signals that there has been a lack in Africa, and Southern Africa in particular, when it comes to experiments and research into AI as it can be used in legal processes, particularly in adjudication.

This research set out to investigate whether AI systems have the potential to help improve adjudication in South Africa. In so doing, it has discovered several things; the first and most apparent discovery is the fact that technologies such as AI, machine leaning and NLP, as they exist in 2020 and going forward, are tremendously advanced. Their stage of development is what could make it possible for these technologies to find application alongside judges in an auxiliary role, in the adjudicative process in South African courts.

Another discovery brought forth by this research is that for AI systems to be even considered for use in adjudication (in any capacity), they must first of all be transparent and free from opacity and second, used in such a way that they can be held accountable. This can be done by firstly ensuring that people are aware of their

[605] Agrawal, Gans and Goldfarb *Prediction Machines: The Simple Economics of Artificial Intelligence* 53-69.
[606] Kleinberg *et al* 2018 *QJE* 240 and 241.

existence and secondly, of the manner in which these technologies are used in the adjudicative process.

What this research also discovered is that as of 2020, the AI systems have done a lot to harm human rights. This has mainly been through unfair discrimination, infringing on people's privacy and failure to treat people equally. These transgressions on people's human rights are, in large part, what fuels the distrust and misunderstandings that people generally have when it comes to AI systems. A lot of resources would have to be invested, both by the South African government and by the private sector on AI systems education.

What this research also brought to light is the fact that the South African government, beyond the *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution*, is yet to develop a clear strategy, either through policy or legislation, which lays out how AI systems should be implemented in all industries, particularly in law. Without a clear strategy, the application of AI systems in the legal field, particularly in adjudication, will most likely be successful.

What this research also uncovered, is that AI systems can be used in more than one way in the adjudicative, and other similar court processes. For instance, they can be used to make predictions of the outcome of cases based on the textual data that is available. They can also be used to predict future decisions. Despite the role they play in the adjudicative process, research has found that AI systems can be great auxiliary tools for judges and other legal practitioners.

Research has also pointed out that the best results come from combining human expertise with intelligent machines and software. The reason for this is the fact that since AI systems and humans make different types of mistakes, their combination will ensure that they offset each other's weaknesses, while complementing each other's strengths. Additionally, most of the authors who have published papers discussing the usefulness of AI systems in legal processes collectively hold the view (and rightly so) that AI systems should operate in an auxiliary position alongside judges and other judicial officers.

Another fact that the research pointed out is that AI literacy or education is important. This is a task that should be carried out by the government through a specific arm of the state. During the process of educating people about AI, the government should ensure that any misunderstandings about AI and its application are clarified. The government should also ensure that people are aware of their rights and how AI systems will potentially affect their rights (both negatively and positively) and the procedure to be followed when filing complaints about the infringement of their rights by AI systems.

What the research has also pointed out is that as a result of advances in AI, NLP and machine leaning, AI systems in general are at a point where they can be used to improve adjudication in South Africa and other jurisdictions around the world. The two main contributions of AI systems in the adjudicative process will be firstly, the ability to improve judges' ability to make better decisions during court cases and secondly, to help reduce the judges' error rate when it comes to decision making in the adjudicative process.

In light of the above discovery, what also becomes apparent is the fact that AI systems are far from the point of complete efficacy. They must continually be developed, regulated and improved to ensure that their application in adjudication is without catastrophe. That is why, going forward, it will be important for the South African government to have regulatory frameworks in place that regulate the development and the application of AI systems in adjudication and in other legal processes.

The fact that AI systems are not yet completely developed, is no reason to not start phasing in their implantation in adjudication and other legal process. These technologies are growing at such a rapid rate that they will soon be completely developed. Therefore, now is the time to start developing regulatory frameworks around the development and application of AI systems.

Alertas *et al* paint the perfect picture when it comes to the application of AI systems in judicial processes (and other):

> It is instructive to compare the state of the art for introducing data-driven decision aids with how new drug therapies are brought to market. Before any new drug can

> be sold, the Food and Drug Administration requires several stages of testing. Phase 0 and Phase 1 trials demonstrate basic safety of the drug, while Phase 2 trials compare at medium scale and for easily measured outcomes the effects of the new drug to either placebo or current best practice. If a drug passes, it is subject to a larger scale Phase 3 trial that quantifies key clinical outcomes. Current machine learning practice of establishing predictive validity is analogous to passing a Phase 0 or 1 trial. As with drugs, going directly from a Phase 0 or 1 trial to market risks doing social harm.[607]

Upon evaluation of the above extract, it becomes apparent that the analogy that Alertas *et al* use to illustrate how the development and application of AI systems should be treated is quite correct. It points out that even through AI systems are useful and have even proved that they can be applicable in legal and other processes, there needs to be ongoing development and evaluation of the AI systems to ensure that they can be used in various processes, adjudication being one of them, as much as possible. This oversight process needs to be implemented and controlled by the government.

5.3 Recommendations

The first step that needs to be taken in ensuring that South African courts are ready and able to implement AI systems in adjudication is developing a legislative and regulative framework. Such a framework can only be developed by the South African government. The need for such a framework is of utmost importance. The reason being because technologies such as AI, machine learning and NLP have developed so quickly, that it has not been possible to develop laws and a regulatory framework that can effectively regulate these technologies.[608]

The South African government, to its credit, has indeed acknowledged the need for such a regulatory framework. To that end, through the National Planning Commission, the government put forth the *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution*.[609] This is a document that in essence, makes clear the South African government's realisation of the importance of having a strategy to comprehensively regulate technologies such AI, machine

[607] Kleinberg *et al* 2018 *QJE* 288 and 289.
[608] Kroll *et al* 2017 *UPLA* 633.
[609] National Planning Commission *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution*.

learning[610]; while at the same time pointing out the important need for South Africa to take advantage of the technological enhancements that these technologies will bring.[611]

Despite the current efforts by government, South Africa still lags behind (in preparedness) when compared to the United States and the European countries. However, it should be stated that the above-mentioned draft paper is a good start, but more needs to be done by government in this regard. Government needs to move beyond mere rhetoric and develop an implementation plan.

When the government has indeed developed this implementation plan, it must ensure that people are made clearly aware of the existence and of the manner in which these AI systems operate.[612] The government needs to invest resources towards the process of making people aware of, and educating them about AI systems.[613] This process should exist in different parts; first, in awareness campaigns that the government carries out through traveling to different communities and educating people about these technologies,[614] and second, at school level, educating learners about AI, machine learning and possibly also NLP and how they will potentially affect their rights.[615]

Additionally, the application of AI systems in the adjudicative, and other related legal processes should be carried out in a way that ensures that people are firstly, not discriminated against, secondly, that people are treated equally and third, that

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[610] National Planning Commission *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution* 78.
[611] National Planning Commission *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution* vi.
[612] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E. also see Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[613] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[614] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64.
[615] Council of Europe 2019 https://rm.coe.int/unboxing-artificial-intelligence-10-steps-to-protect-human-rights-reco/1680946e64; also see National Planning Commission *Draft, Digital Futures: South Africa's Digital Readiness for the Fourth Industrial Revolution* 53 and 54.

people's privacy is not infringed.[616] Since 2020, the relationship between AI systems and the protection and promotion of human rights has not been a good one;[617] it stands to reason, therefore, that it is an important issue that needs to be addressed.

Furthermore, these systems need to be refined and improved upon to ensure that they remain functioning optimally and effectively.[618] In addition, their application should be such that the AI systems offer outputs or predictions that are explainable in a simple language, such as English.[619] This will go a long way towards helping eradicate the fear and anxiety[620] that most people generally have about the use of AI systems.

Since it is possible for AI systems, once fed training data, to extend the biases and stereotypes of the programmers that developed them,[621] extra focus and scrutiny needs to go to ensuring that application of AI systems in adjudication in South African courts is carried though in a transparent and open manner. This is where the use of explanations, clear appeal and review rules will come into play. Also, since South Africa is a constitutional democracy that believes in all citizens being treated equally before the law[622], the country cannot afford to have in its courts' AI algorithms that carry with them biases as a result of their training data or their programming (or both).[623]

Therefore, it is of utmost importance that government, along with having legislation and regulatory policies in place that regulate the use of AI systems in adjudication,

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[616] See McGregor *et al The Universal Declaration of Human Rights at 70 – Putting Human Rights at the Heart of the Design, Development and Deployment of Artificial Intelligence* 11; also see A 12 of the Declaration of Human Rights (1948); and Section 14 of the *Constitution of the Republic of South Africa*, 1996.
[617] Raso *et al Artificial Intelligence & Human Rights: Opportunities & Risks* 4.
[618] Lander and Beigelmacher 2020 https://www.cloudfactory.com/training-data-guide.
[619] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/*artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/*.
[620] Alston 2018 https://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=23881&LangID=E.
[621] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/winter/*artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear/*.
[622] Section 9 (1) of the *Constitution of the Republic of South Africa*, 1996.
[623] Kraus 2019 https://www.americanbar.org/groups/judicial/publications/appellate_issues/2019/*winter/artificial-intelligence-invades-appellate-practice-the-here-the-near-and-the-oh-my-dear*|.

needs legislation and policies in place that also regulate (by way of standards and guidelines) the way in which computer programmers design and program these AI systems.[624] This additional regulatory framework will help to ensure that AI systems are developed in a manner that takes into account the legal standards of fairness and equality,[625] as they exist in South Africa.

5.4 Conclusion

This paper investigated the extent to which AI systems could be used to help improve adjudication as used by the judiciary system in South Africa. This was carried through by assessing and evaluating the application of AI systems in the United States, as they were used to make bail determinations and as they were used to predict the future decisions that the Supreme Court will make. In both instances, it was clear that AI systems could firstly help improve judges' ability to make decisions and secondly, they can relatively accurately predict the decisions that the Supreme Court will make, on both the side of the Justices' and Court's decisions.

The research also evaluated and assessed the use of AI systems in legal processes that occurred in the EU, particularly in the ECtHR. What became apparent after evaluating and assessing the use of AI systems in the EU by the ECtHR, is that AI systems can indeed be used to analyse court material in real time and make relatively accurate predictions on the future of the courts' decision. This was done with the specific goal of trying to determine whether there are instructive lessons that can be learned about the application of AI systems in the above-mentioned jurisdictions that can be used as case studies with regards to the implementation of AI systems in South African adjudication.

Towards the end of evaluating and assessing whether AI systems can be used to help improve adjudication in South Africa, the nature and scope of AI, machine learning and NLP, and how these technologies could help benefit (and also hamper) the adjudicative process in South Africa was also discussed. This research evaluated the effects of AI technologies, up until 2020, on human rights. It found that AI

[624] Kroll *et al* 2017 *UPLA* 696.
[625] Kroll *et al* 2017 *UPLA* 633.

systems, to date, have done more to harm human rights than they have done to protect and uphold them.

The human rights that are most affected by the application of AI systems are the rights to equality and privacy as they are guaranteed by the UDHRs. Furthermore, it revealed that despite the current *status quo* of the nature of the relationship between AI systems and human rights, AI systems have the potential to be used to help uphold and protect human rights. This is possible because AI systems have the ability to process, assimilate, and interpret large quantities of data and then make predictions on this basis. That ability can be used to predict where the next atrocious human rights violations will occur.

This research also considered the practical implications with regards to the application of AI systems in the adjudicative process in South Africa. It found that even AI systems can indeed be applied and used in the adjudicative process in South Africa, but only in auxiliary capacity as decision-aiding tools to judges and other legal practitioners. The reason for this boils down to the fact that since AI systems and humans have different strengths when it comes to the ability to make predictions and decisions, their combination will complement each other.

Perhaps the combination of human intelligence and AI systems prediction's ability will be most beneficial to the adjudicative process (and other related legal processes) because AI systems and humans make different types of mistakes, thus, their combination will offset their inherent weakness. This is probably more important that enhancing their strengths. The reason for this is simple; through complementing humans' weaknesses, AI systems will help ensure a reduction in decision-making error rate. Therefore, the adjudicative system in South Africa can benefit immensely from a reduction in errors made by judges. AI systems have the potential to make that possible.

Therefore, the ultimate benefit and contribution to the adjudicative process that AI systems will bring, will not be the automation of the process (although in future, routine procedures like bail applications have the potential to be automated) but it will come from helping judges improve their decisions-making ability and reduce

errors when coming to the decisions they make. The improvement to judges' decision-making ability will not only help improve adjudication, but it will also go a long way in ensuring that the credibility of the South African judicial system is strengthened.

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