1.0 Executive Summary

I am a graduate of Law with Politics from Ulster University in Belfast working in the Legal Services field in Belfast, with a particular focus on Intellectual Property. I am submitting this evidence entirely in my own capacity.

I have been following the increasing usage of algorithms in daily life for a number of years and have become fascinated with how it is developing inside and outside my sector. However, I've also become increasingly concerned by the lack of focused regulation for algorithms, and how slowly proposed regulation is developing, not just in the UK but on a global scale.

This submission will focus on a few key points, namely:

- How algorithms works and how they make decisions
- Potential Uses in the Legal Sector
- Issues with Algorithm Decision-Making
- Bias and Discrimination in Algorithms
- Regulating Algorithm

2.0 Algorithms - Workings & Decision Making

An algorithm in simplest terms can be explained as "any well-defined computational procedure that takes some value, or set of values, as input and produces some value, or set of values as output" (Hickman, 2013). They follow a set of rules input by the programmer to make a decision based on these rules regarding a relevant situation. Their output will be based on the input and the rules they receive. These rules tend to be a series of "simple" rules that allow a decision to be reached cleanly and efficiently (Farnam Street, 2015). Some algorithms are "taught" by imputing historical sets of data - it will then process the data and find the most common decision in each similar situation and apply that.

Algorithms are used daily in numerous aspects of life; from searching on the internet to national security. They are far new; in 1954 psychologist Paul Meehl stated that data-driven algorithms can better predict human behaviour than a trained clinical psychologist. This is simply because a data-driven algorithms can work from a simple set of rules, and unlike a human the same input will generate a consistent output. A study from the UCLA found that a simple algorithm created to mimic the decision makings of doctors had an extremely high rate of success - and was more consistent than medical professionals (Farnam Street, 2017).

Given the evident capabilities of algorithms it is necessary to explore its potential uses.

3.0 Legal Sector Growth - Algorithms, Judiciary and the "Human Element"

An area where the use of algorithms has significantly expanded in recent years is the legal sector. US firm Cooley has trialled an algorithm on a litigation matter involving 29 million documents. The algorithm was able to identify word clusters and limit the amount of documents lawyers had to review to those pin-pointed by the algorithm (Croft, 2016). London firm Slaughter and May has also successfully trialled a similar algorithm (Fouzder, 2016).

Algorithms have the potential to save time and money in the legal sector and allow for a much smoother transaction process.

However, aside from the transactional side of law, there is now talk of how algorithms can impact decision-making in the justice system. The law may be complicated but it is, in theory, based on a series of "rules" which an algorithm should be able to process with ease.

The current Lord Chief Justice noted in his speech the capability of AI in even predicting the outcome of cases;

"It is probably correct to say that as soon as we have better statistical information, artificial intelligence using that statistical information will be better at predicting the outcome of cases than the most learned Queen’s Counsel. (The Journal, 2017)."
3.1 Case Study

A case study ran by computer scientists based in UCL explored the ability of algorithms to mimic judicial decision-making. They created an algorithm system that would, in theory mimic the judgements of the European courts. It analysed 584 judgements and came to the same conclusion as the judges in 79% of cases (Johnston, 2016). This study shows a promising step forward in the advanced decision-making capabilities of algorithms, however there are three main caveats in this research.

1. First and foremost, 79% may seem like a high success rate but (assuming the rulings were just) this would mean that it would judge 1 in 5 cases incorrectly. The margin for error isn't devastating when talking of something like a credit card application (although the effect may be adverse nonetheless), but when it comes to decisions that can massively impact an individuals life, such as in the legal system, the margin of error is too great to be considered. The reality of the situation is that odds of 50/50 are available when flipping a coin - this isn't much better.

2. The "decisions" that the algorithm reaches are based on the judgements (due to the confidential nature of evidence) - which can often subtly indicate the direction a case is going (UCL, 2016). The algorithm in this case hasn't been able to process evidence and make its own decision. Rather, it has processed the judgement and made a conclusion based on the language used throughout.

3. While some cases may be able to be decided simply on the "letter of the law" or through examining previous cases, human input and emotional intelligence are essential in exceptional cases (Frears, 2016). The ability to recognise moral injustices, exercise mercy and look closely at the underlying circumstances to identify where new principals are required, is the backbone of the legal system and at this stage it is unlikely that algorithms will be able to replicate that successfully (A Stranieri et al, 1999).

3.2 Law: A simple set of rules?

Automated legal reasoning systems have been considered in the past. However, it is difficult to pin down a definitive set of rules. As mentioned previously the judiciary has "extensive" discretion when exercising their powers. It is argued that judicial discretion makes it too difficult to identify a definitive set of rules, as required by an algorithm (A Stranieri et al, 1999).

The reality of the situation is that law is much more than a set of rules. They judiciary do not "robotically apply the law". More often than not the judiciary leans towards "Legal Realism" instead of "Legal Formalism", meaning rather than sticking to the letter of the law the judiciary interpret creatively and liberally to ensure the law adapts to the modern world and serves the public in the best way possible. Legal realists view the law as a set of guidelines, to be built upon rather than simply to be enforced. Legal realism and judicial interpretation are vital to ensuring that judges can ensure the law suits each situation (Schwerd, Fryman & Torrenge, LLP, 2015). In the absence of an ability to mimic the judicial legal reasoning, an algorithm would have to rely on a strict interpretation of the law, which can lead to nonsensical decisions, as an example see the dissenting opinion in the "Frozen Trucker" case (Transam Trucking, Inc. v Administrative Review Board, 2016).

3.3 Assisted Decision-Making?

However, algorithms should not be written off completely. Rather than replacing the judiciary or lawyers, they can be used to help legal teams make more effective decisions. A recent example of this is the KIM system developed by the University of Liverpool with Riverview Law. This system can instruct lawyers on the most efficient ordering with which to negotiate contracts, or present contractual information in an easier to understand matter. It could essentially act as an assistant, picking up key-trends and patterns and therefor enabling the decision-maker to make a more effective decision. (Friedman, 2015).
4.0 The Bias Problem

This submission has spoken briefly about the human condition’s advantages in decision-making. However, it should be noted that the human condition has a major flaw that has always and will continue to impact the justice system and this is bias. From the juror to the judiciary, bias is prevalent throughout each case (Baksi, 2014).

Lord Neuberger warned of the “unconscious bias” that everyone has, and this includes the judiciary - we as humans are shaped and moulded by our own experiences and although all members of the judiciary should be able to make fair decisions regardless of race and gender - there is still an ingrained bias that even the most learned and fair judge may struggle to ignore (Smith, 2015).

This is where algorithms should have an advantage - they would be unencumbered by bias and would make it’s judgement based on the facts. It is often claimed that data reliant algorithms are more objective than a human can be, and therefor it should theoretically make a fairer decision (Miller, 2015).

However, this is only partially true. The objectivity of an algorithm is based on the programmers who are developing the algorithm and the information/data sets that have been input into the system; if this data is biased then the algorithms may begin discriminating against people (Byrnes, 2016). This being the case, algorithms can even reinforce bias, particularly if the algorithms’ decisions are considered objective and therefor not scrutinised appropriately (Miller, 2015). For example, if historical data is input into a hiring system and if women were/are discriminated against in that company, then the algorithm will read the data and continue hiring in that manner, as it will assume that male candidates are better equipped. The bias is then built in and reinforced with each decision, this could have similar impacts not just in hiring but in any form of decision making.

The same issue can be identified in currently used models such as personality tests used in hiring, which are widespread across the USA and among larger firms in the UK. The algorithms used in these tests look for a set of characteristics which, according to Cathy O’Neill author of "Weapons of Math Destruction", can discriminate against people with mental health problems due to the set of rules it works from (O’Neill & Frick, 2016). Simply put, an algorithm will look for a very specific set of characteristics and is not prepared recognise mitigating circumstances. This is a further demonstration of the dangers of algorithmic decision-making, these systems can become unintentionally discriminatory due to the set of rules they follow. The employer, and even the programmers, may not have considered the impact disabilities may have on the personality tests and unless action is taken on the part of the applicant, then they may never know that their algorithms holds bias. Therein lies a major problem with algorithms, more often than not the users are completely unaware of how it makes decisions.

Rebecca MacKinnon, director of the Ranking Digital Rights project at New America has also commented on this: “Algorithms driven by machine learning quickly become opaque even to their creators who no longer understand the logic being followed to make certain decisions or produce certain results. The lack of accountability and complete opacity is frightening” (Mazanec, 2017).

4.1 Making Algorithms Safe

The above may seem highly critical of algorithms. However, it is unfair to simply write-off algorithms, they have considerable potential and will unquestionably continue to improve how we process data, it can even make leaps in fighting bias by allowing us to identify, understand and ultimately remove it from the decision-making process (Leetaru 2016). Algorithms are simply a tool that is still being developed and the identification, acceptance and correction of the issues above will be key to improving its safety and functionality.

The fault for the issues above does not lie with the algorithms themselves, but that despite it's ever increasing usage in our daily lives, that no concrete regulations have been put in place. We need to be aware that issues can arise from algorithms, as a fairly basic example one could look at accidents caused by satellite navigation systems, which use algorithms to calculate the best routes (PC Plus, 2010). Although an invaluable tool, it is far from perfect, and drivers know better than to place their full trust in it. This being the case, why do we blindly assume that other algorithms are infallible?
At the moment there is simply no transparency in how these algorithms make decisions, and thus there is no accountability. Nicholas Diakopoulos states that the way in which these algorithms make decisions need to be published and brought to light "Only then can the public know whether the factors and calculations involved in arriving at the score are fair and reasonable, or uninformed and biased." (Kassner, 2016).

Aside from more transparency in the decision-making of algorithms, it is also important that the programming and testing of these algorithms becomes more inclusive. We need to ensure that when coding these matters are considered. Simply put, we should be developing algorithms that will work fairly across people across a variety of backgrounds, this could be done by ensuring the coding or testing teams are diverse and come from a multitude of races and backgrounds.

Finally, these systems need to be audited. As these systems become more entrenched in our daily lives it is important that there are checks to ensure that the bias isn't coded in and to identify blind spots in the coding. By doing this, more inclusive algorithms can be created and we can ensure that they work for everyone in the same manner (Buolamwini, 2016).

5.0 How to regulate?

Regulation should reflect the above requirements and, at the very least, there should be an audit procedure to ensure that algorithms operate fairly. To do this, there will be a need for large amounts of data collection. This could be done by forcing algorithms to track their decision-making process, in other words each time they reaches a conclusion they should "explain" why (Datta et al., 2016). This could then be audited and thus it would be easier to ensure the decision-making process is just.

However, given the ever-increasing usage of algorithms it would be near impossible for a regulator to keep track of them all (Croll, 2016). That being the case, regulation should be dependent on function, Nick Couldry, Professor of Media, Communications and Social Theory LSE, when speaking about regulating algorithms stated "I may care a lot less about algorithms that change what buying or listening recommendations I receive than those that affect what appears to me as news, or affect how I am evaluated by others," (Kobie, 2016).

This approach is already being brought forward in Regulation (EU) 2016/679 in the European Union which will limit the ability of decision-making algorithms that will 'significantly impact' an individual. This regulation will also include a "Right to Explanation" as discussed above, which will require an explanation to be provided upon request of any individual which an algorithms decision-making has impacted.

It should be noted however, that when talking of such regulation there will be massive amounts of personal data collected. That being the case we would need strict rules governing and limiting the usage of such data to ensure that it is not used beyond its intended purpose.

5.1 Development and Regulation at odds?

It is evident from the debates in parliament over the Digital Economy Bill that there is significant tension between regulating algorithms and allowing them the freedom to grow and develop at speed (Hansard, 2017). It is also evident that such regulation as proposed above would present massive challenges for industries that rely on algorithms. However, it presents opportunities and the drive to perfect algorithms, which can only be a good thing both for the individual and the industry (Goodman & Flaxman, 2016).

6.0 Conclusion and recommendation

Algorithms have and will continue to revolutionize how we process data and make decisions. They have proven extremely adept at processing large amounts of data in record time, and has made significant leaps in their ability to make decisions. Algorithms are a formidable tool and often go above and beyond the abilities of the average person regarding decision making, and data processing. Algorithms have changed the way the world works, without algorithms we wouldn't have the internet, computers or numerous other technological advancements that have benefited society.
However, as formidable as they are we shouldn’t be intimidated out of scrutinizing how algorithms make their decisions. Jason Hong, of Carnegie Mellon University, states the speed and volume in which algorithms processes data can give a false impression of correctness (Raine & Anderson, 2017). We need to be aware that algorithms are far from infallible, nor are they free from human influence. There can be no doubt that algorithms are going to continue to entrench in our daily lives and as we become more reliant on them we need to be able to analyze how they make decisions and do to this we need transparency. We need to know the calculations and the rules behind their decisions. We need to ensure that current algorithms are audited for fairness and that algorithms being developed have regard for equality and fairness. It is important to remember that algorithms are a tool, and should not be treated as a complete replacement for human judgment.

It is my recommendation that specific and focused regulation be put into place, in particular, the upcoming Digital Economy Bill needs to take a special focus on algorithms. Once we can ensure that algorithms are working fairly, they will become invaluable in fighting bias and improving how we make decisions worldwide. Until then, they should be treated with due caution and consideration for their potentially devastating shortcomings.

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