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Artificial Intelligence and Digital Watermarking will Transform Copyright Arbitration and Dispute Resolution for 3D Printing: An Empirical Analysis

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Abstract

Artificial intelligence (AI) has been the subject of much discussion in terms of its applicability to law. This paper focuses on the use of AI in copyright arbitration and dispute resolution for three-dimensional (3D) printing (3DP). Its main argument is that laws relating to digital watermarking will push the utilisation of AI in such alternative dispute resolution (ADR) methods, be it arbitration or mediation, in a particular direction, i.e., one that favours more complex watermarking, and the use of AI in automatically resolving disputes, through ADR methods, i.e. arbitration and/or mediation. In order to make this argument, the article is structured as follows: first, it discusses the existing laws relating to digital watermarks, making the point that the more complex the watermark placed in content, the more likely it is to obtain protection. Next, it outlines the authors' empirical work to apply an existing AI system

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to copyright case law, to see how an AI system – which may fall under the purview of such protection – can read and understand cases and produce outcomes in disputes concerning 3DP. The conclusion of this research was that complex watermarks will lead to faster and more accurate resolutions. Following that, it considers the existing legal regime for dispute resolution, through ADR methods (i.e. arbitration and/or mediation), and makes the contention that AI systems can fit within the existing legal framework. However, the conclusion argues that certain issues merit closer attention. For example, there should be more explicit consideration in law of how watermarking can influence the direction of AI dispute resolution, through ADR methods, and that the role of the judge in such AI dispute resolution methods needs to be considered further.

Keywords: artificial intelligence; natural language programming; arbitration; dispute resolution

1. Introduction

The development of AI and computational processes has the potential to radically change the operation of law. Existing literature has tended to focus on the role of the lawyer, and how lawyers themselves may be replaced by AI.[1] The contention of this paper is different: that AI will revolutionise the administration of law due to the

[1] E.g. see, B Alarie, A Niblett, A Yoon, How Artificial Intelligence Will Affect the Practice of Law (November 7, 2017) at http://dx.doi.org/10.2139/ssrn.3066816; M Markovic, Rise of the Robot Lawyers? 61 *Arizona Law Review* 325 (2019); B Simpson, 'Algorithms or Advocacy: Does the Legal Profession Have A Future in a Digital World?' 25(1) *Information & Communications Technology Law* 50 (2016); D Ben-Ari et al, 'Artificial Intelligence in the Practice of Law: An Analysis and Proof of Concept Experiment' 23(2) *Richmond Journal of Law & Technology* 2 (2017); J Davis, 'Artificial Wisdom: A Potential Limit on AI in Law (and Elsewhere)' 72(1) *Oklahoma Law Review* 51 (2019); W Wendel, 'The Promise and Limitations of Artificial Intelligence in the Practice of Law' 72(1) *Oklahoma Law Review* 21 (2019); D Remus and F Levy, 'Can Robots Be Lawyers: Computers, Lawyers, and the Practice of Law' 30(3) *Georgetown Journal of Legal Ethics* 501 (2017); M Legg, 'New Skills for New Lawyers: Responding to Technology and Practice Developments' in K Lindgren, F Kunc, M Coper (eds), *The Future of Australian Legal Education* (Thomson Reuters, 2018) 375; G Marchant, 'Artificial Intelligence and the Future of Legal Practice' 14(1) *ABA SciTech Lawyer* 20 (2017); M Cohen, S Dahan, W Khern-am-nuai, H Shimao, J Touboul, 'The use of AI in legal systems: determining independent contractor vs. employee status' *Artificial Intelligence and Law* 63 (2023); C Fang, J Wilkenfeld, N Navick, J Gibbs, '"AI Am Here to Represent You": Understanding How Institutional Logics Shape Attitudes Toward Intelligent Technologies in Legal Work 37(4) *Management Communication Quarterly* 20 (2023); D Barysė, R Sarel, 'Algorithms in the court: does it matter which part of the judicial decision-making is automated?' *Artificial Intelligence and Law* 60 (2023); P Baser, J Saini, 'AI-Based Intelligent Solution in Legal Profession' 516 *ICT Systems and Sustainability* 75 (2023); V Bertalan, E Ruiz, Using attention methods to predict judicial outcomes *Artificial Intelligence and Law* 68 (2022).

intersection between digital watermarking and machine learning. The paper considers the impact within the specific field of arbitration, as a dispute resolution method, as well as mediation, relating to copyright disputes arising from 3DP. Using new empirical evidence, it argues that AI can utilise digital fingerprint watermarking and natural language programming (NLP) technologies in order to quickly and efficiently resolve 3DP copyright disputes. Digital watermarking and NLP can provide many unique ways to identify all sorts of physical and online content, and this in turn will revolutionise day-to-day interactions with the law to resolve 3DP copyright disputes.

To this end, the paper at first considers an outline of how digital watermarks operate under existing legal rules, and then proceeds to consider how newer technologies such as digital fingerprint and NLP operate to resolve 3DP copyright disputes. Further on, it analyses and discusses how the technology works with arbitration in relation to 3DP copyright disputes, and considers mediation as well as a dispute resolution method in relation to 3DP copyright disputes. Finally, it suggests some proposals for reform. Overall, it argues that the current legal regime protects the use of watermarking for NLP in a manner that will hasten its use throughout ADR used for 3DP copyright disputes, but also with regards to its wider application for the resolution of disputes, and that this in turn poses questions for the future direction of legal regulation.

2. Law and AI

Richard Susskind, an author preeminent for his writing on the relationship of law and AI, wrote that robots would replace lawyers, citing the commonly held conception that computers will ultimately surpass human cognition.[2] However, the development of AI in the legal arena will be far more multifaceted.[3] One way in which this change will occur is in relation to the use of digital watermarking and other identifiers within copyrighted content. At the moment, digital fingerprint watermarks are used within digital services such as YouTube,[4] but it is possible to use such watermarks on not just traditional physical media, but also within newer technologies such as 3DP. This will not only provide the means by which to provide evidence about infringements in more detail than ever before (potentially providing a detailed trail of breadcrumbs of infringements and information re-use), but also provide a means for computers to directly interface with this information for the purposes of copyright enforcement. AI is relevant in the development of watermarking technologies, their implementation, and in the analysis of whether or not a potential infringement of copyright has

[2] R Susskind, D Susskind, *The Future of the Professions* (OUP, 2015) 66–71, and see for example https://www.legalfutures.co.uk/latest-news/susskind-lawyers-wrong-to-think-technology-cannot-replace-them accessed 31/10/2022.
[3] See also ibid. 270–302.
[4] See 'How Content ID works' at https://support.google.com/youtube/answer/2797370?hl=en-GB accessed 31/10/2022.

occurred. The law in these areas is encouraging the technology to grow in directions which will further increase the spread of the law and its interaction with AI.

3. Digital Watermarking

Watermarks can be used with AI to enhance its assessment of data in terms of speed and verification of potential infringements. They are, in essence, the eyes and ears of an effective AI system. Watermarks are by no means new, having been around for thousands of years.[5] However, those watermarks are *passive*, used primarily for the purposes of identification. Examples include paper, stamps and banknotes.[6] Digital watermarks, by contrast, can be considered *active*.[7] This has been taken to mean that they can actively report on activities affecting the object to which they are attached. For example, it is possible for a digital watermark to report if it is being tampered with. There are a number of variants of digital watermarks, but it is the latter which has often posed the greatest legal issues, for example, those concerning privacy.

Digital watermarks in copyright content can be used not just for the purpose of identification (fingerprinting) but also in conjunction with other software to assess the likelihood of copyright infringements occurring. With the rise of unique watermarks in 3D prints for physical objects, and the increased growth in NFTs online, it is expected that the use of such watermarks will increase considerably.

There are two main sets of legislation relevant to the protection of digital watermarks, both of which favour watermarks that will best protect copyright-related information. They therefore tend to favour investment into technologies which are related to copyright enforcement, and which in turn are best suited to related automated procedures. The first set of statutes to protect digital watermarks were those that concerned 'Copyright Management Information', stemming from the World Intellectual Property Organization (WIPO) Copyright Treaty of 1996.[8] This led to further international and national agreements. The nature of protection revolves around two key elements: a) the existence of a copyright work (in most

[5] They are intrinsically linked to the history of cyphers, which come from the time of the ancient civilisations – see D Kahn, *The Codebreakers – The Story of Secret Writing* (Scribner, 1997); likewise, see 'Archive of Watermarks and Papers in Greek Manuscripts' at http://abacus.bates.edu/wmarchive/guide_contents.html accessed 31/10/2022; G Putnam, 'Authors and their public in ancient times' (Knickerbocker Press, 1894) 61.

[6] See e.g., B Buxton, *The Buxton Encyclopaedia of Watermarks* (Buxton, 1997); X Cao, D Yu, C Li, J Yao, 'A Novel Design of Automatic Welding System for White Watermarks' 365–366 *Applied Mechanics and Materials* 52 (2013) at 52; Stanley Gibbons, *Specialised Volume 1 Queen Victoria: Part 1* (Stanley Gibbons Ltd, 2020).

[7] F Petitcolas, R Anderson, M Kuhn, 'Information Hiding – A survey', 87 *Proceedings of the IEEE* 1062 (1999). T Page, 'Digital watermarking as a form of copyright protection' 14(6) *Computer Law and Security Report* 390 (1998).

[8] WIPO Copyright Treaty, 20th December 1996, 36 ILM 65 (1997).

circumstances); and b) a set of seemingly passive information. An example is Article 7 of the EU Copyright Directive 2001:

> '1. Member States shall provide for adequate legal protection against any person knowingly performing without authority any of the following acts:
>
> (a) the removal or alteration of any electronic rights-management information;
>
> (b) the distribution, importation for distribution, broadcasting, communication or making available to the public of works or other subject-matter protected under this Directive or under Chapter III of Directive 96/9/EC from which electronic rights-management information has been removed or altered without authority,
>
> if such person knows, or has reasonable grounds to know, that by so doing he is inducing, enabling, facilitating or concealing an infringement of any copyright or any rights related to copyright as provided by law, or of the sui generis right provided for in Chapter III of Directive 96/9/EC.
>
> For the purposes of this Directive, the expression 'rights-management information' means any information provided by rightholders which identifies the work or other subject-matter referred to in this Directive or covered by the sui generis right provided for in Chapter III of Directive 96/9/EC, the author or any other rightholder, or information about the terms and conditions of use of the work or other subject-matter, and any numbers or codes that represent such information.'[9]

Although a reference to information such as author names or publisher seems quite innocuous, the reality is that if such information is embedded within a watermark, it is also possible that that watermark will gain legal protection independent of traditional copyright law (indeed, that basic level of information would rarely obtain copyright protection, if at all).[10] In the UK, removing information such as the name of the author, if knowledge of the removal is proven, is an automatic breach of the provision, which brings with it statutory damages.[11] Furthermore, such information, especially when embedded within a watermark, often forms part of other mechanisms such as digital rights management (DRM) or technical protection measures (TPM). Those in turn have additional legal protections to prevent the

[9] Directive 2001/29 of the European Parliament and of the Council of 22 May 2001 on the harmonisation of certain aspects of copyright and related rights in the information society, OJ L 167/10.

[10] See cases such as *Exxon Corp v Exxon Insurance* [1982] Ch 119; *Francis Day & Hunter v 20th Century Fox* [1940] AC 112 (PC Canada) at 122–123; *Bookmakers Afternoon Greyhound Services v Wilf Gilbert* [1994] FSR 723.

[11] s.296ZG CDPA 1988.

breaking of them,[12] provided they restrict access or reproduction of content 'in the ordinary course of operation'.[13] Again, this will lead to a penalty for breaking the mechanism, similar to the removal of a watermark. Legal DRM protection is sufficiently strong that it might negate the need to undertake traditional copyright infringement tests. It is thus more than possible that digital watermarks will have extremely strong legal protection – not just over copyright management information (CMI) itself, but also in relation to DRM.

In addition to these strong legal protections, further measures are in place for matters such as filtering. In the EU, Article 17 of the EU Copyright Directive 2019 requires certain content providers to filter content for potential copyright infringements.[14] Providers such as YouTube use systems such as Content ID to assist with this, which is essentially a form of digital watermarking. In other words, Article 17 is in effect mandating the use of a legal and digital mechanism which already enjoyed strong protection under existing laws. EU Member States are not the only countries to do this – the US has implemented similar provisions.

Taken as a whole, it is possible to observe that the law is directing the development of technology down a particular avenue, one which favours the development of methods to track and trace the use of copyright (or even non-copyright)[15] content. This in turn is incentivising the use of these technologies in the enforcement of copyright, as seen with services such as YouTube. It is thus not such a far-reaching step to see that these technologies can be used in the development of arbitration and mediation; and, indeed, this is already the case in some online services such as YouTube, whose ContentID system already has a DRS attached to it.

In addition to the watermarking trend, there has also been an increased interest in machine learning, and its role in AI. AI can be used to make digital watermarking more secure. Furthermore, the use of AI in the way outlined in this paper could also lead to its own watermark legal protection.[16] ADR already occurs on platforms such as YouTube or Spotify; this paper details exactly how AI can play a role through mechanisms such as NLP. There are two levels – how AI can help to provide evidence that can be used in a case, and how that evidence is in turn utilised by AI in deciding the outcome of a given case.

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[12] See e.g., Art.6(1); Art.7(1) Information Society Directive 2001, or the complete set of s.296 provisions (s.296; s.296ZA–ZG) in the CDPA 1988.

[13] Art.6(3) Information Society Directive 2001.

[14] Art.17 Directive (EU) 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC, OJ/L 130/92. Note that this directive does not have effect in the UK following Brexit.

[15] *Nintendo Company Ltd v Sky UK Ltd* [2020] ECDR 13.

[16] See discussion below.

4. Utilisation of the Legally Favoured Watermarks in AI Systems

4.1 AI and Related Functional Components related to Law

AI already has a profound impact on our daily lives, in healthcare, business, education and, as mentioned, law,[17] moving us toward a more algorithmic society.[18] NLP has seen tremendous progress in the last 4–5 years in relation to translation, text analytics, digital assistants, sentiment analysis, text extraction and text summarisation. NLP has also been shown to provide a significant value to the legal domain, allowing fast processing of unstructured data via keyword extraction and summarisation,[19] information retrieval in legal research,[20] searching for evidence, and even predicting judgments and possibly outcomes.[21] This paper takes an NLP system and applies it to legally protected watermarking information, to establish a method of fingerprinting that assists with dispute resolution by means of ADR, i.e., arbitration and mediation. Many copyright disputes are traditionally resolved outside courts, currently through a system of ADR established by YouTube. AI can act as both assistant and autonomous decision-maker in 3DP disputes. The NPL system can provide assistance as a predictive tool to facilitate the adjudication process, whilst AI can act as an assistant in delivering the adjudication per se.

The 'Attention Is All You Need' paper by Google[22] created a new model paradigm, the Transformers, for language processing and other AI application areas. The model architectures required large amounts of training data and were hungry for computational power. The research for this paper looked elsewhere for language models which can be more suitable. Specifically, it relied on technologies which utilise semantic fingerprinting to develop a custom-trained model and obtain similarity results when processing legal documents and extracting data points of interest. This technology is described as the engine behind the SemanticPro, a product made

[17] See the section immediately above.
[18] D Kaur, S Uslu, K Rittichier, A Durresi, Trustworthy Artificial Intelligence: A review 55 *ACM Computing Surveys* 39 (2022).
[19] V Singh, S Bansal, 'Keyword extraction and summarization from unstructured text', Proceedings of the Symposium on Open Data and Knowledge for a Post-Pandemic Era ODAK22, UK (ODAK 2022) available at https://ucl.scienceopen.com/hosted-document?doi=10.14236/ewic/ODAK22.9 accessed 31/10/2022.
[20] S Kalva, F Geldon, 'Semantic NLP technologies in information retrieval systems for legal research' 2(1) *Advances in Machine Learning & Artificial Intelligence* 28–32 (2021) available at https://opastpublishers.com/open-access/semantic-nlp-technologies-in-information-retrieval-systems-for-legal-research.pdf accessed 31/10/2022.
[21] M Chen, The development and significance of NLP from the perspective of linguistic development and social influence, 19(4) *US-China Foreign Language Exchange* 71 (2021).
[22] A Vaswani, N Shazeer, N Parmar, J Uszkoreit, L Jones, A Gomez, L Kaiser, I Polosukhin 'Attention is all you need' available at https://arxiv.org/abs/1706.03762?context=cs accessed 31/10/2022.

available by cortical.io.[23] Significantly, these technologies hold the legal watermarking protection outlined above and, as argued above, such protection will exist where there is copyright content, and probably exists even where copyright content is not present.[24] This means there is an incentive to invest in this technology, leading to the development of watermarking processes such as semantic fingerprinting, as detailed below. This in turn has consequences for the three key themes identified below: (a) transparency, (b) size of disputes, and (c) a particular technology paradigm of dispute.

4.2 Transparency

AI, in general, poses issues when it comes to transparency. AI transparency issues related to watermarking might pose obstacles in relation to ADR and arbitration and mediation in 3DP disputes as transparency is required in order to collect the necessary evidence, as well as in the adjudicatory process. However, the lack of transparency can be resolved with the use of AI in ADR in the adjudication process. AI may have inherent bias or leanings – accidentally or deliberately – due to the manner in which it is coded. The issue of transparency also arises in relation to the use of AI and watermarking techniques. A watermark does not need to be visible per se – it can be placed within an object in a way that makes it hard for an average user to detect. Watermarks do not usually contain code, but there is no reason why they cannot. There is no requirement to disclose what a watermark contains. Although, as noted in the previous section, there are various rules and laws concerning watermarking, none specifically lay out what a watermark should or should not contain beyond providing what are, in effect, examples of watermarks. There is no requirement of disclosure or standards for watermarks.

Furthermore, the AI systems that might utilise watermarking may themselves have transparency issues. There are limits to how much information an AI company may release due to worries about losing competitive advantage. The empirical research in this paper used a system known as semantic folding.[25] The basics of this technology provide a novel way to be able to process data. Similar to NLP, the system creates a simulated system of neurons and generates predicated associations between words. In the research for this paper, the Semantic Folding system was trained to read and predict cases. The system used provides an accessible web interface by which to train the AI system. Even though there is a white paper outlining precisely how the semantic folding operates, and the output can be described as 'explainable AI', it is not easy to truly predict how such a system will operate at a given time, nor is it fully possible when feeding data into the system to anticipate potential biases.

[23] Cortical.io, 'SemanticPro – Intelligent Document Processing for Unstructured Data' available at https://www.cortical.io/semanticpro.
[24] See above n.15.
[25] Cortical.io, 'White Paper: What is Semantic Folding?' available at https://www.cortical.io/wp-content/uploads/White-Paper_What-is-Semantic_Folding.pdf accessed 31/10/2022.

For example, the approaches of certain judges may come to predominate when the system is being trained. This could particularly apply where there is long-standing case law, meaning the AI system cannot fully appreciate new and upcoming legal doctrine. For example, and as evidence in this research, a bias towards the traditional 'labour, skill and effort' test[26] predominated as compared to the increasingly influential test of the 'creativity' of the author.[27] Under the 'labour, skill and effort' test, the courts have considered to varying degrees the labour, skill, investment, and judgement deployed by the author in the production of the work. The 'creativity' of the author test requires a minimal level of creativity in the artistic work to make their product copyrightable.[28] As per this test , the courts have given importance to the creative and subjective contribution of the author. In relation to this test and the use of data in AI, if the selection or arrangement of the data is an original expression of the creativity of the author of the database, copyright protection is available.[29] However, it is possible for the system to identify the development of such novel data, and share it with system users.

Nonetheless, it is clearly important for any AI system used in arbitration to have a clear set of principles laid out as to how decisions are reached. In the case of watermarking, and in the case of 3DP disputes where ADR, arbitration and mediation are the preferred methods of dispute resolution, that could be through standards that outline what is (and is not) included, and perhaps a requirement that any watermarked goods state clearly whether or not a mark is on, or within, them. For AI, the AI system should disclose the source materials, and list potential biases; alternatively, a list of principles could be produced suggesting core tenants of impartiality that should be met by AI systems in the event of an appeal. This is further detailed in the conclusion of this paper.

4.3 Size of Disputes

A combination of an increased use of watermarking alongside greater use of AI is likely to mean a proliferation of small-scale disputes. Although courts have been keen to stress that works should not be broken down into small elements for the purposes of enabling or disabling copyright infringement claims, clearly watermarking and AI have the potential to achieve this. Watermarks can be placed into small copyright works

[26] *Inter alia Walter v Lane* [1900] AC 539; *University of London Press v University Tutorial Press* [1916] 2 Ch 601; *Designers Guild v Williams* [2001] ECDR 10.

[27] *Response v Edinburgh Woollen Mill* [2020] EWHC 148 (IPEC); *Islestarr v Aldi* [2019] EWHC 1473 (Ch); *Martin v Kogan* [2021] EWHC 24 (Ch); *Pasternak v Prescott* [2023] FSR 293; and *Wright v BTC* [2023] ECDR 273.

[28] C Manning, 'English & Continental Tests of Originality: Labour, Skill, and Judgement versus Creations of the Mind' (May 19, 2016) 5–7 available at https://ssrn.com/abstract=2782052 or http://dx.doi.org/10.2139/ssrn.2782052; see also *Arnold, Walter v Lane revisited (again)* [2021] IPQ 67.

[29] A Rahmatian, 'Originality in UK Copyright Law: The Old "Skill and Labour" Doctrine Under Pressure' 44 *International Review of Intellectual Property and Competition Law* (2013) 9.

(or small elements of larger works), creating potential for more infringing claims to be brought. AI means that these claims are more likely to be automated on behalf of right holders. Currently, there is no system of registration required for copyright works in the UK, although in the US, works need to be registered before an infringement action is begun.[30] It is submitted than an initial requirement of registration be required for the UK, to provide some oversight over the size of copyright works being registered. For example, a film may have a film copyright in it, but it may also have additional copyright works such as the plot, screenwriting, artistic works, characters and music. Typically, a right holder may seek an action for copyright infringement where they consider there has been an infringement over something which holds copyright subsistence. However, even with the newer test of creativity for many works, the test remains of a low standard. This means scope for many works being present within, e.g., a film. The use of watermarks alongside AI will make it easier for copyright infringement lawsuits to be brought for copyright infringements over copyright works, particularly where those works form part of a film.

An additional issue that also arises with smaller-scale disputes is a potential erosion of the traditional copyright balance. For example, being able to track and trace infringements more effectively, along with smaller-scale infringement actions, means it is possible to identify individuals infringing copyright at home. The UK has not traditionally had a defence of private copying (unlike many countries) and instead has relied on basic enforcement difficulties, meaning that private copying was, in effect, permitted.[31] There is also the possibility that more small-scale infringement actions may make fair dealing difficult to apply. For example, one of the requirements is to look at the market of the original work.[32] Watermark tracing can be used to provide precise evidence of copyright markets. For example, it might be possible to state with evidence that a work is purchased only because of its fictional characters, because people search for those when buying and using the work.[33] This evidence might not have been possible before watermarking because there was no means to trace such evidence on a mass scale. Consequently, this is something else that may need to be reformed.[34]

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[30] See 17 USC §408–§412.

[31] Note in *R (on the application of British Academy of Songwriters, Composers and Authors) v Secretary of State for Business, Innovation and Skills* [2015] EWHC 2041, Green J ruled that the private copying exception in s.28B CDPA 1988 was unlawful and that the Copyright and Rights in Performances (Personal Copies for Private Use) Regulations 2014 which implemented s.28B should be quashed.

[32] Consider *inter alia Fraser-Woodward v BBC* [2005] EWHC 472 (Ch); *Sillitoe v McGraw-Hill Book Co* [1983] FSR 545.

[33] Remember this is similar to the tracing that Netflix used to identify and direct future investment – see K Vanhemert, 'The Secret Sauce Behind Netflix's Hit, "House Of Cards": Big Data' (2013) available at https://www.fastcompany.com/1671893/the-secret-sauce-behind-netflixs-hit-house-of-cards-big-data accessed 3/6/23.

[34] See the Conclusion.

4.4 Favouring a Form of Technology

The final point to note is that the current law favours track and trace technology, which is, in turn, pushing development of AI to interface with such technology. As an example from the empirical research conducted for this paper, the embodiment of watermarking technology into semantic folding technology makes a formidable tool not just in terms of technology itself, but because of the additional legal protections that it holds. This additional level of protection tends to push development of both AI and technologies such as semantic folding into enforcement. When this is aligned with smaller levels of infringements being detected, along with transparency concerns, the development of AI and watermarking in this direction will change not just the notion of the copyright balance, but the general direction of societal development. For example, the use of semantic folding – a machine learning approach which converts text into a semantic fingerprint – enables the model to learn quickly with small amounts of training data and then extract details of interest based on context similarity distances. With existing law prioritising enforcement, future investment could become focused on existing copyright boundaries rather than other novel uses of the technology (e.g. use as a vectorisation technology or customer service tool).

Overall, the development of AI conjoined with the development of watermarking means that there will be more evidence available to courts to be able to infer copyright infringement, e.g. in establishing if a substantial part has been taken.[35] As noted above, the technology is being encouraged by law to develop in a direction related to enforcing copyrights. This will also mean more potential actions involving copyright works, because it will be easier to be able to detect infringements. In terms of the impact on copyright law, this will mean more disputes – and consequently, potentially more discussion about the boundaries of copyright subsistence. If there are more cases, it may be asked whether there is too much copyright protection being granted, potentially leading to a situation where the making of new works becomes increasingly difficult without triggering automated infringement proceedings.[36]

4.5 Test Data and Test Results

The above issues concerning transparency, small-scale disputes and the favouring of particular technologies arose in the empirical research for this paper. For the purpose of this research in using advanced AI NLP or natural language understanding (NLU) techniques for copyright dispute resolution (CDR), a total of 150 court documents, available in the public domain, were employed. Of those, 15 were used for training

[35] See section 3 above.

[36] It is worth noting the trend of works highlighting that many copyright works build on earlier works – see M Woodmansee and P Jaszi, *The Construction of Authorship* (Duke University Press, 1994) – so if copyright becomes more strictly enforced, it could become more difficult to make new works. Even under current application of the law, it is possible that Mickey Mouse might not exist – see L Lessig, *Free Culture* (Penguin, 2004) Chapter 1.

the NLP/NLU model, even though higher numbers will result in better extractions by the model. The model was trained and retrained based on the annotations the research team made, and extractions of useful information were taken from the remaining of the documents. Specific information of interest was defined (see Appendix 1).[37] The documents were categorised as 'Court Cases' and 'Settlements'. Information extracted was tagged to belong to any of these types: Subsistence; Infringement; Defences; and Moral Rights. The trained model, after ten tuning operations, was able to extract 2,965 items of interest within a few seconds, with accuracy ranging from mid- to high-confidence (about 50%). Examples of extractions achieved are shown below (sensitive data marked as XXXX in Appendix 1).

In terms of transparency, the cortical system can provide detailed results for predicting future cases. As noted above, this can be skewed towards existing (and more traditional) approaches than those that might be considered 'up and coming'. For example, there is a tendency to stress traditional tests of labour, skill and effort for copyright subsistence rather than the newer tests concerning the creativity of the author.[38] There is a need for such a system to be fully explainable in the use of such information with case hearings. In addition, systems such as semantic folding, due to their nature, favour the revealing of smaller-scale infringements. Such AI systems can be run reasonably cheaply for disputes, so they may become more commonplace – in effect, expanding the scope of the law. There is currently no method by which to identify if this is occurring, so any such system should ideally be checked by an independent body to monitor if there is overreach occurring simply by virtue of the number of cases being brought and successfully prosecuted (or otherwise resolved). As noted, current legal intellectual property (IP) protections favour the development and investment in this form of combined AI watermarking technology through specific protections over both the information and the AI technology. Furthermore, the same procedure can be used with digital evidence itself. The next section considers the specifics of how this technology operates within the existing ADR law concerning 3DP disputes.

5. Deployment of AI Watermarking Evidence in Arbitration

Ongoing technological developments have made it possible for researchers to consider and imagine ADR methods taking place with the assistance of AI.

5.1 AI and ADR: Arbitration

Various issues could arise in the process of CDR, or CDR in relation to 3DP, and which AI could potentially alleviate. For instance, copyright arbitration can be facilitated by AI by means of addressing some of the conventional jurisdictional issues that may arise during arbitration. These include jurisdictional issues deriving from the proper

[37] See Appendix 1.
[38] See above n.26 and n.27.

constitution and exercise of power of the tribunal and, more specifically, challenges to the jurisdiction of the tribunal, i.e., before and after an arbitral award is issued, the removal of an arbitrator for lack of qualities as required by the arbitration agreement,[39] and the need to comply with section 33 of the English Arbitration Act 1996 (AA 1996) imposing a general duty in conducting arbitral proceedings.

Firstly, section 24(1)(a) of AA 1996 refers to the power of English courts to remove an arbitrator where, amongst others, 'circumstances exist that give rise to justifiable doubts as to his impartiality'.[40] The provision creates a direct route for a party to challenge the impartiality of an arbitrator. The lack of impartiality presupposes the absence of any bias held by the arbitrator towards the parties or the dispute. It expects that the arbitrator will approach the arbitration with an open mind and will not have any predisposition towards the parties or the subject matter.[41] Some of the situations which may give rise to a discussion as to whether the arbitrator was indeed impartial relate to professional or personal connections with the parties, current or past client relationships, and repeat appointments of arbitrators. Apart from section 24 of AA 1996, the relevant test for an appearance of bias is set out in *Porter v Magill*, where the question is 'whether the fair-minded and informed observer, having considered the facts, would conclude that there was a real possibility that the tribunal was biased.'[42] Most recently, the issue of arbitral bias arose before the Supreme Court in the case of *Halliburton v Chubb,*[43] where the court reaffirmed the test, but also held that the duty to disclose relevant facts and circumstances which may create doubts of impartiality is also a legal duty under English law. Drawing from *Porter v Magill*[44] and *Halliburton v Chubb*,[45] a wide criterion as to the unbiased arbitrator could be formulated in order to safeguard the unbiased resolution of copyright 3D disputes. Additionally, section 24(1)(b) of AA 1996 establishes that an arbitrator can be removed for not possessing the qualifications required by the arbitration agreement.[46]

Secondly, section 33 of AA 1996 sets out a general duty on the tribunal to act fairly and impartially, adopting suitable procedures and acting without unnecessary delay and expenses. This is a mandatory provision, which establishes the duty of impartiality, breach of which can later give rise to challenges of the arbitrators. The application of this provision can serve as a guarantee for the impartial and neutral resolution of any disputes to be resolved via ADR and arbitration, more so in the case of watermarking and 3DP disputes via the use of AI in arbitration, for the safeguard for neutral and impartial resolution of copyright 3D disputes. Another issue which often arises concerns the jurisdiction and proper constitution of the tribunal.

[39] See s.24(1)(b) of AA 1996.
[40] s.24(1)(a) of AA 1996.
[41] K Noussia, 'Bias of arbitrators revisited' 4 *Journal of Business Law* (2018) 344–366.
[42] *Porter v Magill* [2001] UKHL 67, [103].
[43] *Halliburton Company v Chubb Bermuda Insurance Ltd* (2020) UKSC 48.
[44] *Porter v Magill* [2001] UKHL 67, [103].
[45] *Halliburton Company v Chubb Bermuda Insurance Ltd* (2020) UKSC 48.
[46] s.24(1)(b) of AA 1996.

Specifically, section 67 of AA 1996 allows either party to challenge the substantive constitution of the tribunal which, if successful, could result in the varying or setting aside of the award.

The confidentiality concerned in ADR processes (arbitration and mediation) presupposes prior consent for the collection and usage of relevant data, in line with the GDPR and other related laws. This is important for the resolution of any disputes to be resolved via ADR and arbitration, as well as in the case of watermarking and 3DP disputes via the use of AI in arbitration.

Confidentiality is differentiated from privacy and impartiality in arbitration. Confidentiality is amongst the main reasons why parties choose to arbitrate. Arbitration proceedings are not conducted in public, but the private character of the arbitration proceedings has not always implied that the concepts of confidentiality and privacy are identical. Confidentiality of arbitral proceedings depends upon the ability of the parties arbitrating, and others, to disclose documents and information used or related to the arbitration. In English law, a tort of breach of confidence permits the claimant to restrain the publication of information under a duty of confidence.[47] In *Emmott v Michael Wilson & Partners Ltd*,[48] the issue of the distinction between confidentiality and privacy was raised. It was ruled that because arbitration is private, that privacy would be violated by the publication of documents, so they could only be used for the purposes of the arbitration.

In 3DP disputes using ADR methods (arbitration and/or mediation), confidentiality can still be preserved even if the use of AI will facilitate the process of the dispute resolution. Parties wanting to benefit from the use of various AI tools may wish to consent to the usage of data related to the scope and aim of facilitating in various ways the ADR method (arbitration and/or mediation) used. This is in line with the need to abide with laws such as the GDPR for the protection and appropriate use of data. However, there is nonetheless no technical need to share identifiable data if the parties do not wish to consent to it (such data could be analysed locally and then be anonymised). It will depend on the service used as to the preservation of confidentiality, but given the inherent interests in having it when AI is resolving a dispute, then it is likely that confidentiality will be a feature in such services.

Following the notion of party autonomy, parties to an arbitration appoint the arbitrators of their choice with the required qualifications, expertise, skills, etc. It is essential that arbitrators can demonstrate their impartiality and independence, and are expected to always act fairly and neutrally, and remain unbiased, independent and impartial. Under English law, a party may apply to the court for an arbitrator to be removed under section 24(1)(a) of AA 1996, if that party believes that there are justifiable doubts as to the arbitrator's impartiality.

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[47] *Prince Albert v Strange* (1849) 1 Mac & G 25.

[48] *Emmott v Michael Wilson & Partners Ltd* [2008] EWCA Civ 184.

In 3DP disputes, impartiality must also be preserved as a safeguard and guarantee of the process as well as of the enforcement of the award. A party may challenge impartiality after an award has been issued, and challenge it for serious irregularity under section 68 of AA 1996.

5.2 How AI can Address some of these Jurisdictional Challenges

AI in arbitration in general, as well as more specifically in relation to copyright disputes connected with 3DP issues, could address some of these jurisdictional challenges. For example, the jurisdictional challenge under section 24(1)(b) of AA 1996, with regards to a lack of appropriate qualifications, can be checked with the help of AI prior to commencing arbitration, thus eventually reducing the risk of arbitrators being removed later on for this reason. In the context of 3DP disputes, the AI tool may check for and require the possession of specific knowledge, expertise and qualifications in this area – e.g., experience in copyright infringements. This would be a very important means of preventing later challenges based on qualifications and would therefore contribute to the smooth commencement and running of the arbitral proceedings. That is because it upholds party autonomy and the parties' freedom to appoint their decision-makers, which is one of the founding pillars of arbitration, while also ensuring their ability to enter arbitral proceedings with the full knowledge that their arbitrators possess the relevant qualifications to hear the dispute. Therefore, with the help of AI in arbitration, the prospect of a challenge against an arbitrator's qualifications in relation to 3DP copyright disputes can be resolved or minimised by having qualifications checked in advance through the AI tool.

The question of whether the tribunal has jurisdiction to hear the dispute in the first place could also be checked by virtue of AI in advance. The tool proposed by this paper inhabits an online system for 3DP CDR, whereby the parties could agree that the tribunal has jurisdiction to hear the dispute in an online and AI environment by depositing consent forms in advance. AI will assist in examining data and proceeding faster to the substance of the 3DP copyright dispute, namely the copyright infringement and the observation of the digital watermark. At a further future step, AI can also implement the use of robo-judges to help decide instead of a tribunal composed of humans decision-makers.

In addition, AI can also assist with compliance with section 33 of AA 1996, which relates to the general duty of the tribunal. Following COVID-19, there has been an urgent need for the transformation of arbitral rules and proceedings in response to increased digitalisation. For example, the LCIA Arbitration Rules 2020 amendments[49] incorporated the need for online dispute resolution, at least in some parts. For instance, a request for arbitration and response thereto can be submitted electronically and so can the correspondence between parties take place; moreover,

[49] The London Court of International Arbitration, LCIA Arbitration Rules 2020, effective 1 October 2020.

the issuing of awards in electronic form 'shall prevail' over the paper form in case of disparity, according to the 2020 Rules (Article 26.7). The parties and arbitral tribunal can make contact in person at a hearing, or virtually by conference call, videoconference, or other technology, after receipt of notification of the formation of tribunal (Article 14.3). Hearings can take place in person, virtually by conference call, videoconference, or other technology (Article 19.2). In contrast, the London Court of International Arbitration (LCIA) Arbitration Rules 2014[50] made no reference to the possibility to have virtual hearings.

Furthermore, AI can assist in streamlining these processes and help to make the process of 3DP CDR faster and more neutral via the use of ADR methods and machine learning. The integration of AI in arbitration promotes consistency and predictability in decision-making. AI-powered analytics can help identify patterns and trends in past arbitration decisions, enabling parties and arbitrators to make more informed and reliable judgments. Most AI tools today use machine learning, wherein the AI identifies patterns and varies its algorithm based on existing data and user feedback. AI tools today often make use of deep learning and natural language processing to perform tasks that require human intelligence and present them in comprehensible form.[51] All of this can assist and hasten the process of 3DP CDR via the use of ADR methods.

Furthermore, the International Chamber of Commerce (ICC) Rules[52] address online dispute resolution. Appendix IV provides for the usage of 'telephone or video conferencing for procedural and other hearings where attendance in person is not essential and use of IT that enables online communication among the parties, the arbitral tribunal and the Secretariat of the Court.'[53] Appendix IV is attached to the interpretation of Article 22 'Conduct of the Arbitration', wherein the tribunal and the parties shall ensure 'effective case management'.[54] In addition, the ICC International Court of Arbitration issued a Guidance Note on Possible Measures Aimed at Mitigating the Effects of the COVID-19 Pandemic.[55] It includes considerations of conducting

[50] Ibid.
[51] T Bello, 'Online Dispute Resolution Algorithm; Artificial Intelligence Model as a Pinnacle' 84(2) *The International Journal of Arbitration, Mediation and Dispute Management* 159, 161 (2018); A Chauhan, 'Future of AI in Arbitration: The Fine Line Between Fiction and Reality' (2020), Kluwer Arbitration Blog, 26.9.2020, available at https://arbitrationblog.kluwerarbitration.com/2020/09/26/future-of-ai-in-arbitration-the-fine-line-between-fiction-and-reality/?output=pdf
[52] See n.49.
[53] Ibid., Appendix IV, Case Management Techniques, paragraph f.
[54] Ibid., Art.22.2.
[55] The ICC International Court of Arbitration issued a Guidance Note on Possible Measures Aimed at Mitigating the Effects of the COVID-19 Pandemic, 9 April 2020, available at https://iccwbo.org/content/uploads/sites/3/2020/04/guidance-note-possible-measures-mitigating-effects-covid-19-english.pdf accessed 19/03/2022.

conferences and hearings by audio conference, video conference, and other virtual hearing modes.

This signifies the extent to which and pace with which technology has penetrated legal dispute resolution. While it is believed that such transformation would have been introduced regardless, the COVID-19 pandemic seems to have seriously accelerated the process. Therefore, the application of AI can ensure compliance with allowing the parties a fair hearing and preventing an unnecessary delay by relying on platforms for online hearings. This will in turn also ensure effective case management and prevent backlogs, especially in relation to 3DP copyright disputes, whereby the proliferation of 3DP is expected to also augment the volume and number of the disputes that arise.

However, together with the benefits of AI in addressing jurisdictional issues, there is a clear need for regulation of some new developments. Otherwise, online dispute resolution assisted by AI can give scope for new, unanticipated reasons to challenge the constitution of the tribunal, or later the award itself.

In response to this, the Guidance Note by the ICC International Court of Arbitration[56] has provided for certain strategies to cope with the necessary use of AI in arbitration. For example, the requirement of a cyber-protocol has been introduced. Any virtual hearing requires a consultation between the tribunal and the parties with the aim of implementing measures – often called a cyber-protocol – sufficient to comply with any applicable data privacy regulations. Such measures shall also deal with the privacy of the hearing and the protection of the confidentiality of electronic communications within the arbitration proceedings and any electronic document platform. Otherwise, the traditional challenge to a tribunal's jurisdiction may take the form of a challenge against a tribunal's decision to proceed with a virtual hearing and with the assistance of AI without the parties 'consent or despite their objection. Therefore, the tribunal should be once again guided by the powers vested in them by virtue of the arbitration agreement and must justify their decision for virtual hearings (e.g., mindfulness of unnecessary delay, costs, and ensuring effective case management). This is in line with the suggestion above that the challenge of the tribunal's substantive jurisdiction under section 67 of the Arbitration Agreement could be circumvented by requiring the parties to file consent forms in advance of the arbitral proceedings.

Another element is agreeing on a procedure for the taking of evidence from fact witnesses and experts to ensure that the integrity of any oral testimonial evidence is preserved. This also relates to the organisation and presentation of oral pleadings; agreeing on the modality of presenting evidence; on the examination of witnesses and experts; and ensuring that there are no concealed communications between the parties and counsel/experts/witnesses.

The Guidance further suggests the use of an electronic hearing bundle hosted on a shared document platform to which all participants have access, and the need to

[56] Ibid.

identify which issues can or must be on a hearing agenda, and which can be dealt with on a 'documents only' basis. This corresponds with the tribunal's duties under sections 33–34 of AA 1996. This proposed use of digitalised means of evidence procurement can ensure the fast and effective resolution of 3DP copyright disputes.

An additional issue is the need to ensure sufficient technical capability on the part of the arbitrator(s), counsel and parties, and familiarity with the technology agreed to by the parties prior to the commencement of the proceedings. This could include consideration of potential tutorials for everyone involved in the proceedings. With technology there is always the risk of sudden technical failures which could threaten the hearing. Therefore, the Guidance Note suggests that contingency plans must be in place. Furthermore, there are considerations of privacy requirements, for example in the context of the tribunal deliberations, as well as the security of the virtual hearing, for example with regards to protection against hacking. The presence or availability of IT experts is the final consideration of the Guidance Note.

Finally, it is also believed that AI can assist arbitrators with their case- and process-management, the gathering and analysis of facts, and with their decision-making, by providing prediction models.[57] This could be achieved through AI applications which use NLP to assist in scheduling and planning workloads, and extensive document review and data identification, which could deliver awards of better quality through reliance on predictive data analytics.[58] Such predictive data analytics can have a positive impact on establishing ADR as the prevalent method of 3DP CDR.

5.3 AI and Alternative Dispute Resolution: Mediation

Mediation can be defined as 'a flexible process conducted confidentially in which a neutral person actively assists parties in working towards a negotiated agreement of a dispute or difference, with the parties in ultimate control of the decision to settle and the terms of resolution.'[59] However, recent case law highlights the issues which might arise during mediation and lay the ground for a later claim before national courts. For instance, in *Frost v Wake Smith and Tofields Solicitors*[60] an appeal arose following mediation between two brothers over the division of their shared property and business interests. Tomlinson LJ gave judgment on whether a settlement agreement was enforceable as it was not very detailed. The solicitors were advised to bring a draft settlement agreement to the mediation process so that a properly drafted settlement could be drawn by the end of the day. The question at hand

[57] H Eidenmüller, F Varesis, 'What is an Arbitration? Artificial Intelligence and the Vanishing Human Arbitrator' (June 17, 2020) available at https://ssrn.com/abstract=3629145 or http://dx.doi.org/10.2139/ssrn.3629145 accessed 19/03/2022.
[58] Ibid.
[59] Centre for Effective Dispute Resolution, 'What is Mediation?' available at http://www.cedr-asia-pacific.com/cedr/mediator/faq.php accessed 19/03/2022.
[60] *Frost v Wake Smith and Tofields Solicitors* [2013] EWCA Civ 772.

concerned whether the appellant's solicitor was in breach of duty in failing to draft a legally binding agreement that resulted from the mediation.

Tomlinson LJ stated that, even though the solicitor has a duty to advise his client of the nature of the process and of the status of any agreement reached as a result, the process of mediation should be approached with maximum flexibility, recognising that sometimes it will result in a binding agreement, and sometimes it will not. The *Frost* case serves to illustrate that in the context of copyright infringements and the use of AI in dispute resolution, the algorithm needs to be developed to ensure full transparency as to the status of any agreement the parties may reach. Perhaps, the AI-assisted dispute resolution can grant the parties the option to choose whether they would like to finish the process with a legally binding agreement. The legitimacy of the system needs to be ensured so that it can then be used as evidence before a court if ADR fails. AI assisted mediation can act as a 'safety net' mechanism for effective 3DP CDR.

Establishing the legitimacy of the system and enabling the parties to place their trust in the process will also serve to prevent later claims that the process of ADR and any subsequent agreements were conducted under economic duress or threats. While it is known that principles of confidentiality and privilege apply in mediation, in the interests of justice (or where consent is granted) a mediator may be required to give evidence at trial of whether a mediation settlement agreement was entered into under economic duress.[61] Similarly, the case of *Ferster v Ferster* examined whether threats permit that the settlement agreement be opened and scrutinised.[62] An alleged wrongdoing was found to amount to blackmail. As a result, the contents of an email that would normally be protected by the without prejudice privilege fell within the impropriety exception to prejudice; and the shareholder was permitted to rely on what otherwise would have been treated as privileged material. Consequently, the risk of threats, economic duress and dishonesty is another aspect to effective dispute resolution that may need to be somehow prevented in an AI-assisted environment. The authors of this paper hope that their proposed AI-assisted dispute resolution tool will be able to address this by creating an algorithm which can alert the parties against the use of certain expressions, and which can also be applied in 3DP copyright disputes.

Finally, national courts have on a number of occasions encouraged the parties to consider the resolution of a dispute by an appropriate ADR procedure and have reiterated that unreasonable failure to do so may result in sanctions.[63] Therefore, AI-assisted dispute resolution in the context of copyright infringements could provide an informal way of attempting to resolve the dispute by means of ADR, thus avoiding

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61 *Farm Assist Ltd (In Liquidation) v Secretary of State for the Environment, Food and Rural Affairs* [2009] EWHC 1102 (TCC), [2009] 5 WLUK 444.

62 *Ferster v Ferster* [2016] EWCA Civ 717, [2016] 7 WLUK 232.

63 E.g. *Pravin Patel, Nalini Patel v Barlows Solicitors (a firm), Paul Stanley and Paul Barber (as joint trustees in bankruptcy of Drupad Chorera), Mr Nirmal Tanna* [2020] EWHC 2795 (Ch), [2020] 10 WLUK 408.

later judgments by a court that the parties should have attempted mediation first, for example. The potential advantages of AI-assisted dispute resolutions, such as added flexibility and accessibility, and cost- and time-efficiency should encourage the parties to pursue this as a means of dispute resolution, for the effective, neutral and fast-paced resolution of 3DP copyright disputes.

5.4 Possible New Issues and Concerns with AI-Assisted Dispute Resolution

The introduction of AI in dispute resolution undoubtedly raises questions as to how this will be perceived by the parties. Will the parties challenge the proper usage of AI in dispute resolution itself? As stated above, watermarking can help avoid this, guaranteeing veracity, authenticity and transparency.

At present, certain technology platforms use different algorithmic techniques to help with information and case prediction, and courts accept their outcomes. However, these systems are not used for comprehensive adjudication but rather to enhance the court's capacity.[64] Some practical examples include Simmons & Simmons AI-driven conflict prediction tool for EU trade mark conflicts[65] and Solomonic, which is a data and analytics platform that uses proprietary machine learning and input from practitioners to go through High Court claims, documents and court hearings to evaluate settlement patterns, determine litigation tactics and enhance estimates and predictions.[66] Another example is YouTube's Content ID Dispute Processes, which seek to protect copyright material and resolve copyright infringements. For example, rights holders can upload content to which they have exclusive rights as reference files under the 'digital fingerprinting system'. The system scans videos on YouTube's databases for matches of that content submitted by content owners. If there is a match, the video gets a Content ID claim. Actions that the rights holder can take against alleged copyright infringements include blocking the video from being viewed, monetising the video by running ads against it or tracking the video's viewership statistics.[67] Another tool is the Persuader, a platform where a mediator uses case-

[64] J Cockburn, 'Holding back the tide: The rise of the machines in arbitration '(Thomson Reuters Practical Law Arbitration Blog, 1 August 2019), available at http://arbitrationblog.practicallaw.com/holding-back-the-tide-the-rise-of-the-machines-in-arbitration accessed 19/03/2022.

[65] T Little, 'Rocketeer prepares for take-off: exclusive first look at Simmons & Simmons' AI-driven conflict prediction tool' 20 January 2020, available at https://www.worldtrademarkreview.com/rocketeer-prepares-take-exclusive-first-look-simmons-simmons-ai-driven-conflict-prediction-tool accessed 19/03/2022.

[66] Solomonic litigation analytics, available at https://www.solomonic.co.uk accessed 19/03/3033.

[67] Google, 'How ID Content Works' available at https://support.google.com/youtube/answer/2797370#zippy=%2Cwhat-options-are-available-to-copyright-owners%2Cwho-can-use-content-id accessed 19/03/2022 also 'Dispute a Content ID Claim' available at https://support.google.com/youtube/answer/3244015?hl=en-GB) accessed 19/03/2022.

based reasoning for resolving conflicts in the labour domain.[68] The system keeps track of the agreements found in past negotiations. Once conflict arises, it looks for the most similar past situations. Another well-known example is ROSS, a digital attorney built using IBM's Watson AI platform.[69] It understands natural language legal questions and provides expert answers, cutting down on legal research time and energy. It is able to make recommendations and detect patterns, but lacks capacity to detect connections between different sets of data.[70]

However, the emergence of AI-assisted dispute resolution may create new challenges. It is suggested that to introduce an intelligent system into dispute resolution, a degree of formality is required to ensure the process abides by judicial order and guarantees property rights and reciprocal obligations; a registry which proves compliance with the required steps to resolve a dispute; and adequate record-keeping.[71]

Therefore, one of the leading concerns is the need for transparency. Transparency could be an issue with AI-assisted dispute resolution because algorithms are often not transparent; data is input and outcomes generated with no explanation or justification.[72] Thus, the reasons for their outcomes may not be understood and the reliability and fairness of the system may be doubted.

An additional concern is algorithm bias: when a database reflects an underling bias, this also shows up in the algorithm.[73] While it is agreed that addressing algorithm bias is easier than addressing human bias, resolution of that concern is necessary. To resolve this, increased transparency and identification of the factors that lead to an outcome are required, so as to neutralise those that are objectionable.[74] Perhaps, there would be an increased need to provide publicly available information on the processing methods of AI systems and to grant the parties sufficient explanation for AI-assisted outcomes. The Council of Europe recommended that at least some key information about the algorithm is provided to the public, such as 'which variables are in use, which goals the algorithms are being optimized for, the training data and average values and standard deviations of the results produced, or the amount and type of data being processed by the algorithm'.[75] Hence, there is need for a robust

[68] R Lin, Y Gev, S Kraus, 'AniMed*: An Automated Animated Mediator for Facilitating Negotiation with People' (2011) available at https://u.cs.biu.ac.il/~linraz/Papers/linetal-eumas11.pdf accessed 19/03/2022.
[69] https://rossintelligence.com accessed 31/10/2022.
[70] M Minsky, S Papert, *Perceptrons: An Introduction to Computational Geometry* (MIT, 1988) xii; see also N Lozada-Pimiento, 'AI Systems and technology in dispute resolution' 24(2) *Uniform Law Review* 348 (2019).
[71] N Lozada-Pimiento, ibid. 56.
[72] A Zuckerman, 'Artificial intelligence – implications for the legal profession, adversarial process and rule of law' (2020) 136 *Law Quarterly Review* 427, 436.
[73] Ibid., 437.
[74] Ibid.
[75] Council of Europe study DGI(2017)12, 'Algorithms and Human Rights: Study on the human dimensions of automated data processing techniques and possible regulatory implications' 38,

transparent regulatory regime on using and deploying watermarks and blockchains: even if the best AI-assisted technology is in place, without trust in it, there will be no massive use potential – to have an AI tool that is obsolete in terms of use frequency is not optimal.

Therefore, the level of trust in the mediation/arbitration in the AI system is crucial; some research suggests decreased engagement with a virtual agent during dispute resolution.[76] It is suggested that the reliability of automated systems is intertwined with legitimacy.[77] Therefore, human intervention should always be ensured. This is in line with the EU General Data Protection Regulation, which recognised the right 'not to be subject to a decision based solely on automated processing'.[78] Similarly, the European Commission for the Efficiency (CEPEJ) Justice of the Council of Europe has emphasised the need for a 'hybrid' model of online dispute resolution, which features AI recommendations and human decision-making.[79] Likewise, machine learning and AI tools cannot replace human decision-makers. While AI can be equipped with intelligence to extract complex information and patterns from large volumes of data, it cannot yet be taught the relationship between context and meaning,[80] even though recent developments with Transformer models indicate that this might become a reality by the end of the decade.

Last but, not least, it is also proposed that the AI system would be controlled each time in institutional arbitration or in *ad hoc* arbitration or mediation by the employed arbitral/mediation panel and a neutral appointed agency/auditor to guarantee its functionality and independence in processing the data. This would promote neutrality, impartiality and independence throughout the process. Further, it would help establish as valid and trustworthy the whole system used in 3DP and watermarking disputes by arbitration, assisted by an AI system, and in this way promote its vast deployment by the party involved each time in 3DP disputes.

In relation to 3DP copyright disputes, overall, AI is there to assist in examining data and proceeding faster to the substance of a dispute – the copyright infringement and the observation of the digital watermark. In the context of 3D printing disputes, the AI tool may check for and require the possession of specific knowledge, expertise, and

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available at https://rm.coe.int/algorithms-and-human-rights-en-rev/16807956b5. See also ibid., 427–453.

[76] University of Southern California, 'Do we trust artificial intelligence agents to mediate conflict? Not entirely' Science Daily, 16 October 2019, available at https://www.sciencedaily.com/releases/2019/10/191016094909.htm accessed 19/03/2022.

[77] N Lozada-Pimiento, n.70, at 356.

[78] Art.22 EU General Data Protection Regulation, Regulation 2016/679 .

[79] The European Commission for the Efficiency of Justice, 'European ethical Charter on the use of Artificial Intelligence in judicial systems and their environment' 3–4 December 2018, Strasbourg, 44–46, available at https://rm.coe.int/ethical-charter-en-for-publication-4-december-2018/16808f699c accessed 19/03/2022.

[80] Ibid.

specific qualifications in this area – for example, legal knowledge of copyright infringement.

Watermarks act as a permanent labelling and recording method to be used to verify the veracity and authenticity of documents and is able to act as the required credentials for the copyright infringement checking process and verification. It can assist with the pace of evidence collection and be able to assist with the establishing of authenticity. The AI system we propose will facilitate the collection of evidence of legal disputes and enable their faster resolution. Evidence will be deposited and be ready to be used. This can fast track the whole process.

The system could ease or prevent procedural issues, although as seen above, new AI-based and online-based issues may arise based on the reliability and functioning of the tool. However, it is hoped that blockchain technology will assist in building a trustworthy tool. A vast array of individuals use these 3DP file websites and in most situations copyright litigation does not arise. IP laws affect people in 3DP differently according to the nature of their business.[81] Nonetheless, litigation over 3DP will become increasingly prevalent as the technology becomes cheaper to build, and demand will rise. This will prompt legislation reforms to deal with innovations in the field and the issues involved. ADR and AI can help proliferate the dispute resolution process.

Legislators need to address the strengthening of IP law to protect copyright holders and to keep the law open to innovation. Any reform in IP law must be comprehensively examined to meet the desired goals of sufficient protection to balance all competing interests whilst overall supporting new technologies instead of impeding their development.[82]

5.5 The Way Forward?

The way forward could be a hybrid system in which AI will be efficient in addressing some of the potential jurisdictional/procedural issues but will always be 'controlled' by human arbitrators. Human–computer interaction is vital, but equally vital is allowing humans assume control, especially in complex cases, where AI may not be capable of understanding the context of certain information and its relation to present facts. There has been outcry over dispute resolution systems used by some social media platforms and content providers that have not only erroneously removed

[81] S. Claire, 3D Printing and Intellectual Property: Are the Laws Fit for Purpose?, 3D Natives, 15.3.2023, available at https://www.3dnatives.com/en/3d-printing-and-intellectual-property-are-the-laws-fit-for-purpose-150320235/#! accessed 23/10/2023.

[82] NS Ghoumman, 3D Printing, Interactive Robotics and Artificial Intelligence Disrupting Intellectual Property Laws, Courting the Law, Commentary, 9.7.2020, available at https://courtingthelaw.com/2020/07/09/commentary/3d-printing-interactive-robotics-and-artificial-intelligence-disrupting-intellectual-property-laws accessed 23/10/2023.

or blocked content and accounts, but also failed to provide human intervention to quickly resolve obviously erroneous decisions.

AI can help arbitration through supervised learning: a computer can be taught to identify relevant documentation, to extract, analyse and scan a substantial number of documents labelled as relevant, and create a model. But a human presence will, for now and for the foreseeable future, be required. AI is not meant to replace human decision-makers; it is there to provide an increased access to justice by offering a time-/cost-efficient and accessible means of dispute resolution. In relation to 3DP copyright disputes, which are forecast to proliferate in the near future, this can be a valuable tool for the effective service of justice.

5.6 Interim Findings

This discussion has highlighted the possible ways in which AI can assist ADR processes, and in particular ADR processes related to the adjudication of 3DP copyright disputes. Arbitration can be facilitated by AI by means of addressing some of the conventional jurisdictional issues that may arise during arbitration, e.g., automated checks of required qualifications ahead of arbitration to ensure the right level of expertise and prevent the later displacement of the arbitrator, such as is required in 3DP cases. In this way, party autonomy is also automatically upheld. This reflects the needs that arose during the COVID-19, and there will continue to be a push for online processes in the post-pandemic era; this is already depicted in many revised arbitral institution rules.

In addition, AI can assist arbitrators with case management and in predicting outcomes. In mediation, case law such as *Frost v Wake Smith and Tofields Solicitors*[83] has demonstrated that as far as the use of AI in dispute resolution is concerned, the algorithm needs to be developed to ensure transparency of any agreement concluded between the parties. It is suggested that, at least for now, a hybrid system between AI and human interaction in ADR in 3DP cases could be the way forward.

6. Future Reform

It can be concluded that the current legal regime favours the development of watermarking technology when AI is utilised as part of dispute resolution. That protection currently requires potentially tenuous links to AI (though this is not entirely certain). The AI system favours a particular form of fingerprint watermarking, which can be applied to both the understanding of existing laws and regulations, as well as to the evidentiary materials themselves. As noted, under current ADR laws, the use of such AI is entirely possible and can be (and is) utilised in a complementary manner to existing dispute resolution.

[83] *Frost v Wake Smith and Tofields Solicitors* [2013] EWCA Civ 772.

The consequence of this is that watermarking AI technology – and consequently online arbitration – is being pushed, without consideration by legislators, in a particular direction. For example, the current system favours the development of more complex watermarking systems which can be applied to evidence itself, thus leading to increasing automated justice, rather than just purely acting as an aid for judicial decision-making (setting aside the issues of judicial bias that might result). It would thus be preferable for legal regulation to clarify how watermarking (and the use of AI, such as semantic folding) is to be used within ADR. Currently, the use of watermarking and AI in complex and novel ways is favoured – ideally, there should be a debate as to how far this complexity and novelty is desired as part of ADR. To what extent should ADR become autonomous? To what extent should AI algorithms play a role in preliminary justice systems? These are societal issues that should be addressed in legal regulation, yet to date this has not happened. This paper argues that a hybrid system, rather than entirely automated justice, is the way forward, but a broader societal debate is required, and regulatory reform needed, in order to determine the direction of watermarking AI.

7. Conclusion

'Convergence' is often used within computer science in reference to how technologies can combine as they develop in order to strengthen their use and application.[84] This paper has demonstrated that there is a convergence of technologies relating to watermarking, AI and its subdomain, natural language processing. This combination leads to a particularly extensive system that can be used as part of ADR, either as the entire system itself or as a means by which to aid existing processes. This convergence is in part due to the nature of the technologies themselves, but it is also a consequence of legal protections, particularly the protections granted over watermarking technologies. This protection favours more complex technologies, of the sort that this paper considers for NLP further to the authors' empirical research.[85]

A system – such as that in the research – has potential ramifications not just in terms of law, but also for the way in which individuals engage with society. Justice is invariably served with some human discretion, and there is always a gap between the legal system and the day-to-day activities of individuals. Individuals do not expect the law to be rigidly applied to all activities, and individual acts must reach a certain degree of severity before the legal system engages with it. The convergence of watermarking, AI and NLP technologies reduces the need for that severity. It increasingly brings the (legal) resolution of disputes to the individual citizen, meaning that smaller disputes are more likely to be adjudicated, whether by human or by a

[84] See *inter alia* W Bainbridge, M Roco, 'Science and technology convergence' 7 *Journal of Nanoparticle Research* 211 (2016); M Roco, 'Coherence and divergence of megatrends in science and engineering' 4 *Journal of Nanoparticle Research* 9 (2002).

[85] As per the empirical work detailed in section 3; also note the Appendix.

computer. The leeway that society has traditionally entertained – the safety valve that exists around the law in the individual – is being eroded. This is why this paper has argued that the development of such systems should be more as a support for existing resolution, rather than as a new free-standing form of regulation.

Nonetheless, it is clear that the direction of development of technology is such that increasing use of AI and watermarking, for instance within ADR, is likely. It is not just that the technology is going in that direction itself due to convergence, but also that the market demands it. However, individuals' relationships with both the state and private companies could become strained. This has been seen in cases where individuals have been sued for copyright infringements in ways that they might not have expected, through the machinations of YouTube's Content ID system.[86] This is not to say whether these systems are right or wrong, but it does highlight that an increasing growth of low-level interactions by individuals that would otherwise not be so regulated. Distribution of speech online is more likely to be regulated through copyright adjudication systems than an individual simply reading out a speech in a public place. It is therefore proposed that regulation in this area should consider the changing nature of the technology, and the impact of that upon individual–state relationships.

This paper demonstrates how technological convergence and technological developments can occur, showing how individuals' relationships are impacted by the development of these systems. Furthermore, it demonstrates that the impact of legal protection can occur in unexpected ways – it is doubtful that legislators would have considered the impact of watermarking provisions upon AI in the use of arbitral disputes, given that these provisions were first introduced in 1996.[87] The future is always going to be one of convergence; and it will always lead to new challenges, not just to the state, but also in the way in which individuals relate to one another using such technologies. Just as there has been a questioning of law and political technologies in the distant past,[88] a discussion is now required about the way in which individuals are impacted by technologies such as watermarking AI. It calls for a rethinking of how individuals want to engage with the state and private law, of how digital law should become enmeshed within the daily actions of individuals, and it poses a question for us all: not only what do we want from our technologies, but also what do we want from our regulators in this new era of converged watermarked-AI-NLP technologies?

[86] One amongst many – https://www.bbc.co.uk/news/blogs-trending-51090857 accessed 31/10/2022.
[87] See discussion above, n.39.
[88] E.g. M Heidegger, *The Question of Technology* (Harper, 1977) *inter alia* 12.

Appendix 1:

The following information of interest was defined:

Bias
Case type
Claimant
Confidentiality disclosure
Court date
Court name
Creative fingerprint
Fraud, Dishonesty, Duress
Judgment
Legal principle
Mediation settlement agreement
Parties
Reasonableness
Referenced cases
Refusal to mediate
Reproduction
Right against derogatory treatment
Right not to be named
Right to be named
Subsistence

Appendix 2:

Bias	88.. There is a close relationship between the concept of independence and that of impartiality
Case type	Copyright
Claimant	InfXXXX International
Confidentiality and Disclosure	A failure of an arbitrator to make disclosure in the circumstances described in para 153 above is a factor for the fairminded and informed observer to take into account in assessing whether there is a real possibility of bias

Court date	15-Jan-99
Court name	High Court of Justice
Creative fingerprint	The starting point for considering this submission must be s.1(1)(a) CDPA. To satisfy that subsection the headline must be 'a work' and both 'original' and 'literary.' A headline is plainly literary as it consists of words. The word 'original' does not connote novelty but that it originated with the author. This test was clearly established in the domestic law of England by the decision of Peterson J in University of London Press Ltd v University Tutorial Press Ltd [1916] 2 Ch 601 approved by the House of Lords in Ladbroke (Football) Ltd v William Hill (Football) Ltd [1964] 1 WLR 273

Fraud, Dishonesty, Duress	The dispute with which I am concerned is not that dispute but the dispute whether the settlement agreement was entered into under duress.
Judgment	THE EAEL XXXX. said that the judgment of North J. having been for an interim injunction, and the parties having agreed when in the Court of XXXX that the case should be treated as if it were a hearing of the cause, there would be judgment in this House for a perpetual injunction.
Legal principle	16 (1) The owner of the copyright has, in accordance with the following provisions of this Chapter, the exclusive right to do the following acts in the United Kingdom, (a) to copy the work (see section 17); (b) to issue copies of the work to the public (see section 18);