AI in ADR: Building Consensus Around the Path Forward

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Conference Reference Materials

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SILICON VALLEY ARBITRATION AND MEDIATION CENTER

GUIDELINES ON THE USE OF ARTIFICIAL INTELLIGENCE IN ARBITRATION

DRAFT of 31 August 2023

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FOREWORD

[TBC]

INTRODUCTION

These Guidelines on the Use of Artificial Intelligence in Arbitration (the **Guidelines**) introduce a principle-based framework for the use of artificial intelligence (**AI**) tools in arbitration at a time when such technologies are becoming increasingly powerful and popular. They are intended to assist participants in arbitrations with navigating the potential applications of AI.

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These Guidelines can be used in domestic or international arbitrations and are meant to serve as a point of reference for arbitral institutions, arbitrators, parties and their representatives (including counsel), experts, and, where relevant, other participants in the arbitral process. To that end, the Guidelines provide a Model Clause that can be incorporated into procedural orders to make the Guidelines applicable to all participants involved in a particular arbitration proceeding.

The Guidelines are prefaced by preliminary provisions which clarify the scope and application of the principles contained herein. The body of the Guidelines is organised into three chapters: one chapter containing Guidelines that generally apply to all participants in the arbitration process, regardless of their role; a second chapter containing Guidelines that address specific uses of AI by parties and party representatives (including counsel); and a third chapter with Guidelines addressing particular considerations that may arise when arbitrators use AI.

In a separate section, the Guidelines offer examples of both compliant and non-compliant uses of AI in arbitrations. These examples are illustrative only to clarify the practical implications of the Guidelines and provide a yardstick to measure conformity in real-world scenarios.

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SUMMARY OF GUIDELINES

PRELIMINARY PROVISIONS

Application of the Guidelines

These Guidelines shall apply when and to the extent that the parties have so agreed and/or following a decision by an arbitral tribunal or an arbitral institution to adopt these Guidelines.

Commentary

The Guidelines seek to establish a set of general principles for the use of AI in arbitration. Intended to guide rather than dictate, they are meant to accommodate case-specific circumstances and technological developments, promoting fairness, efficiency, and transparency in arbitral proceedings.

These Guidelines may be adopted, in whole or in part, in the arbitration agreement or by the parties and/or the tribunal at any other time subsequently, including during the course of arbitral proceedings (*see* Model Clause for inclusion in Procedural Orders).

As applied to international arbitrations, the Guidelines acknowledge the multi-faceted and multi-jurisdictional nature of such proceedings. Given the potential for various national laws to apply – for instance, an arbitration seated in Paris, governed by Mexican law, with hearings in Hong Kong– it becomes necessary to harmonise the potentially disparate local and international standards relating to the use of AI.

Accordingly, these Guidelines do not intend to replace or override local AI laws or regulations (*see* non-derogation of any mandatory rules). Instead, they serve as a supplementary international standard that provides a common denominator for AI's ethical and effective use in international arbitrations.

Development of best practices around the use of AI in international arbitration is only beginning, and these Guidelines aim to contribute to that effort. As such, they are a tool that assists parties, arbitral tribunals, institutions and others in navigating the application of AI, with an understanding that technologies, local laws and international standards will continue to evolve.

Definition of AI

As used in these Guidelines, the term "AI" refers to computer systems that perform tasks commonly associated with human cognition, such as understanding natural language, recognising complex semantic patterns, and generating human-like outputs.

Commentary

There is no single definition of AI, and even existing definitions may evolve over time. For this reason, it is essential to clarify how the term should be understood in the Guidelines.

The definition adopted is meant to be broad enough to encompass both existing and future foreseeable types of AI but not so broad as to encompass every type of computer-assisted automation tool. Rather, the definition focuses on modern technologies that tend to be more autonomous, complex, multifunctional and probabilistic than traditional automation tools based on rule-based deterministic logic.

Modern AI systems are usually based on machine learning, a set of computer science techniques that allow machines to learn patterns and make intelligent predictions based on the data on which they have been trained. Machine learning algorithms have existed for decades and are employed behind the scenes in various technology products used by dispute resolution professionals, such as spelling and grammar checkers, email spam filters, search engines, optical character recognition (also known as "OCR"), and machine translation.

With the advent of technological advances such as deep neural networks, large language models and generative AI, however, it has become possible for the general public to interact with multi-purpose AI systems directly. The potential uses for AI in the field of dispute resolution has exploded, even as the risks and limitations of these tools have become more difficult to comprehend. For example, deep neural networks can learn highly complex patterns and abstractions. Still, these patterns are recorded in a largely indecipherable form even to the computer scientists who created

the models. Moreover, such models generate outputs based on statistical probabilities rather than a defined set of rules.

Large language models are a type of deep neural network trained on vast amounts of textual data and capable of generating natural-sounding and plausible (but not necessarily accurate) responses to a given prompt. AI that can generate meaningful text, images or other types of output that appears creative and extrapolates well beyond the data the model was trained on is often referred to as Generative AI. Generative AI is used in tasks such as question-answering, summarising text and producing drafts based on a given input or instruction.

It is important to note that, while Generative AI systems tend to receive the most publicity and are the most accessible to the general public, there are other equally complex types of AI, such as those powering recommendation or classification tools, sometimes known as evaluative or discriminative AI. The focus of these Guidelines is not solely on Generative AI but rather on all modern types of AI tools, whether intended to perform a specific evaluation or to generate outputs that resemble human-created content (including text, sound or visual images).

Non-derogation of any mandatory rules

These Guidelines shall not derogate from any legal obligations, ethical duties, or rules of professional conduct, or any other binding rules applicable to the arbitration proceedings or persons participating in them.

Commentary

This provision recognises that the use of AI tools and AI applications in arbitrations may be subject to a range of rules and regulations, whether at the domestic or international level. These include, but are not limited to, laws, domestic statutes or international treaties on the use and development of AI, domestic rules of professional conduct, ethical and professional standards, and applicable arbitration rules, all of which can indirectly impact how certain professionals can use AI tools in an arbitration setting.

These Guidelines should not be construed as detracting or derogating from any of the above-mentioned rules and regulations. To the extent that these Guidelines are incompatible with any applicable mandatory rules and regulations, the latter should prevail.

CHAPTER 1: GUIDELINES FOR ALL PARTICIPANTS IN INTERNATIONAL ARBITRATIONS

GUIDELINE 1

Understanding the uses, limitations, and risks of AI applications

All participants involved in arbitration proceedings who use AI tools in preparation for or during an arbitration are responsible for familiarising themselves with the AI tool's intended uses and should adapt their use accordingly.

All participants using AI tools in connection with an arbitration should make reasonable efforts to understand each AI tool's relevant limitations, biases, and risks and, to the extent possible, mitigate them.

Commentary

Participants should make reasonable efforts to understand, at least in general terms, the functionality, limitations and risks of the AI tools they use in preparation for or during the course of an arbitration proceeding. For example, for tools that use Generative AI, participants should recognise the known limitations of such tools, such as their tendency to perpetuate biases contained in the training data, their propensity to mix up or invent information to fill gaps in knowledge, and their inability to identify the true logic or sources of information used to produce a given output, as further described below.

Participants should also review the AI tool's terms of use and data handling policies to understand if the tool's data treatment is consistent with any applicable confidentiality, privacy, or data security obligations (*see* Guideline 2 - Safeguarding confidentiality).

Notably, participants should be aware of the following limitations, biases, and risks that (at present) are inherent in the use of certain AI tools:

"Black-box" problem

Generative AI tools produce natural-sounding and contextually relevant text based on speech patterns and semantic abstractions learned during their training. However, these outputs are a product of infinitely complex probabilistic calculations rather than intelligible "reasoning" (the so-called "black box" problem). Despite any appearance otherwise, AI tools lack self-awareness or the ability to explain their own algorithms.

In response to this problem, participants may, as far as practical, use AI tools and applications that incorporate explainable AI features or otherwise allow them to understand how a particular output was generated based on specific inputs. "Explainable AI" is a set of processes and methods that allows human users to comprehend how an AI system arrives at a certain output based on

specific inputs. Explainable AI can help promote transparency, increase trust in the AI tool's accuracy and help ensure fairness when applied in an arbitration context, especially when the output of an AI tool significantly influences the proceedings. However, a complete understanding of complex AI systems may be beyond the reach of non-technical individuals, and this Guideline does not impose an expectation of thorough understanding. There are also technical and cost-related limitations to explain how AI systems work fully, especially those systems employing complex algorithms and machine learning techniques.

Quality and representativeness of the training data

Large language models and other AI tools are trained using specific datasets and parameters, and their capabilities are a function of that particular training. Even the most advanced AI tools will exhibit biases and blind spots resulting from limitations in underlying datasets and training protocols. Moreover, general-purpose AI tools may not be well-suited for tasks requiring specialised knowledge or case-specific information, unless they are fine-tuned or provided with more relevant data.

Errors or "hallucinations"

Large language models have a tendency to "hallucinate" or offer incorrect but plausible-sounding responses when they lack information to provide an accurate response to a particular query. Hallucinations occur because these models use mathematical probabilities (derived from linguistic and semantic patterns in their training data) to generate a fluent and coherent response to any question. However, they typically cannot assess the accuracy of the resulting output.

Hallucinations can be reduced through various techniques such as "prompt engineering" (*i.e.* crafting the query in a manner that is more likely to generate a better response) and "retrieval-augmented generation" (*i.e.* providing the model with relevant source material together with the query), but they are difficult to eliminate completely.

Augmentation of biases

An AI tool's training data may reflect biases that can be perpetuated through the use of the tool. Participants in arbitrations should minimise the risks associated with flawed or biassed predictions by exercising their own independent judgement.

This is especially important when existing biases in the data may create, exacerbate or perpetuate any form of discrimination, racial, gender or other profiling in the search and appointment of individuals as arbitrators, experts, counsel, or any other roles in connection with arbitrations. Biases may occur when the underrepresentation of certain groups of individuals is carried over to the training data used by the AI tool to make selections or assessments. Participants should exercise extreme caution in using any AI tool for such purposes, especially if they are unaware of how the selection or assessment algorithm works.

Using AI tools to help identify a suitable candidate for a specific role in connection with an arbitration is a particularly sensitive matter, and participants should be mindful of the impact such

use may have on diversity and the fair representation of diverse individuals. [1] In summary, participants are urged to: (i) use their personal judgement to evaluate the output of these AI tools from a diversity standpoint; (ii) to the best of their ability, become aware of the potential biases that may underlie the AI tool's output and, to the extent possible, mitigate them; (iii) use AI tools that control for biases.

[1] The term "diversity", as used in this Commentary, refers to race, ethnicity, national origin, gender, sexual orientation, gender identity and ability.

GUIDELINE 2

Safeguarding confidentiality

All participants in international arbitration are responsible for ensuring their use of AI tools is consistent with their obligations to safeguard confidential information (including privileged, private, secret or otherwise protected data). They should not submit confidential information to any AI tool without appropriate vetting and authorisation. Where a third-party (rather than an in-house) AI tool is considered for use in arbitration, special attention should be paid to the third party's policies on recording, storage and use of prompt or output histories and of any other confidential data sources provided to the AI tool.

Only AI tools that adequately safeguard confidentiality should be approved for uses that involve sharing confidential or legally privileged information with third parties. For this purpose, participants should review the data use and retention policies offered by the relevant AI tools and opt for more secure solutions.

Parties and their representatives should be aware of the data and confidentiality risks associated with using particular AI tools available to the general public in connection with an arbitration.

Commentary

Different jurisdictions have their own rules on confidentiality, privilege and secrecy of information.

Professionals bound by these duties should limit themselves to using AI tools that adequately safeguard the confidentiality of client or other protected data, or otherwise refrain from inputting any such data into AI tools that do not guarantee confidentiality.

Some AI tools available to the general public may retain information provided to them for a variety of purposes or even state that the service providers have rights to all the information that users enter. The use of these publicly available AI tools in the context of an arbitration could pose a risk of disclosing confidential information. By contrast, business-oriented or privacy-oriented AI tools and vendors may offer similar functionality but with additional safeguards for confidentiality.

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GUIDELINE 3

Disclosure and protection of records

[Note for reviewers: The drafting Subcommittee has produced two options for your consideration. We ask that you kindly indicate your preference for Option A (with additional comments or suggestions), Option B (with additional comments or suggestions), or Option C, none of the above (in which case we ask that you propose your own language for an appropriate standard of disclosure, if any). Substantive differences between Options A and B are bolded]

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[OPTION A]	[OPTION B]
1-1. Disclosure concerning the use of AI tools in connection with an arbitration may be appropriate in certain circumstances **depending on the function for which such tool is used and other relevant factors. In assessing whether disclosure is warranted, participants are encouraged to consider the extent to which (i) the output of an AI tool is to be relied upon in lieu of primary source material, (ii) the use of the AI tool could have a material impact on the proceeding, and (iii) the AI tool is used in a non-obvious and unexpected manner.** **1-2** . For instance, proactive disclosure **may be warranted** when (i) a party or an expert uses AI tools in the preparation of **evidentiary submissions, including expert testimony, witness testimony or documentary exhibits** and (ii) the use of such AI tools could have **a material impact** on the proceedings and/or their outcome. **1-3. Where disclosure is warranted, it should be timely and sufficiently detailed to permit a reasoned objection or a request for further information. Relevant details may include:** **1)** The name **, version and relevant settings of the tool used;** **2) A short description of how the tool was used; and,** **3) In cases where reliance is placed on the output by a Generative AI tool, information regarding the complete prompt (including any template, additional context and conversation thread) and associated output.**	1. Without limitation, disclosure may be appropriate **in the following circumstances:** When a party or an expert (i) uses AI tools in the preparation of **submissions, expert opinions or other documents that are materially relied upon** (**[including evidence and demonstratives])** and (ii) the use of such AI tools could have **[an impact / a material impact]** on the proceedings and/or their outcome. In that case, they should include the following information in their disclosure: 1) The name of the tool used; 2) **Methodology** and a short description of how it was used (including, *e.g* ., prompts, instructions **, or search terms);**

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2. Should a party have reason to believe that another party **or participant involved in the arbitration may have used AI tools in circumstances that warrant disclosure,** it may submit an application explaining the reasons for such belief to the tribunal.	2-1. Should a party have reason to believe that another party **or an expert (i) used AI tools to prepare submissions, expert opinions or other documents that are materially relied upon ([including evidence and demonstratives]), and (ii) that the use of such AI tools could have [an impact / a material impact] on the proceedings and/or their outcome,** it may submit an application explaining the reasons for such belief to the tribunal **and request the disclosure of the information in Guideline 3.1** . **2-2. If a tribunal believes (i) that a party or an expert used AI tools to prepare their submissions, expert opinions or other materially relied-upon documents ([including evidence and demonstratives]) and (ii) that the use of such AI tools could have [an impact / a material impact] on the proceedings and/or their outcome, the tribunal may request the parties to disclose the information in Guideline 3.1, as well as other information they deem necessary.**
3. Arbitrators **should make appropriate disclosure to the parties prior to using any AI tool** in a manner that could be perceived as delegating any part of their decision-making function.	**3-1. If an arbitrator has used, is using, or intends to use AI tools, and deems its disclosure necessary, the arbitrator should include the information in Guideline 3.1 as well as other information they deem necessary.** **3-2. If an arbitrator has used, is using, or intends to use AI tools,** in a way that could be perceived as delegating any part of their decision-making function, the arbitrator **[should consider disclosing it] / [should disclose it] and provide the information in Guideline 3.1 as well as other information they deem necessary.**

4-1. **The parties and the arbitral tribunal, should, at an early stage of the arbitration, consider the extent to which proactive disclosure of the use of AI tools should be required of parties, experts and the tribunal during the course of the proceedings. Any directives to this effect are without prejudice to a tribunal's power to order disclosure related to the use of AI tools upon the request of a party or on its own motion.** 4-2. Decisions regarding disclosure of the use of AI tools shall be made on a case-by-case basis, considering, where applicable, the principles of transparency, due process, work-product privilege, and confidentiality of deliberative material. **4-3. Counsel and other professionals retained by the parties should consider the extent to which proactive disclosure of their use of AI tools should be made to their clients.**	4. Decisions regarding disclosure of the use of AI tools shall be made on a case-by-case basis, considering, where applicable, the principles of transparency, due process, work-product privilege, and confidentiality of deliberative material.

Commentary

Guideline 3 does not create any presumption in favour or against disclosure of the use of AI tools. Courts in certain jurisdictions have required parties and their attorneys to affirmatively disclose the use of Generative AI tools in preparing submissions, and/or certify the accuracy of submissions prepared using Generative AI. This Guideline does not impose mandatory disclosure or certification obligations by default. Some uses of AI by parties, experts and arbitrators may be uncontroversial and would not ordinarily warrant disclosure (*see* Examples of compliant and non-compliant uses of AI in arbitrations). To the extent that the arbitral tribunal, the parties, or the administering institutions consider it advisable, they may require proactive disclosure and/or certification in connection with the use of any Generative AI tool. As technology evolves and Generative AI tools become more accurate, however, and depending on the type of tool used, the need for such disclosures or certifications may need periodic reassessment.

Guideline 3 does recognise, however, that there are certain circumstances where disclosing the use of AI tools may be warranted to preserve the integrity of the proceedings or the evidence, although there are differences in the formulations proposed under Option A and Option B, respectively.

Option A identifies a range of factors that may be relevant in the assessment of whether disclosure is is warranted, specifically whether (i) the output of an AI tool is to be relied upon in lieu of primary source material, (ii) the use of the AI tool could have a material impact on the proceeding,

and (iii) the AI tool is used in a non-obvious and unexpected manner. Option A provides an example of when disclosure may be appropriate bearing these factors in mind but stops short of making it a requirement.

Option B goes a step further in proposing a two-prong test, providing for disclosure (i) when the output of AI tools is used to prepare or create materially relied-upon documents (including evidence, demonstratives, witness statements and expert reports) and (ii) when the output of that AI tool can have a material impact on the proceedings or their outcome. Disclosure in these cases should be proactive, at the party, expert or arbitrator's own initiative, but it can also be requested by a party by submitting an application to the tribunal.

When a party seeks disclosure on the use of AI tools from another, the materiality requirement seeks to discourage frivolous applications from disclosing fairly innocuous and uncontroversial uses of AI. Accordingly, under both Option A and B, a party seeking disclosure from another party should explain both (i) why it believes that an AI tool was actually relied upon in the proceedings and (ii) how it would materially impact the proceedings and/or their outcome.

Orders mandating disclosure of the use of AI tools and other related information may sometimes risk violating work-product privilege, which allows counsel to withhold strategies and materials prepared in connection with an arbitration. Thus, orders requiring AI disclosure must be approached carefully to prevent infringing work-product privilege, balancing considerations of transparency and due process with the need to preserve privilege or confidentiality.

Arbitrators should affirmatively disclose [Option A] or at least consider disclosing [Option B] the use of AI tools when that use could create the impression that an arbitrator is delegating part or all of their decision-making function (*see* Guideline 6 - Non-delegation of decision-making responsibilities) or, in any other situation the arbitrator deems necessary.

This Guideline aims to allow space for participants to explore and adopt AI tools without undue interference or retaliation, while maintaining checks and balances to safeguard the integrity of the arbitration process. The decision for disclosure should always be determined on a case-by-case basis, without reference to sweeping generalisations on the use of specific AI tools.

Ultimately, it is up to the parties and/or tribunal to specify the level of disclosure they want to institute for the proceedings, ideally at the outset of the arbitration, as expressly proposed in Option A.

The Guideline does not seek to regulate disclosure vis-a-vis clients as professional rules on the matter vary greatly by jurisdiction. However Option A explicitly encourages counsel and other professional service providers to consider whether their use of AI tools should be disclosed to their clients.

CHAPTER 2: GUIDELINES FOR PARTIES AND PARTY REPRESENTATIVES

GUIDELINE 4

Duty of competence or diligence in the use of AI

Party representatives shall observe any applicable ethical rules or professional standards of competent or diligent representation when using AI tools in the context of an arbitration.

Parties shall review the output of any AI tool used to prepare submissions to make sure it is accurate, from a factual and legal standpoint, as required by any applicable ethical rules or standards of competent representation (*see* Non-derogation of any mandatory rules). Parties and party representatives on record shall be deemed responsible for any uncorrected errors or inaccuracies in any output produced by an AI tool they use in an arbitration.

Commentary

Scope

This Guideline draws attention to some of the risks that may arise when party representatives delegate legal tasks (such as summarising cases, writing portions of briefs or oral submissions, or conducting legal research) to AI tools without reviewing the AI tool's output to make sure it is accurate, from a factual and legal standpoint.

As established in the Commentary to Guideline 1, certain Generative AI tools may be prone to errors and hallucinations, and their output can include inaccurate legal citations or mistakes in the presentation or interpretation of facts, evidence and legal authorities. Accordingly, this Guideline reminds party representatives (and particularly legal professionals) of their ethical and professional duty to review any work product created by, or with the help of, AI and remain responsible for inaccurate submissions made during an arbitration.

Guideline 4 does not impose an independent standard of review of party representatives' conduct. Rather, it contains *renvoi* to any applicable rules of professional conduct or responsibility to determine the level of diligence and reasonableness required when using AI tools. Party representatives on record will ultimately be deemed responsible for any non-compliance with this Guideline.

Consequences of non-compliance

Not all AI-induced errors are created equal. In some cases, an AI-induced error may be legitimately inadvertent, even after a reasonable review, or may be inconsequential or have no significant impact

on the arbitration. In other cases, AI-induced errors and hallucinations can compromise the integrity of the proceedings, or result in a skewed presentation of the facts, the law or the evidence (*see* Guideline 5 - Respect for the integrity of the proceedings and the evidence).

The tribunal can take these factors into account when deciding how to address submissions containing AI-induced errors and inaccuracies.

GUIDELINE 5

Respect for the integrity of the proceedings and the evidence

Parties, party representatives and experts shall not use any forms of AI in ways that affect the integrity of the arbitration or otherwise disrupt the conduct of the proceedings.

Parties, party representatives and experts shall not use any form of AI to falsify evidence, compromise the authenticity of evidence, or otherwise mislead the arbitral tribunal and/or opposing party(ies).

Commentary

This Guideline prohibits any use of AI that compromises the integrity of the arbitration or the authenticity of evidence. While deploying AI can enhance the efficiency of arbitration proceedings, its potential misuse may disrupt due process and corrupt an arbitral tribunal's findings.

The duty to protect the integrity of the proceedings and not to submit false or adulterated evidence already exists in arbitration. Fraudulent behaviour and misconduct, such as submitting false documents or resorting to so-called "guerilla tactics", can occur with or without the use of AI.

Advancements in AI, however, particularly in Generative AI and deep fakes, can heighten the risks of manipulated or false evidence, making it significantly easier to create fake evidence that can appear strikingly convincing to the naked eye or which can sometimes be virtually indistinguishable from authentic versions. It can also make it more costly or difficult to detect any such manipulation through forensic and other means.

This Guideline reminds parties to be aware and vigilant of these heightened risks while emphasising the importance of ensuring the fairness and integrity of the proceedings when using AI. Parties, party representatives and experts should simply not use AI tools to fabricate evidence, distort evidence, or compromise the integrity of the proceedings under any circumstances.

If the arbitral tribunal determines that a party has violated this Guideline, it may consider, in addition to any other measures available under the applicable arbitration rules or the *lex arbitri* (such as, for example, striking the evidence from the record, or deeming it inadmissible), taking the infringing party representatives' conduct into account in its assignment of the costs of the arbitration.

CHAPTER 3: GUIDELINES FOR ARBITRATORS

GUIDELINE 6

Non-delegation of decision-making responsibilities

An arbitrator shall not delegate any part of their [2] personal mandate to any AI tool. This principle shall particularly apply to the arbitrator's decision-making function.

Commentary

Non-delegation of personal mandate

This Guideline underlines the critical principle that an arbitrator's mandate, especially their ultimate decision-making function, is personal and non-delegable. This Guideline does not forbid the use of AI tools by arbitrators as an aid to discharge their duty to personally analyse the facts, arguments, evidence and the law and issue a reasoned decision.

While AI tools can assist in managing information, analysing data, and predicting outcomes, they should not replace the human judgement, discretion, responsibility, and accountability inherent in an arbitrator's role. Therefore, arbitrators must be mindful that they are not inadvertently delegating part of this personal mandate to the AI tool.

Under this Guideline, arbitrators need to review the output produced by any AI tool to ensure it is accurate and shall take responsibility for any errors or inaccuracies. If an arbitrator uses a Generative AI tool to assist in the analysis of the arguments or the drafting of a decision or award, the arbitrator cannot simply reproduce the AI's output without making sure it adequately reflects the arbitrator's personal and independent analysis of the issues and evidence at hand.

This Guideline reminds arbitrators that, even as technology evolves, their personal responsibility in rendering decisions remains paramount. AI can enhance efficiency and provide insights, but the arbitrator must make the ultimate decisions, preserving the human element essential to the fairness and integrity of arbitration proceedings. At all times, the arbitrators remain responsible for the use of AI during the arbitration.

[2] The terms "their", "they", and "them" as used in these Guidelines in relation to any of the individual participants in an arbitration are used as singular, gender-neutral pronouns.

GUIDELINE 7

Respect for due process

An arbitrator shall not rely on AI-generated information outside the record [3] without making appropriate disclosure to the parties and, as far as practical, allowing the parties to comment on it.

Where an AI tool cannot cite sources that can be independently verified, an arbitrator shall not assume that such sources exist or are characterised accurately by the AI tool.

Commentary

This Guideline focuses on the principle of due process in using AI in arbitration. It emphasises the arbitrator's duty to disclose any reliance on AI-generated outputs outside the record that influence their understanding of the case, to the extent that any outputs are used, allowing parties the opportunity to comment. This approach ensures transparency and upholds the parties' right to be heard.

At the same time, it acknowledges that disclosure requirements may vary depending on the specific AI application used.

The Guideline also stresses the arbitrator's responsibility to avoid assuming the existence of authoritative sources from AI outputs. It prompts arbitrators to evaluate the reliability of AI-derived information independently and critically.

EXAMPLES OF COMPLIANT AND NON-COMPLIANT USES OF AI IN ARBITRATIONS

For each Guideline, this section offers a few practical examples of both compliant and non-compliant uses of AI in international arbitration.

These instances are not exhaustive but illustrative, encouraging thoughtful use of AI while ensuring the principles of fairness, integrity, and equality are preserved in arbitration proceedings. Ultimately, whether the use of AI in international arbitration in a given case is appropriate or not will need to be determined on a case-by-case basis.

[3] Some civil law jurisdictions recognise the principle of *iura novit arbiter*, or the "arbitrator knows the law", pursuant to which arbitrators may have the authority to apply laws, case law and precedents not cited by the parties. This principle has also been applied in investment treaty cases and by the International Court of Justice. The extent of this authority may vary depending on the jurisdiction. However, this Guideline does not preclude in any way the application of the principle of *iura novit arbiter*, where appropriate.

GUIDELINE 1 - Understanding the uses, limitations and risks of AI applications	
Compliant	**Non-compliant**
Using a specialised AI tool to conduct research on potential arbitrators or experts for a case, being mindful of the AI tools' limitations and evaluating the results accordingly.	Using AI tools to select arbitrators or experts for a case without human input and without assessing the AI tool's selection critically and independently or controlling for biases and other limitations.
GUIDELINE 2 - Safeguarding confidentiality	
Compliant	**Non-compliant**
Using AI tools for routine non-confidential tasks, such as meeting scheduling.	Submitting confidential information to a third-party AI tool without proper authorisation and where the terms of use for such tool allow logging of inputs/outputs and sharing them with third parties.
Using AI tools to research or summarise legal authorities in a third-party database, provided there is no sharing of confidential information.	
GUIDELINE 3 - Disclosure and protection of records	
Compliant	**Non-compliant**

Using AI tools to generate document summaries for internal use, creating indices or proofreading drafts without disclosing it.	Using an AI tool to calculate damages without disclosing it and providing information to critically assess reliance on the AI tool's output.
Using AI tools to identify and select the documents potentially relevant and responsive to document production requests while disclosing the manner in which such tool was used in a way that would permit the opposing party to make an informed objection.	As an arbitrator, use an AI tool to "score" or otherwise compare the persuasiveness of parties' submissions without disclosing it (assuming the arbitrator has checked the accuracy of the AI tool's output).
GUIDELINE 4 - Duty of competence or diligence in the use of AI (parties)	
Compliant	**Non-compliant**
Using AI tools to assist with drafting language for pleadings or written submissions where the final work product is fully source-checked and vetted for accuracy from a factual and legal standpoint.	Using AI tools to draft pleadings or written submissions without checking the accuracy of their output from a factual and legal standpoint.
Using specialised AI tools to find or summarise relevant cases, vetting the accuracy of the descriptions before incorporating them into pleadings.	Using AI tools to summarise cases and "copy-paste" them into pleadings without verifying whether the AI's output may contain any errors.
Using AI tools to assist in the preparation of cross-examination questions or find inconsistencies in witness statements.	

GUIDELINE 5 - Respect for the integrity of the proceedings and the evidence (parties)	
Compliant	**Non-compliant**
Using AI tools to produce demonstratives, such as 3D and other graphic representations, where the demonstratives are based on evidence in the record and the accuracy of the representation can be challenged by the opposing party by accessing the referenced source data.	Using AI tools to falsify or otherwise manipulate documents submitted as evidence.
GUIDELINE 6 - Non-delegation of decision-making responsibilities (arbitrators)	
Compliant	**Non-compliant**
As an arbitrator, using an AI tool capable of providing accurate summaries and citations to create a first draft of the procedural history of a case, or generate timelines of key facts, and then double-checking accuracy of the AI tools' output with underlying sources and making other appropriate edits.	As an arbitrator, using an AI tool to provide an assessment of the parties' submissions of evidence and incorporate such output into a decision without conducting an independent analysis of the facts, the law and the evidence to make sure it reflects the arbitrator's personal and independent judgement.
GUIDELINE 7 - Respect for due process (arbitrators)	
Compliant	**Non-compliant**
As an arbitrator, using AI tools to distil or simplify technical concepts to come up with technically accurate or relevant questions for the parties or experts during the hearing.	As an arbitrator, using Generative AI tools to conduct independent research into the substance of the dispute and base their decision on such generated outputs without disclosing it to the parties and providing them an opportunity to comment.

**** Disclaimer: these Guidelines have been made publicly available in draft form for the purposes of receiving feedback and comments, and should not be used, adapted or relied on before the final version has been published by SVAMC.*

MODEL CLAUSE FOR INCLUSION IN PROCEDURAL ORDERS

The Tribunal and the parties agree that the Silicon Valley Arbitration and Mediation Center's Guidelines on the Use of Artificial Intelligence in International Arbitration (**SVAMC AI Guidelines**) shall apply as a reference framework to all participants in this arbitration proceeding.

*** *Disclaimer: these Guidelines have been made publicly available for the purposes of receiving feedback and comments, and should not be used, adapted, or relied on before the final version has been published by SVAMC.*

SILICON VALLEY ARBITRATION & MEDIATION CENTER

SILICON VALLEY ARBITRATION AND MEDIATION CENTER

GUIDELINES ON THE USE OF ARTIFICIAL INTELLIGENCE IN ARBITRATION

Draft 31 August 2023

CONSULTATION FORM FOR ARBITRAL INSTITUTIONS

If you are a representative of an arbitral institution, we invite you to use this form to comment separately on each chapter of the draft Guidelines. Your feedback is extremely valuable to us and we thank you for taking the time to review. Please send your comments by email and forward them to aitaskforce@svmac.org.

Name of arbitral institution:

Contact person:

Email:

General comments *Please provide any general comment you might have on the draft Guidelines on the use of Artificial Intelligence in Arbitration*
Introduction *The first part of the draft Guidelines contains the Introduction. Please add any comments you may have below, as well as edits to the text of the introduction.*

Preliminary Provisions *Please add any comments you may have below.*	
Please add below any edits to the text, or alternative proposed text, for each Preliminary Provision.	
Application of the Guidelines	
Definition of AI	
Non-derogation of any mandatory rules	
Chapter 1. General Guidelines *Please add below any comment you may have on the Chapter below.*	
1. Understanding the uses, limitations and risks of AI applications *Please add below any comment you have on this provision.*	
Please add below any edits to the text, or an alternative proposed text, for this provision.	

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2. **Safeguarding confidentiality**

Please add below any comment you have on this provision.

Please add below any edits to the text, or an alternative proposed text, for this provision.

3. Disclosure and protection of records

Please add below any comment you have on this provision. Please note that Guideline 3 is the longest and is divided into several paragraphs. Moreover, the Drafting Subcommittee has produced two alternative drafts of most of these paragraphs for consideration. The key substantive differences between Options A and B are highlighted for convenience. In your comments, we kindly ask that you indicate a preference for Option A or Option B along with any other comments or suggestions you wish to make.

Please add below any edits to the text, or an alternative proposed text, for this provision.

Please add belo

Chapter 2. Guidelines for Parties and Party Representatives *Please add below any comment you may have on the Chapter below.*

4. Duty of competence or diligence in the use of AI *Please add below any comment you have on this provision.*

Please add below any edits to the text, or an alternative proposed text, for this provision.
5. Respect for the integrity of the proceedings and evidence *Please add below any comment you have on this provision.*
Please add below any edits to the text, or an alternative proposed text, for this provision.
Chapter 3. Guidelines for Arbitrators *Please add below any comment you may have on the Chapter below.*
6. Non-delegation of decision-making responsibilities *Please add below any comment you have on this provision.*
Please add below any edits to the text, or an alternative proposed text, for this provision.
7. Respect for due process *Please add below any comment you have on this provision.*

Annex A. Examples of compliant and non-compliant uses of AI in arbitrations *For each Guideline, this section offers a few practical examples of both compliant and non-compliant uses of AI in international arbitration. These instances are not exhaustive but illustrative, encouraging thoughtful use of AI while ensuring the principles of fairness, integrity, and equality are preserved in arbitration proceedings. Ultimately, whether the use of AI in international arbitration in a given case is appropriate or not will need to be determined on a case-by-case basis.* *Please add below any comment or edit you may have on the Annex.*
Annex B. Model Clause for inclusion in Procedural Orders *Please add below any comment or edit you may have on the Annex.*
Please include any other comment or suggestion you may have below.

Many thanks for your input.

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The Future of International Arbitration in the Age of Artificial Intelligence

Orlando Federico Cabrera Colorado*

This article postulates that there will be two stages for the implementation of Artificial Intelligence (AI). In the short term, the first stage will lead to a complementary relationship between predictive machines and humans. After the cost of prediction decreases, new players come to the arbitration arena and the flow of capital to finance AI's use in international arbitration is widely available, we will see the second stage's outset where predictive machines will assist in more sophisticated tasks. AI may assist counsel in crafting arguments, and arbitrators in comparing evidence submitted, and finding conflicting fact patterns in the evidence. AI may even decide some aspects of a case. This requires a new division of labour. Lawyers will have to adapt and learn to delegate to such machines while being aware of their limitations. In response, new arbitration specialties will inevitably emerge. However, flesh-and-blood arbitrators will not be eliminated. While predictive machines may be able to decide certain aspects of arbitrations quickly and at a lower cost, the amount of data, the lack of repetitive patterns, inconsistencies, and parties' agreement that the award shall remain confidential and state the reasons upon which it is based may hinder their capabilities. The current legal framework seems to require drastic changes to make way for AI.

Keywords: artificial intelligence, machine learning, international arbitration, expert systems, rule systems, the future of arbitration, division of work, intelligence

'AI is probably the most important thing humanity has ever worked on. I think of it as something more profound than electricity or fire'. Google's CEO, SundarPichai, 2018

'Tomorrow's legal world … bears little resemblance to that of the past'.
Richard Susskind, *Tomorrow's Lawyers*, 2017

'The best way to predict the future is to invent it'.
Alan Kay, 1971

1 INTRODUCTION

The world is at a tipping point where Artificial Intelligence (AI) will allow us to see[1] unique economic, social, and cultural changes.[2] In the future, arbitration will

* Senior Associate at Hogan Lovells. The author wishes to thank Rafael Carlos del Rosal Carmona (ICDR), Sophie Nappert (3VB), Erick Clavel (Clavel Abogados), and Daria Pietropaolo (University of Miami School of Law) for helpful comments and observations on earlier versions of the article. All errors and ideas remain the author's own. Email: orlando.cabrera@hoganlovells.com.

1 Erik Brynjolfsson & Andrew McAfee, *The Second Machine Age: Work, Progress and Prosperity in a Time of Brilliant Technologies* (W. W. Norton & Company 2014).

2 Klaus Schwab, *The Fourth Industrial Revolution* 28 (Currency 2017).

Cabrera Colorado, Orlando Federico. 'The Future of International Arbitration in the Age of Artificial Intelligence'. *Journal of International Arbitration* 40, no. 3 (2023): 301–342.

be different. This article postulates that there will be two stages. In the short term, the first stage will lead to a complementary relationship between predictive machines and humans. AI will assist arbitrators, arbitral institutions, and counsel, but in the end, humans will make the decisions. This human-technology complementarity will reduce routine activities, making the process of arbitration more efficient. In fact, we are living at the outset of this first stage. After the cost of prediction decreases, new players come to the arbitration arena and the flow of capital to finance AI's use in international arbitration is widely available, we will see the second stage where robot-arbitrators[3] or predictive machines will assist in more sophisticated tasks. However, flesh-and-blood arbitrators will not be eliminated. While predictive machines may be able to decide certain aspects of arbitrations quickly and at a lower cost, the abundance of data and parties' agreement that the award shall state the reasons upon which it is based[4] may hinder their capabilities.

New arbitral institutions and appointing authorities will emerge, and they will have AI as a pillar of their decision-making. Lawyers will then have to adapt and learn to delegate to such machines while being aware of their limitations. In response, new arbitration specialties will inevitably emerge, including lawyers with expertise in algorithm development, machine training, data interpretation, and responsible AI support to safeguard the integrity of the arbitration process. AI may assist counsel in crafting arguments, and arbitrators in comparing evidence submitted, and finding conflicting fact patterns in the evidence. AI may even decide some aspects of a case. While the future for AI is promising in making arbitration more efficient, the current legal framework seems to require drastic changes to make way for AI. Some will be hesitant and critical with well-founded fears, but we need to be prepared if we want to capitalize on the potential of AI in arbitration.

In the transition to subsequent stages, the arbitration world will become even more competitive. Gradually, as technology prices become cheaper, algorithms may replace a part of the workforce.[5] In 2020, McKinsey & Company estimated that 23% of lawyer's work can be completed by automated technology.[6] Although

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[3] One way to encourage trust in machines is to make them humanoids. People interact more with humanoids. Walter Frick, *When Your Boss Wears Metal Pants, in HBR's 10 Must Reads on AI, Analytics and the New Machine Age* 147 (HBR 2019). Nonetheless, Hawkins and Blakeslee do not believe that 'we will build intelligent machines that act like humans, or even interact with those in human like ways'. Jeff Hawkins & Sandra Blakeslee, *On Intelligence* 207 (New York Times: Times Books 2004).

[4] UNCITRAL Model Law on International Commercial Arbitration with amendments as adopted in 2006, Art. 31(2).

[5] Ajay Agrawal, Joshua Gans, & Avi Goldfarb, *Prediction Machines* 9–11 (HBR 2018).

[6] Nick Whitehouse, *INSIGHT: The Future of Junior Lawyers Through the AI Looking Glass* (3 Aug. 2020), https://news.bloomberglaw.com/tech-and-telecom-law/insight-the-future-of-junior-lawyers-through-the-ai-looking-glass, (accessed 5 Mar. 2023).

AI will disrupt arbitration, lawyers will not disappear. In those areas where AI carries out certain activities better than humans, like document review or conflict checks, machines may take portions of current jobs.

Job displacement is due to the exponential pace of technology. Gordon Moore, one of the founders of Intel, postulated Moore's Law in which he projected that every two years the processing power of computers would double.[7] With this law, Google guru Ray Kurzweil predicts that at this rate, by 2050 the equivalent of a desktop computer will have more processing power than all the brains on Earth.[8] Others believe that machines will be able to perform professions as well as humans by 2075 or 2100.[9] However, others remain sceptical.[10]

The advances will be far more astonishing than science fiction writers imagined in certain sectors, but in arbitration, three factors will restrict these advances: (1) lack of data; (2) flaws in the data; and (3) lack of repetitive patterns and inconsistencies.

Today, AI is a reality, whether we realize it or not. AI filters spam emails, assists in contract analysis, legal research, and electronic document production (e-discovery). In arbitration, AI has been predicted to be used for a wide variety of tasks, including the appointment of arbitrators, legal research, proof reading briefs, translations, case management and document organization, cost estimation, stenographic services, simultaneous interpretation, and drafting standard sections of an arbitration award such as the procedural history.[11]

Considering what the future of arbitration will look like, we look at whether the results that arbitrators and lawyers produce today can be replicated with technology.[12] Where do machines outperform lawyers? Where do lawyers have advantages over machines? Where will arbitrators not be replaced by technology?[13] What new skills do lawyers require? What limitations does AI have? When will this happen?

No one has a crystal ball to reveal all the answers to these questions. No one can predict the future in detail.[14] However, current uncertainty gives rise to necessary questions. All we can do is try to understand an answer to the best of our abilities,[15] in this case by bringing to light some of the broader trends emerging

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7 Richard Susskind, *Online Courts and the Future of Justice* 36 (Oxford 2019).
8 Ray Kurzweil, *The Singularity Is Near* 127 (Penguin Books 2005).
9 Nick Bostrom, *Superintelligence* 23 (Oxford 2017).
10 *See* Kai Fu Lee, *AI Super-Powers: China, Silicon Valley, and the New World Order 159* (Houghton Mifflin Harcourt 2018). *See also* Hawkins & Blakeslee, *supra* n. 3, at 207.
11 Maxi Scherer, *Artificial Intelligence and Legal Decision-Making: The Wide Open? Study on the Example of International Arbitration, Queen Mary University of London,* 3 School of Law Legal Studies Research Paper No. 318/2019.
12 Susskind, *supra* n. 7, at 51.
13 *Ibid.,* at 49, 53.
14 Hawkins & Blakeslee, *supra* n. 3, at 217.
15 Lee, *supra* n. 10, at xi.

from the interaction of AI and lawyers.[16] As such, this article does not pretend to be an oracle of prediction but is the fruit of research, attempting to answer concrete questions, awaken interest in AI and its impact on arbitration, present potential applications of AI to arbitration, explore alternative futures, which may be possible, probable and preferable, and inspire the future development of AI in arbitration.

This article begins by exploring AI and its implementation through rule system and machine learning. Second, it explores the importance of data for AI and how the confidentiality of arbitration plays to the detriment of the capacity for AI to fully assist lawyers. Third, it explains the magic of AI for prediction in arbitration. Fourth, it addresses how, with the advancement of technology, the distribution of work will be revolutionized. Fifth, the work process is then broken down to analyse where and how AI can be implemented. This article also answers the question: when will it happen? Sixth, regarding the second stage, this article will assess what opportunities AI has to solve arbitrations, casting doubt on the viability of the current legal framework to fully exploit AI in the future. Then, the author proceeds to conclude.

2 AI AND MACHINE LEARNING

This section introduces AI, as well as the rule system and machine learning, which are the two ways of implementing AI.

United Nations Educational, Scientific and Cultural Organization (UNESCO) provides the following updated and comprehensive definition of AI:

> AI systems are information-processing technologies that integrate models and algorithms that produce a capacity to learn and to perform cognitive tasks leading to outcomes such as prediction and decision-making in material and virtual environments. AI systems are designed to operate with varying degrees of autonomy by means of knowledge modelling and representation and by exploiting data and calculating correlations. AI systems may include several methods, such as but not limited to: (i) machine learning, including deep learning and reinforcement learning; (ii) machine reasoning, including planning, scheduling, knowledge representation and reasoning, search, and optimization.[17]

AI is 'making a machine behave in ways that could be called intelligent if a human were so behaving'.[18] Also, AI is the theory and development of computer systems to perform tasks that require human intelligence, such as visual perception, speech recognition, decision-making, and language translation.[19]

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16 Hawkins & Blakeslee, *supra* n. 3, at 217.
17 UNESCO, *Recommendation on the Ethics of Artificial Intelligence*, adopted on 23 Nov. 2021.
18 John McCarthy quoted by Scherer, *supra* n. 11, at 5.
19 Oxford Dictionary quoted by Scherer, *supra* n. 11, at 5.

The first way to implement AI is through 'rule system' or 'expert system'. In this system, rules are encoded into the system as 'if x occurs, then y'. The main idea of this system is to capture the knowledge of a human arbitration expert lawyer and transfer that expert knowledge into a computer system; the knowledge is encoded as rules. Given that programmers set the code, they can easily correct flaws. This system is limited by the size of its rules, so it is said to have a rigid intelligence. The AI that the expert systems can implement is always narrow.[20]

The second way to implement AI is through 'machine learning', which refers to computer programs that learn from experience and improve their development over time. When we speak of 'learning' we are not referring to a cognitive process thought of as human learning, but to a parallel, functional sense of learning; that is, the ability to change behaviour through experience over time.[21] However, intelligence is not just a matter of acting or behaving intelligently. Behaviour is intelligence's manifestation but not the essential characteristic of being intelligent.[22]

Machine learning creates its own models or rules as if by magic. Machine learning programs extract and develop the algorithms from the data they process. Unlike expert models or rule systems, the programmer does not need to write the rules or code the algorithm, nor does it use logic as a normative principle. Machine learning, as neural networks, uses pattern recognition, and constructs probabilistic methods; there are no defined rules. Neural networks use massive amounts of data to 'learn' repeat patterns, relevant features, and continually improve with feedback. These networks use an inverse approach; i.e., they *extract* or *deduce* the hidden factors and patterns available in the data they process. The method is predictive, calculating the probability of a given outcome based on the extraction and continuous improvement of the algorithm.[23]

Machine learning has produced amazing results. One example is the use of predictive coding for document review. Attorneys frequently use predictive coding – a form of supervised machine learning – to classify documents. An algorithm identifies a relevant document or documents responsive to a document request or a tribunal order. Humans train the algorithm by 'coding' or

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[20] Tricentis, *AI Approaches Compared: Rule-Based Testing vs. Learning*, www.tricentis.com/artificial-intelligence-software-testing/ai-approaches-rule-based-testing-vs-learning/ (accessed 5 Mar. 2023).

[21] Scherer, *supra* n. 11, at 6–7.

[22] Hawkins & Blakeslee make this point and underscore that 'reflection proves this: you can be intelligent just lying in the dark, thinking and understanding. Ignoring what goes on in your head and focusing instead on behavior has been a large impediment to understanding intelligence and building intelligent machines'. *See* Hawkins & Blakeslee, *supra* n. 3, at 29.

[23] Scherer, *supra* n. 11, at 6–7.

'tagging' documents as relevant or not relevant, responsive or not responsive, privileged or not privileged. After tagging a sample, the algorithm will provide a result.[24]

Table 1 Differences Between Systems of Rules and Machine Learning

Type of System	*How the Machine Acquires Knowledge?*	*Coding?*	*Summary*
Rules or experts	The knowledge of an expert arbitration lawyer is transferred to a computer system	Knowledge is coded as rules (rigid intelligence)	If 'x' occurs, then 'y'
Machine learning	Computer programs learn from experience and improve their development over time	The rules are not written, and the algorithm is not coded. There are no hard and fast rules	It creates its own models or rules like 'magic'. The algorithms are extracted from the processed data: Google translate, DeepL spam mail

Another example of machine learning is the product of translation programs. Programmers do not need to code the rules or algorithm for the program to translate; the program uses massive amounts of available documents in various languages to 'learn' the relevant elements and continuously improve.[25]

These types of models are known as neural networks because they try to reconstruct the human brain, the premier demonstrator of intelligence as we know it.[26] Therefore, programmers of neural networks construct layers of artificial neurons to receive and transmit information in a structure similar to biological neurons. Nonetheless, 'unlike the rule-based approach, builders of neural networks generally do not give the networks rules to follow in making decisions. They simply feed lots … of examples of a given phenomenon' like pictures, emails, or sounds 'into the neural networks and let the networks themselves identify patters within the data'.[27] For example, when attorneys

[24] ICC Commission Report, *Leveraging Technology for Fair, Effective and Efficient International Arbitration Proceedings* 29–30 (23 Nov. 2021).
[25] Scherer, *supra* n. 11, at 6–7.
[26] Of course, animals do exhibit some intelligent behaviours. 'However the human brain is more intelligent than that of other animals because it can make predictions about more abstract lines of patterns and longer temporal pattern sequences'. *See* Hawkins & Blakeslee, *supra* n. 3, at 96.
[27] Lee, *supra* n. 10, at 8.

feed a program with a large number of relevant or responsive documents, the program can develop the algorithm necessary to classify emails relevant or not relevant, responsive or not responsive, and privileged or not privileged. Repeated patterns of documents help to detect future documents with the same characteristics to classify them as relevant/not relevant and privileged/not privileged.

A computer's search for hidden patterns is illustrated in the term *data mining*, which is one type of machine learning. The analogy alludes to miners digging through tons of earth in the mine to find precious material. In the context of AI, data mining programs remove large amounts of data in an attempt to develop a relevant and accurate model[28] to predict future cases. This may take the form of classifying documents as relevant, not privileged, and so forth. This is of particular interest in the legal context,[29] because it accelerates tedious legal tasks like document review, and decreases costs. However, there exists a problem for developing data mining in arbitration: data in arbitration is scarce. Of course, document review is the exception.

3 DATA AND ITS SCARCITY IN THE WORLD OF ARBITRATION

Data is vital for machine learning based on probability inference models. The programs develop the algorithms that solve the tasks by processing the data. The larger the data sample, the more accurate the predictive value of the model. Nonetheless, in the arbitration world, there are multiple factors limiting the predictive value potential of machine learning models. As such, this article will explore the following four foundational problems: (1) lack of information; (2) the available amount of data; (3) lack of repeated patterns; and (4) flawed data.

The first problem lies in the lack of information. Arbitral awards, mainly commercial, are generally not public. Confidentiality of arbitral awards inherently limit the availability of data. Of course, there are some publicly available materials: procedural orders and awards in investment arbitration[30]; maritime arbitrations by the Society of Maritime Arbitrators[31]; sports arbitration by the Tribunal Arbitral du

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28 *Ibid.*; Ethem Alpaydin, *Machine Learning* 14 (MIT Press 2016).

29 Scherer, *supra* n. 11, at 7.

30 ICSID, the Permanent Court of Arbitration and other institutions frequently publish awards. Some are, https://jusmundi.com/en; and at www.italaw.com/.

31 Since 1963, SMA has published maritime and admiralty decisions. More than 4,300 awards have been published and are, www.smany.org/award-service-main.html.

Sport[32]; international trade arbitrations by the World Trade Organization[33]; as well as arbitrations with public law bodies.[34]

However, available commercial arbitral awards are generally limited to those cases that are enforced and become public or when parties publish them. Some institutions publish edited versions or abstracts of cases. The International Court of Arbitration of the International Chamber of Commerce (ICC), the International Centre for Dispute Resolution (ICDR), the Singapore International Centre for Dispute Resolution (SIAC), and the Stockholm Chamber of Commerce (SCC) publish versions of selected awards with permission of the parties excluding certain data.[35] The inability to constantly gain access to awards from different jurisdictions around the world is a real problem for AI and machine learning. In the absence of data at least Jus Mundi,[36] Kluwer Arbitration Practice Plus,[37] Arbitrator Intelligence,[38] and Global Arbitration Review Arbitrator Research Tool (GAR ART)[39] have developed methods and techniques to compile and organize some of the available information.

These four institutions provide foundations to solve AI's major problem because they compile, organize and make information available for lawyers. Additionally, Jus Mundi and Kluwer Arbitration Practice Plus have started to capitalize on data collection benefits and AI by developing the 'conflict checker' tool, proving how an algorithm can save time and costs for a client. These new players may revolutionize arbitration if they keep developing AI tools.

The second problem lies in the amount of data available. Areas of law with large numbers of accessible decisions on a given issue will be more suitable for AI models. While there is no minimum, the more data there is, the more accurate the model will be. But how much data is needed? Certainly, more data will improve

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32 The CAS publishes non-confidential arbitral decisions since 1986 (year of the first arbitral proceedings). The repository is, www.tas-cas.org/en/jurisprudence/archive.html.

33 *See* www.wto.org/english/tratop_e/dispu_e/arbitrations_e.htm.

34 For example, Colombia has recently published a Thesaurus of Arbitral Awards rendered between 2012 and 2017 to contribute to the strengthening and transparency of arbitration. *See* https://ciarglobal.com/wp-content/uploads/2018/09/Documento-Tesauro-del-Laudo-Arbitral.pdf (accessed 5 Mar. 2023).

35 Kathleen Paisley & Edna Sussman, *Artificial Intelligence Challenges and Opportunities for International Arbitration*, 11 NY Disp. Res. Law. 37 (2018).

36 Jus Mundi claims to have the most comprehensive international arbitration database. It uses artificial and collaborative intelligence to collect and structure legal data worldwide. It has developed 'Conflict Checker', a tool that identifies relationships between individuals, firms or states. *See* https://jusmundi.com/en/about (accessed 5 Mar. 2023).

37 Kluwer Arbitration Practice Plus is a research service, it allows lawyers to explore relationships between arbitrators, counsel and other individuals to uncover potential conflicts of interest. *See* www.wolterskluwer.com/en/solutions/kluwerarbitration/practiceplus.

38 Arbitrator Intelligence collects feedback from arbitration users and lawyers on key elements of an arbitrator's decision, *see* https://arbitratorintelligence.com/about-1 (accessed 5 Mar. 2023).

39 GAR ART provides information about arbitrators, *see* https://globalarbitrationreview.com/article/1138706/gar%E2%80%99s-art-goes-live (accessed 5 Mar. 2023).

prediction. Conversely, when we deal with the *value* someone gets from a prediction, and how data improves this *value*, the amount of data is not so significant. From a statistical point of view, data have decreasing returns to scale: as you get more data each piece is less *valuable*. You get more marginal *value* from a third observation than from the hundredth observation. As observations are added to the training data, it becomes less useful for increasing the number of predictions.[40]

Agrawal, Gans and Goldfarb illustrate this with an example of how long it takes a person to go to the airport. If this person has never been to the airport before, the first time he or she goes will give a lot of useful information. The second and third times will give an idea of how long it normally takes to get to the airport. However, after a hundred times, this person will not learn much about how long it takes to get to the airport. Therefore, they argue that data has decreasing returns to scale, as you get more data, each additional piece is less *valuable*. This refers to the *value* you get from a prediction, *not how you improve the prediction*.[41] In law, this happens, for instance, when a Supreme Court renders a decision to resolve Circuit splits, i.e., when two or more Circuits reach opposite interpretations and Supreme Courts create a unified interpretation of the law which binds all lower courts. Then each additional decision is less valuable to the prediction, because all lower courts will at least theoretically 'rule the same way'. Subsequent decisions by the judiciary in the same sense are not going to substantially change the observations that a lawyer might make. Again, this assertion relates to the 'value' someone gets from the prediction, and how data improves this value, not how data improves the prediction; nor does it refer to when the judiciary seeks to unravel vague concepts, like the meaning of public policy that gives rise to an award's annulment. Depending on the breadth of the arbitral concepts, more or less decisions will be required to predict the outcome of future cases.

The third problem lies in the lack of repetition in arbitration patterns. As arbitration encounters more dissimilar, unique and non-repetitive cases, AI models will encounter greater hurdles in their development.[42] For example, in investment arbitration, while there exists recurrence of standards, there are also inconsistencies in cases mainly because there is no doctrine of precedent or *stare decisis*.[43] More generally, in international law, there exists no doctrine of binding precedent or *stare decisis* either. 'Most, if not all, statutes of international courts

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[40] Agrawal, Gans & Goldfarb, *supra* n. 5, at 50.
[41] *Ibid*.
[42] Scherer, *supra* n. 11, at 17.
[43] UNCITRAL Working Group III, *Possible Reform of Investor-State Dispute Settlement (ISDS)* (A/CN.0/WG.III/WP.180) 29 Aug. 2019, at 40.

and tribunals provide that the decision is binding only for the parties to the dispute'.[44] Inevitably, therefore, there are inconsistent decisions regarding the jurisdiction *ratione materiae* of investment tribunals. For example, several cases apply the *Salini* test,[45] and numerous cases reject it.[46] As another example, there exist cases that are in favour of applying the most favoured nation clause to import more favourable dispute settlement provisions[47] and cases that reject

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[44] Eric de Brabandere, *Arbitral Decisions as a Source of International Investment Law,* in *International Investment Law. The Sources of Rights and Obligations* 247 (Tarcisio Gazzini & Eric De Brabandere eds, Martinus Nijhoff Leiden Boston 2012); G. Guillaume, *Le précédent dans la justice et l'arbitrage international,* 3 J. de droit Int'l. 685–703 (2010), doi: 10.4000/books.iheid.1439; *Michael Anthony Lee-Chin v. Dominican Republic*, ICSID Case No. UNCT/18/3, Partial Award on Jurisdiction (15 Jul. 2020), para. 80.

[45] *Salini Construttori SpA & Italstrade SpA v. Kingdom of Morocco,* ICSID Case No ARB/00/4, Decision on Jurisdiction (23 Jul. 2001); *Patrick Mitchell v. Democratic Republic of the Congo,* ICSID Case No. ARB/99/7, Decision on Annulment (1 Nov. 2006), para. 48; *Bayindir Insaat Turizm Ticaret Ve Sanayi AS v. Islamic Republic of Pakistan,* ICSID Case No. ARB/03/29, Decision on Jurisdiction (14 Nov. 2005), para. 130; *Helnan International Hotels v. Arab Republic of Egypt,* ICSID Case No. ARB/05/19, Decision on Jurisdiction (17 Oct. 2006), paras 77, 117; *Ioannis Kardassopoulos v. Republic of Georgia*, ICSID Case No. ARB/05/18, Decision on Jurisdiction (6 Jul. 2007), para. 116; *Joy Mining Machinery Ltd v. Arab Republic of Egypt,* ICSID Case No. ARB/03/11, Award (6 Aug. 2004), para. 15; *Milcom International Operations BV and Sentel GSM SA v. Republic of Senegal*, ICSID Case No. ARB/08/20, Decision on Jurisdiction of the Arbitral Tribunal (16 Jul. 2010), para. 80; *Saipem SpA v. People's Republic of Bangladesh*, ICSID Case No. ARB/05/07, Decision on Jurisdiction and Recommendation on Provisional Measures (21 Mar. 2007), para. 99; *Toto Costruzioni Generali SpA v. Republic of Lebanon*, ICSID Case No. ARB/07/12, Decision on Jurisdiction (11 Sep. 2009), para. 16; *Phoenix Action, Ltd v. Czech Republic*, ICSID Case No. ARB/06/5, Award (15 Apr. 2009), paras 82–86, 114; *Malicorp Ltd v. Arab Republic of Egypt*, ICSID Case No. ARB/08/18, Award (7 Feb. 2011), para. 109.

[46] *Saba Flakes v. Republic of Turkey*, ICSID Case No. ARB/07/20, Award (30 Jul. 2010), paras 111, 113; *Société Générale v. Dominican Republic*, LCIA Case No. UN 7927, Award on Jurisdiction (19 Sep. 2008), para. 32; *Alpha Projektholding GmbH v. Ukraine*, ICSID Case No. ARB/07/16, Award (8 Nov. 2010), para. 311; *Ceskoslovenska Obchodní Banka, AS v. Slovak Republic*, ICSID Case No. ARB/97/4, Decision on Jurisdiction (24 May 1999), para. 90; *RSM Production Corp. v. Grenada*, ICSID Case No. ARB/05/14, Award (8 Mar. 1999), para. 90; *RSM Production Corp. v. Grenada,* ICSID Case ARB/05/14, Award (13 Mar. 2009), para. 241; *Pantechniki SA Contractors & Engineers v. Albania*, ICSID Case No. ARB/07/21, Award (30 Jul. 2009), para. 45; *MCI Power Group LC and New Turbine, Inc. v. Ecuador*, ICSID Case No. ARB/03/6, Award (31 Jul. 2007), para. 165; *Inmaris Perestroika Sailing Maritime Services GmbH and others v. Ukraine*, ICSID Case No. ARB/08/8, Decision on Jurisdiction (8 Mar. 2010), para. 129; *Malaysian Historical Salvors SDN BHD v. Government of Malaysia,* ICSID Case No. ARB/05/10, Decision on Annulment (6 Apr. 2009), paras 77–79; *Abaclat and others v. Argentine Republic*, ICSID Case No. ARB/07/5, Decision on Jurisdiction and Admissibility (28 Oct. 2011), paras 363–364; *Poštová Banka, AS and Istrokapital SE v. Hellenic Republic*, ICSID Case No. ARB/13/8, Award (9 Apr. 2015), para. 173.

[47] *Emilio Agustín Maffezini v. Spain,* ICSID Case No. 97/7, Decision of the Tribunal on Objections to Jurisdiction (25 Jan. 2000), para. 56; *Siemens AG v. Argentine Republic,* ICSID Case No. ARB/02/8, Decision on Jurisdiction (3 Aug. 2004), para. 103; *Salini Costruttori SpA and Italstrade SpA v. Hashemite Kingdom of Jordan*, ICSID Case No. ARB/02/13, Decision on Jurisdiction (29 Nov. 2004), para. 118; *Camuzzi v. Argentina (II),* ICSID Case No. ARB/03/7, Decision on Jurisdiction (10 Jun. 2005), paras 28, 34; *Gas Natural SDG, SA v. Argentine Republic*, ICSID Case No. ARB/03/10, Decision of the Tribunal on Preliminary Questions on Jurisdiction (17 Jun. 2005), para. 49; *National Grid v. Argentina,* Ad hoc Arbitration, Decision on Jurisdiction (20 Jun. 2006), para. 93; *Telefónica v. Argentina,* ICSID, Decision on Jurisdiction (25 May 2006), para. 103; *RosInvestCo UK Ltd v. Russian Federation*, SCC Case No. V079/2005, Award on Jurisdiction (5 Oct. 2007), paras 124–139; *Austrian Airlines v. Slovak Republic*, Ad hoc Arbitration, Final Award (9 Oct. 2009), para. 124; *Suez, Sociedad General de Aguas de*

them.[48] This factor is compounded by the complexity and details of the cases; for example, the text of treaties may not be uniform across several languages.

Although the ICC leads the pathway of arbitration cases, the problem of lack of patterns from which to develop predictive models may be persistent.[49] Assuming that in all the 25,000 ICC cases tribunals rendered awards and procedural orders, one would have to consider that the awards (1) are issued in English, French, Spanish, Portuguese, and German, primarily; (2) the law applicable to the merits varies and has changed through the years; (3) the seats of arbitration are different; and (4) even the cases and awards are based on different version of the ICC Arbitration Rules. One constant appears in the New York Convention, which has remained unchanged since it entered into force in 1959, but case law has changed.

Fourth, the data taken from arbitration decisions can be tainted by human biases, and machine learning algorithms can perpetuate the bias.[50] Thus, those biases will form the base of algorithmic decisions, and they will possibly even exaggerate them by setting them as 'truth' for their future decisions or predictive

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Barcelona SA and InterAgua Servicios Integrales del Agua SA v. Argentine Republic, ICSID Case No. ARB/03/17, Decision on Jurisdiction (16 May 2006), para. 55; *Hochtief v. Argentina*, ICSID Case No. ARB/07/31, Document on Jurisdiction (24 Oct. 2011), para. 72; *Teinver SA v. Argentine Republic*, ICSID Case No. ARB/11/20, Decision on Jurisdiction (3 Jul. 2013), para. 186; *Itisaluna Iraq LLC, Munir Sukhtian International Investment LLC, VTEL Holdings Ltd, VTEL Middle East and Africa Ltd v. Republic of Iraq*, ICSID Case No. ARB/17/10, Award (3 Apr. 2020), para. 195.

48 *Plama v. Bulgaria*, ICSID Case No. ARB/03/24, Decision (8 Feb. 2005), para. 233; *Vladimir Berschader and Moïse Berschader v. Russian Federation*, SCC Case No. 080/2004, Award (21 Apr. 2006), para. 206; *Telenor Mobile Communications AS v. Republic of Hungary*, ICSID Case No. ARB/04/15, Award (13 Sep. 2006), para. 92; *Wintershall Aktiengesellschaft v. Argentine Republic,* ICSID Case No. ARB/04/14, Award (8 Dec. 2008), para. 167; *ICS Inspection and Control Services Ltd v. Argentine Republic (I),* PCA Case No. 2010-09, Award on Jurisdiction (10 Feb. 2012), para. 309; *Les Laboratoires Servier, SAS, Biofarma, SAS, Arts et Techniques du Progres SAS v. Republic of Poland*, UNCITRAL, Award (14 Feb. 2012), para. 511; *Daimler AG v. Argentine Republic*, ICSID Case No. ARB/05/1, Award (22 Aug. 2012), para. 281; *Kılıç İnşaat İthalat İhracat Sanayi ve Ticaret Anonim Şirketi v. Turkmenistan*, ICSID Case No. ARB/10/1, Award (2 Jul. 2013), para. 7.8.3; *Sanum Investments v. Lao People's Democratic Republic (I),* PCA Case No. 2013-13, Award on Jurisdiction (13 Dec. 2013), para. 358; *H&H Enterprises Investments, Inc. v. Arab Republic of Egypt*, ICSID Case No. ARB/09/15, Award on Jurisdiction (6 May 2014), para. 358; *Venezuela US, SRL v. Bolivarian Republic of Venezuela*, PCA Case No. 2013-34, Interim Award on Jurisdiction (26 Jul. 2016), para. 105; *A11Y v. Czech Republic*, ICSID Case No. UNCT/15/1, Decision on Jurisdiction (9 Feb. 2017), para. 103; *Ansung Housing Co., Ltd v. People's Republic of China*, ICSID Case No. ARB/14/25, Award (9 Mar. 2017), para. 138; *Beijing Urban Construction Group Co. Ltd v. Republic of Yemen*, ICSID Case No. ARB/14/30, Decision on Jurisdiction (31 May 2017), para. 113; *Juvel Ltd. Bithell Holdings Ltd v. Republic of Poland*, ICC Case No. 19459/MHM, Partial Final Award (26 Feb. 2019), para. 443; *Christian Doutremepuich and Antoine Doutremepuich v. Republic of Mauritius*, PCA Case No. 2018-37, Award on Jurisdiction (23 Aug. 2019), para. 236.

49 ICC, *ICC Celebrates Case Milestone, Announces Record Figures for 2019*, https://iccwbo.org/media-wall/news-speeches/icc-celebrates-25000th-case-milestone-senegal-announces-record-figures-for-2019/, (accessed 5 Mar. 2023).

50 Susskind, *supra* n. 7, at 171, 288.

outcomes.[51] Suppose that in investment arbitration, there really is a bias in favour of investors. In that case, an AI model based on investment arbitration data would disproportionately perpetuate such investor favouritism.[52]

Therefore, it matters how systemic errors in algorithms are resolved. In rule systems, where a human programmer codes the algorithm, the error will be in the design of the algorithm itself and can easily be corrected when the error is detected. In contrast, in machine learning systems, where the algorithm is extracted from the data, the error is in the data. These errors are more difficult to detect and fix.[53]

Moreover, in machine learning, programs are influenced by both training data and continuous experience and input to improve over time. Microsoft's Tay provides an undesirable example. In 2016, Microsoft launched Tay, an AI-driven bot that appeared on Twitter. Tay was designed to personalize interactions with users while answering questions or mimicking user phrases. As it learned and responded to the community with tweets, the bot began tweeting racist and offensive comments. Tay was terminated within hours.[54] This led Microsoft to identify six AI principles, which should guide AI development and use: fairness; trustworthiness and safety; privacy and security; inclusion; transparency; and accountability.[55]

Mindful of the positive and negative impacts of AI on societies and human lives, interaction, and decision-making, in 2021, UNESCO adopted a Recommendation on the Ethics of AI that pays specific attention to ethical implications of AI regarding education, science, culture, and communication and information.[56]

Now understanding the relevance of data and its challenges in arbitration, it is time to understand how the magic of AI occurs.

4 THE MAGIC OF AI AND MACHINE LEARNING

Machine learning uses probabilities to solve problems. A program recognizes patterns through statistics and probability calculations. The program calculates the probability for each factor or combination of factors and observes that the probability leads to an outcome. Example: if the words 'sex' and 'Viagra' appear in an email the chances are high that it is spam.[57] So why do we refer to machine

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51 Scherer, *supra* n. 11, at 19–20.
52 *Ibid.,* at 20.
53 *Ibid.*
54 Marco Iansiti & Karim R. Lakhani, *Competing in the Age of AI* 110 (HBR 2020).
55 Microsoft, *Microsoft AI Principles*, www.microsoft.com/en-us/ai/responsible-ai.
56 UNESCO, *supra* n. 17, at 3.
57 Scherer, *supra* n. 11, at 7.

learning as AI if it *does not entail intelligence per se*; that is, a human cognitive procedure? Because the output of machine learning, *prediction*, is a key component of intelligence. The accuracy of prediction allows machines to perform 'intelligent' tasks that were once associated with humans.

Prediction, the main function of the neocortex, is the basis of human intelligence.[58] The neocortex, neopallium, or isocortex is the name given to the most evolved areas of the cerebral cortex. The neocortex areas constitute the most recent neuronal mantle (pallium) that covers each cerebral lobe of mammals. The neocortex occupies around 70% of a human brain's volume and 'is responsible for everything we associate with intelligence from our senses of vision, touch and hearing, to language in all its forms, to abstract thinking'.[59] In fact, your neocortex is reading this article and making sense of it.[60]

Our neocortices learn a model of the world through memory and make predictions based on that model. As such, lawyers' brains can create a predictive model of the arbitration field.[61] Attorneys' brains build a model of the world using thousands of maplike reference frames from memory that the brain uses to plan and think.[62] Thus, lawyers recall provisions of the New York Convention or the *lex arbitri* and use that reference frame to craft an argument supporting the jurisdiction of the arbitral tribunal.

We refer to the word 'prediction' from two perspectives. First, 'predict' comes from the Latin '*praedicere*' which means to make known in advance. Our understanding of prediction emphasizes the possibility of seeing hidden information, whether in the past, present, or future. Thus, prediction takes available information known as data, and uses it to generate information that is not available.[63] Second, in espionage, prediction is also 'intelligence' because the machine obtains useful information. The better the prediction, and the better the information: the better the decision-making.[64]

Lawyers may not realize it, but our lives and their practices are full of predictions. The ability to make predictions is a central contribution to legal decision-making. When a client seeks legal advice to initiate an arbitration, the client seeks to assess the case's chances of success. To that end, the lawyer will

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58 Hawkins & Blakeslee, *supra* n. 3, at 89. *See also* Andy Clark, *Whatever Next? Predictive Brains, Situated Agents, and the Future of Cognitive Science*, 36 Behav. & Brain Sci. 181–204 (2013), doi: 10.1017/S0140525X12000477.

59 Jeff Hawkins, *A Thousand Brains: A New Theory of Intelligence* 2–3 (Basic Books 2021).

60 Hawkins & Blakeslee, *supra* n. 3, at 40.

61 Hawkins, *supra* n. 59, at 31.

62 *Ibid.,* at 4.

63 Agrawal, Gans & Goldfarb, *supra* n. 5, at 24.

64 *Ibid.,* at 29.

make predictions about opposing party's defences and objections, or whether to advise settlement.[65] It is unlikely that a lawyer will initiate arbitration if he or she sees unsuccessful odds against the client. Even in such cases, arbitral institutions have set a screening process that filters out, by initial review, arbitrations manifestly outside the institution's jurisdiction.[66] There are also expedited procedures for 'raising an objection concerning the manifest lack of legal merit of a claim'.[67]

In turn, arbitrators make predictions and act accordingly so as to render an enforceable award. That is why the 'Tribunal's obligation as guardian of the legitimacy of the arbitral process is to make every effort to ensure that the Award is soundly based and not affected by procedural imperfection'.[68] The arbitrator constantly assesses how best to safeguard the integrity of the proceedings against a party who wants to sabotage them. There is even a paranoia of due process that has led arbitrators to grant unreasonable procedural motions, thus, prolonging the proceedings.[69]

As arbitrators and lawyers age, their ability to predict becomes more accurate and their predictions become more realistic. However, when the predictions are incorrect and do not accurately anticipate the future, we notice the anomaly and this information feeds into our brain, which updates the algorithm to learn by improving the model.[70]

'At this point, we should remember that the aim of machine learning is rarely to replicate the training data but the correct prediction of new cases'.[71] The first step in supervised learning is to create a labelled dataset. We may acquire a file containing thousands of court decisions confirming or enforcing awards, and thousands of decisions vacating awards, with each decision labelled appropriately. The data is then split between training and validation data. Training data is used to determine the parameters of the model that generates the prediction of the outcome: whether a given decision depicts a confirmed or annulled award. After the model is trained, the validation data is used to test the model's accuracy. The

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65 Benjamin Roe, *The Year Ahead – Innovation: A New Generation of Legal Analysis Tools Is Emerging,* GAR (2019), https://globalarbitrationnews.com/the-year-ahead-innovation-a-new-generation-of-legal-analysis-tools-is-emerging/ (accessed 30 Mar. 2020).

66 ICSID Convention, Art. 36(3) and ICSID Rules, rule 6; ICC Rules, rule 6.4; SCC Rules, rule 10.i.; CAM Rules, rule 12.3.

67 ICSID Rules, Art. 41; SIAC Rules of Investment Arbitration, Art. 26; Dominican Republic-Central America-US Free Trade Agreement, Art. 10.20.4-6; SIAC Rules, Art. 29; SCC Rules, Art. 39; HKIAC Rules, Art. 19; JAMS Rules, Art. 18.

68 *Hrvatska Elektroprivreda, dd v. Slovenia*, ICSID Case No. ARB/05/24, Tribunal's Ruling regarding the participation of David Mildon QC in further stages of the proceedings (6 May 2008), para. 15.

69 Klaus Peter Berger & J Ole Jensen, *Due Process Paranoia and the Procedural Judgment Rule: A Safe Harbor for Procedural Management Decisions by International Arbitrators,* 32 Arb. Int'l 415–435 (2016), doi: 10.1093/arbint/aiw020.

70 Agrawal, Gans & Goldfarb, *supra* n. 5, at 39; Hawkins, *supra* n. 59, at 32.

71 Alpaydin, *supra* n. 28, at 39.

model makes its predictions on the validation data; we can then compare these predictions to the expert prediction and assess the model's quality.[72]

Models predict by calculating the average from past data. For example, to find out if an arbitrator incurs a conflict of interest that would result in a vacated award, you can look at what the judiciary has ruled recently. An average of those decisions will be the most accurate indicator. If a judge has vacated an arbitration award on these grounds in the past, you can predict that the probability of another court vacating the case is that percentage.

Information can be adjusted to consider different approaches from distinct jurisdictions[73] by predicting the outcome of a case in a particular jurisdiction or by a particular court. Thus, we may create a labelled dataset with the distinct decisions for a model to predict by calculating the average from past data. Of course, to improve accuracy, we would need thousands of decisions. This model would help arbitral institutions to determine the existence of conflicts and its effects. The model could also serve counsel and parties to assess the chances to vacate an award.

With this, it is worth studying where it is more efficient to replace humans with machines.

5 NEW DIVISION OF LABOUR IN ARBITRATION

AI has the potential to change the way cases are prepared, including selecting arbitrators based on their performance; making arguments that are more persuasive to those arbitrators; reducing the time and cost of legal research; and preparing more realistic fee arrangements. In the immediate future, arbitral institutions and arbitrators will be assisted by rule systems and machine learning systems that will enable them to conduct arbitrations faster and at a lower cost. Likewise, law firms will have greater support in predictive machines that allow them to analyse data.

5.1 Division of skills between machines and lawyers

To address the division of labour, it is necessary to determine in which areas humans have better predictions and in which areas machines are stronger. Therefore, it will be foundational to segment the areas of work in arbitration to detect where humans are still indispensable and where machines can help us. To address this issue, Agrawal, Gans and Goldfarb have structured the subject from four approaches, which this article adopts.[74]

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[72] Iansiti & Lakhani, *supra* n. 54, at 64.
[73] Agrawal, Gans & Goldfarb, *supra* n. 5, at 33.
[74] *Ibid.*, at 59.

First, what Agrawal, Gans and Goldfarb deem as 'known knowns' occur when we have a wealth of data, so we *know* we can make good predictions. With abundant data, machines know the situation and can predict accurately.[75] For example, Lex Machina does litigation data mining through court dockets to reveal knowledge of judges and counterparties. Lex Machina can show how likely a judge is to grant or deny a motion for summary judgment.[76] Databases analysing document review can also produce known knowns.

Regarding known knowns, predictive machines are very valuable because (1) they can produce predictions faster, better, and cheaper than humans; (2) their prediction is key in making decisions under uncertainty; and (3) decision-making is ubiquitous in our economic and social lives as long as data are abundant.[77] Two examples illustrate this:

(1) A machine can tell if a person is lying in court with 90% accuracy, while humans can tell with 54% accuracy.[78]
(2) Predictive machines now exist that can predict how judges will vote. One program proved that it outperformed humans in predicting the voting of US Supreme Court justices. The program achieved a 75% correct predictability rate, while eminent lawyers and professors could only achieve 59.1%.[79] Another recent model achieved 79% accuracy in predicting all cases of the European Court of Human Rights.[80]

Second, 'known unknowns' occur when there is very little data, which makes prediction difficult. The little data places machines at a disadvantage. As noted, the best prediction models require large amounts of data. Although scientists are working on techniques such as 'one-shot learning' to make machines learn well after observation, thereby reducing the need for data, these techniques are not yet effective. Here, lawyers have a niche opportunity. Unlike machines, humans are good at predicting with little data. We can recognize the face of a classmate

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75 *Ibid.*

76 Lex Machina, https://lexmachina.com/what-we-do/ (Consultation of 30 Mar. 2020).

77 Agrawal, Gans & Goldfarb, *supra* n. 5, at 81.

78 Daniel Susskind, *A World Without Work: Technology, Automation, and How We Should Respond* 56 (Metropolitan Books New York 2020).

79 Theodore W. Ruger et al., *The Supreme Court Forecasting Project: Legal and Political Sciences Approaches to Predicting Supreme Court Decisionmaking*, 104 Colum. L. Rev. 1150, 1152 (2004), doi: 10.2307/4099370.

80 This study was limited to human rights related to protection from torture, the right to a fair trial, privacy and family. Nikolaos Aletras et al., *Predicting Judicial Decision of the European Court of Human Rights: A Natural Language Processing Perspective*, 2:e93 Peer J. Computer Sci. 10 (2016), doi: 10.13039/501100000266.

from fourth-grade forty years later, having never seen him or her before despite the changes.[81]

However, little data for a machine leads to a poor prediction because we know what we do not know. In some cases, we do not have data because we deal with sporadic events[82]; one arbitration example relates to security for costs. In investment arbitration, tribunals have consistently ruled that exceptional circumstances are required to grant security for costs.[83] To date, only few published cases exist in which tribunals have ordered claimants to provide security for costs in favour of the respondent,[84] and one court judgment.[85] If a machine cannot observe enough human decisions to determine those exceptional circumstances needed to obtain security for costs, it cannot predict the underlying judgment of those decisions.

In practice, lawyers solve known unknowns with analogies because they are useful tools for filling in gaps. In fact, the author has constructed this article with analogies. By drawing similarities or differences between cases or rules, lawyers apply a rule designated for a similar situation to a case that is not specifically regulated,[86] i.e., 'because A and B are analogues, a rule X which … is applicable to

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[81] Agrawal, Gans & Goldfarb, *supra* n. 5, at 60. *See also* Richard Russell, Brad Duchaine & Ken Nakayama, *Super-Recognizers: People With Extraordinary Face Recognition Ability*, 16 Psychonomic Bull. & Rev. 252–257 (2009), doi: 10.3758/PBR.16.2.252. They found 'the existence of people with exceptionally good face recognition ability'. Elena Belanova, Josh P. Davis & Trevor Thompson, *Cognitive and Neural Markers of Super-Recognisers' Face Processing Superiority and Enhanced Cross-Age Effect,* 108 Cortex 92–11 (2018), doi: 10.1016/j.cortex.2018.07.008. For them 'super-recognisers inhabit the extreme high end of an adult face processing ability spectrum in the population'. In experiments, 'super-recognisers also generated significantly greater electrophysiological activity in event-related potentials associated with pictorial processing and explicit recognition'. Marlene Cimons, *They Never Forget a Face. Research Delves into How 'Super-Recognizers' Can do This,* TWP (30 Oct. 2021, 10:00 AM EDT), www.washingtonpost.com/science/super-recognizer-facial-memory/2021/10/29/4cf80caa-2159-11ec-b3d6-8cdebe60d3e2_story.html.

[82] *Ibid.,* at 60.

[83] *Ipek Investment Ltd v. Turkey,* ICSID Case No. ARB/18/18, Procedural Ord. 7 (14 Oct. 2019), paras 3–4; *Libananco Holdings Co. Ltd v. Turkey*, ICSID Case No. ARB/06/8, Preliminary Issues Decision (23 Jun. 2008), para. 57; *RSM Production Corp. v. Grenada,* ICSID Case No. ARB/05/14, Decision on Security for Costs (14 Oct. 2010), para. 5.20; *Lighthouse Corp. Pty Ltd v. East Timor,* ICSID Case No. ARB/15/2, Procedural Ord. 2 (13 Feb. 2016), para. 61; *South American Silver Ltd v. Bolivia*, PCA Case No. 2013-15, Procedural Ord. 10 (11 Jan. 2016), para. 59.

[84] *RSM Production Corp. v. Saint Lucia,* ICSID Case No. ARB/12/10, Decision on the Application for Security for Costs (13 Aug. 2014), para. 90; *Manuel García Armas* et al. *v. Bolivarian Republic of Venezuela,* Case CPA No. 2016-08, Procedural Order No. 9 (20 Jun. 2018), para. 261; *Dirk Herzig as Insolvency Administrator Over the Assets of Unionmatex Industrieanlagen GmbH v. Turkmenistan*, ICSID Case No. ARB/18/35, Decision on the Respondent's Request for Security for Costs and the Claimant's Request for Security for Claim (27 Jan. 2020), para. 84; *Eugene Kazmin v. Republic of Latvia*, ICSID Case No. ARB/17/5, Procedural Order No. 6, Decision on the Respondent's Application for Security for Costs (13 Apr. 2020), para. 68.

[85] *Progas Energy v. Pakistan*, Commercial Court Judgment [2018] EWHC 209 (Comm) (9 Feb. 2018), para. 83.

[86] Valentina Vadi, *Analogies in International Investment Law and Arbitration* 2 (Cambridge 2015); Cristiano de Sousa Zanetti, *Filling the Gaps: A Civil Law Tradition*, in *Legitimacy: Myths, Realities, Challenges*, 18 ICCA Congress Series 1007 (Albert Jan Van den Berg ed., Kluwer Law International 2015).

A is also applicable to B'.[87] With analogies, attorneys compare similar patterns. During their process, lawyers transfer meaning (X) from context A (the source), which is a familiar situation viewed as parallel, to the context B (the target). In doing so, lawyers learn about this new situation, which is supposed to be incomplete and in need for completion using the source A.[88] In some instances, lawyers may use analogies as tools to predict where gaps exist or to fill the gaps.

Considering that machines have limited capabilities to deal with known unkowns, attorneys may exploit this niche by relying on comparative reasoning and analogies. As such, lawyers can understand the forces that shape the development of international arbitration. Moreover, the use of comparative reasoning to solve known unknowns makes sense given that in practice law-makers elaborate common standards, and courts ensure consistency and coherence based on comparative reasoning.[89]

As long as lawyers are better at deciding known unknowns than machines, human assistance will be necessary. A lawyer using a predictive machine may foresee known unknowns that a machine cannot, and can fill those gaps with analogies and comparative reasoning.[90]

Third, the 'unknown unknowns' are those events that are not recorded by experience or are not present in the data but are possible to happen, even if we are not aware of them, so prediction is difficult. To predict, you need to tell the machine what you need to predict. If something has never happened before, a machine cannot predict it.[91] We cannot predict true new events from past data.[92] For example, *Abaclat v. Argentina* was the first International Centre for Settlement of Investment Disputes (ICSID) case involving mass claims in an investment arbitration. In 2006, more than 180,000 Italian bondholders initiated an ICSID arbitration claiming that the Emergency Law violated the principle of fair and equitable treatment and constituted an expropriation of their investment. Thus, it was uncertain in that first case whether an ICSID tribunal had jurisdiction to adjudicate collective mass claims.[93] While the arbitration rules were the same prior to and after *Abaclat*, until this case, there was no ICSID precedent that raised the question.

Finally, we have the 'unknown knowns' which occur when there is a seemingly strong association in the past resulting from some unknown or

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87 Vadi, *supra* n. 86, at 35 (citing Becker, *Analogy in Legal Reasoning*).
88 *Ibid.*
89 *Ibid.*
90 Agrawal, Gans & Goldfarb, *supra* n. 5, at 60.
91 *Ibid.*, at 60.
92 Nassim Nicholas Taleb, *The Black Swan* (Random House 2007).
93 *Abaclat and others v. Argentina*, ICSID Case No. ARB/07/5, Decision on Jurisdiction and Admissibility, Dissenting Opinion (28 Oct. 2011), para. 314.

unobserved factors that change over time and make prediction difficult, and unreliable. Prediction machines fail precisely when it is difficult to predict based on the well-understood limits of statistics.[94] With the unknown knowns predictive machines can give very accurate answers but they can be wrong. If the machine does not understand the decision process that generated the data, its predictions may fail.[95]

Chess grandmaster Garry Kasparov comments on a funny anecdote when he and other colleagues wrote a program based on experiential learning in the early 1980s. They fed the machine thousands of positions from Grandmaster games in the hope that the machine would be able to work out what worked and what did not. At first, the experiment seemed to work. Its evaluations of positions were more accurate than conventional programs.[96]

The problem came later when they let the machine start playing chess. The program would launch an attack and immediately sacrifice the queen. It lost in a couple of moves giving up the queen for nothing. Why did this happen? Grandmasters sacrifice the queen to deliver a masterstroke. However, for the machine, schooled in the moves of the grandmasters, giving up the queen was clearly the key to success. The machine was reversing the causal sequence. Not understanding that the Grandmasters sacrificed the queen only when there was a short and clear path to victory, the machine learned that chess is 'won' after giving up the queen. So, sacrificing the queen was the wrong way to success. Today this has been resolved; however, reverse causality is a challenge for prediction machines.[97]

In the arbitral world, we could feed the machine two investment arbitration cases to calculate the costs of arbitration and find a similar challenge. For the purposes of our example, we will first feed the machine the *Yukos v. Russia* case, including its three awards where the arbitral tribunal ordered Russia to pay over USD 50 billion in damages and to pay arbitration costs of EUR 4.2 million and representation costs of over USD 60 million. The plaintiffs claimed USD 80 million and the defendant USD 27 million.[98] We will also feed the machine with a second case: *David R. Aven and others v. Costa Rica*,[99] where the arbitral tribunal upheld its jurisdiction but dismissed all of the claimants' claims. The costs and fees claimed by the respondent were USD 2,641,747.58, of which USD 970,000 were the fees of the law firm, the tribunal ordered the claimants to pay USD 1,090,905.10.

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94 Agrawal, Gans & Goldfarb, *supra* n. 5, at 59, 61.
95 *Ibid.*
96 Garry Kasparov, *Deep Thinking* 99–100 (Perseus Books 2017).
97 Agrawal, Gans & Goldfarb, *supra* n. 5, at 63.
98 *Hulley Enterprises Ltd v. Russia*, PCA Case No. AA226; *Yukos Universal Ltd v. Russia*, PCA Case No. AA227; *Veteran Petroleum Ltd v. Russia*, PCA Case No. AA228, Awards (18 Jul. 2014), paras 1811, 1824, 1829, 1887.
99 *David R. Aven and others v. Costa Rica*, ICSID Case No. UNCT/15/3, Award (18 Sep. 2018).

If we feed in that data, the machine may suggest that fees are high when damages awarded are high and fees are low when damages are low or none. An innocent prediction might suggest that increasing the price of fees would increase the amount of the award or that increasing the amount of the award would necessarily increase the amount of fees. A human with knowledge of arbitration would understand that arbitration costs and fees depend on multiple factors such as the litigiousness of the parties, the complexity of the facts, and the number of witnesses and experts. A higher award of damages does not necessarily mean higher arbitration costs or counsel fees. Nor does estimating higher fees automatically increase the amount of the award. This known correlation would not indicate a causal prediction from which a machine could provide accurate intelligence.

Here, the human can work with the machine to develop models that improve the prediction of counsel fees and arbitration costs. For the machine, this prediction would be an unknown known, but for a human with the understanding of arbitration it will be a known unknown, or even a known known if it can model arbitration costs and fees. Ultimately, humans can find solutions to generate good predictions, so that, between machine and human insight, there are maximized known knowns. This will require machines and humans to work together.

Table 2 Strengths and Weaknesses of Machines and Humans in Arbitration Prediction

RanKing	*Abundance of Data?*	*Can the Machine Make Good Predictions?*	*Example*	*Opportunities for Humans*
known knowns	Yes	Yes	Jus Mundi, Arbitrator Intelligence, GAR ART, Lex Machina, iFlyTek. Document production or review: BrainSpace, Relativity	No
known unknowns	No	No	Orders to secure costs in arbitration: *RSM v. Saint Lucia, Garcia Armas v. Venezuela, Dirk Herzig v. Turkmenistan, Kazmin v. Latvia*	Yes

RanKing	*Abundance of Data?*	*Can the Machine Make Good Predictions?*	*Example*	*Opportunities for Humans*
unknown unknowns	No Unrecorded events, or events that are possible but have not yet occurred	No	In 2006, *Abaclat v. Argentina* was the first ICSID case involving collective claims in an investment arbitration. At the time, the jurisdiction of the ICSID tribunal was doubtful	Yes
unknown knowns	No	No	Calculation of costs and damages under the *Yukos* and *David R. Aven* cases	Yes

To recap, machine prediction is powerful, but it has its limitations. It does not work well when there is little information. Some well-trained lawyers can (1) improve the machine's predictions, and (2) recognize these limitations either because the events are sporadic or because they are causal inference problems. To do so, these lawyers need to understand the machine's limitations. Humans and machines are good at different aspects of prediction. By recognizing where their capacities and abilities differ, a complementary combination of human and machine prediction can help reduce the weaknesses that both have, as well as the error rate.[100] With that, we proceed to meditate on the strengths and weaknesses of humans and machines.

5.2 Strengths and weaknesses of machines and humans

Today, AI falls short of human intelligence. As long as prediction in arbitration relies on data (known knowns), humans will have, at least, three advantages over machines and their jobs will be secure regarding known unknowns, unknown unknowns, and unknown knowns. Lawyers know things that machines do not, at least for now; and we are better at deciding what to do in the face of data scarcity.[101] These ideas are developed below.

[100] Agrawal, Gans & Goldfarb, *supra* n. 5, at 64–65.
[101] *Ibid.*, at 98.

First, human senses are powerful. In many ways, today, human eyes, ears, noses, and bodies surpass the capabilities of a machine.[102] While robots can assemble a vehicle or an airplane, they cannot currently pick up an object in an Amazon warehouse and put it in a box. But robotic start-up Kindred has trained a robotic arm to predict how humans pick up objects.[103] Robots can assemble a vehicle because the components are highly standard and the process routine; in Amazon's warehouse there are infinite shapes, sizes, weights, firmness of objects that are placed on shelves with different positions and orientations for objects that are not rectangular. Kindred, however, uses an arm with a mix of automated software and human control. The automation identifies the object and where it goes, the human wearing a virtual reality headset guides the robotic arm to pick it up and move it. In the long term, Kindred hopes to use a predictive machine trained in many observations of how the human picks things up through tele-operation to teach the robot to do its part.[104]

Second, humans learn continuously; in contrast, deep learning networks must be completely trained before being deployed. And once deployed, they cannot learn new things on the go. To teach a vision neural network to recognize an additional object, the network must be trained from the ground up, which takes days. But for Hawkins, the main reason that today's AI systems are not truly 'intelligent' lies in the fact that they can only perform their trained function; humans, by contrast, can do many things.[105] We are flexible in our ability to learn; we can play chess, farm, write poetry and software, sail a boat, and play the piano. Unlike humans who can learn thousands of skills depending on their experience, deep learning AI systems exhibit almost no flexibility. The future of AI, if it ever occurs, will be to continue to develop machines that exhibit increasingly human-like intelligence more efficiently: machines that can rapidly learn new tasks, draw analogies between tasks, and flexibly solve new problems.[106] This next level of AI is known as artificial general intelligence (AGI).

Third, confidentiality in arbitration restricts the availability of data to machines. As long as parties continue to keep their awards confidential, machines will have insufficient data to predict many types of conduct in arbitration. However, arbitral institutions can capitalize on all their databases for their own benefits by creating a special software that allows them to compile and process all relevant information. Additionally, they can create partnerships with Jus Mundi as the ICC did. The ICC and Jus Mundi 'have joined forces to make ICC arbitral

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[102] *Ibid.*
[103] *Ibid.*, at 144–145.
[104] *Ibid.*, at 144–145.
[105] Hawkins, *supra* n. 59, at 119–120.
[106] *Ibid.*, at 119–120.

awards freely available to the global legal community'.[107] In the absence of data, our understanding of the human experience makes human analysis indispensable. Such situations necessarily make it imperative for humans to fill in gaps and make the very judgments that machines cannot learn to predict. Now we can move to understand how to maximize the division of machine and human labour to make the most use out of human labour hours. Finally, we humans are the ultimate arbiters of our own preferences.[108]

5.3 Humans and machines will work in a complementary way

With the above analysis of strengths and weaknesses, humans can employ their time where it is really needed; i.e., to continue understanding, and developing known unknowns, unknown unknowns, and unknown knowns. These three areas of work will continue to require a consistent human contribution. In light of these developments, for the immediate future of arbitration, a division of labour is most likely where humans and predictive machines work together. This is based on Wilson's and Duagherty's study of 1,500 companies, where they found that firms achieve significant performance improvements when humans and machines work together.[109] For now, in arbitration, the use of rule-based and supervised learning is most promising, especially where data is not abundant or where causal inference may require revision. I explore these ideas in turn.

First, humans and predictive machines should work together. In a first stage, machines can give recommendations in arbitration, rather than taking final decisions. Humans will keep taking final decisions.[110] Two examples illustrate the point:

(1) ICSID may develop an algorithm to find the best candidate(s) to decide an ICSID arbitration arising out of a mining dispute. *See* Table 3. The algorithm may suggest the name of individuals as the best candidates to act as arbitrator, but at the end the President of the World Bank, who is the Chairman of the Administrative Council, will determine whether to appoint him or her.[111]
(2) The 206 System, an AI-based trial assistance system developed by the company iFlyTek and Shanghai People's High Court, exemplifies a

[107] Jus Mundi, *A Unique Partnership for the Publication of ICC Arbitral Awards* (8 Oct. 2022), https://jusmundi.com/en/partnership/icc (accessed 5 Mar. 2023).
[108] Agrawal, Gans & Goldfarb, *supra* n. 5, at 98.
[109] H. James Wilson & Paul R. Daugherty, *Collaborative Intelligence: Humans and AI Are Joining Forces,* in *HBR's 10 Must Reads on AI, Analytics and the New Machine Age* 127 (HBR 2019).
[110] Agrawal, Gans & Goldfarb, *supra* n. 5, at 69.
[111] ICSID Convention, Art. 38.

> similar relationship between humans and AI, as the software assists judges with evidence and sentencing criminal cases.[112] A cross-referencing system uses language recognition and natural speech processing to compare all the evidence presented – testimonial and documentary evidence – to look for conflicting fact patterns. The machine alerts the judge about inconsistencies, allowing the judge to investigate further. Once sentencing is about to take place, the judge can use another AI tool. The machine starts with a fact pattern – the detainee's criminal record, age, damages – then, the algorithm scans millions of court records. With this data, the machine recommends to the judge the years of imprisonment or fine to be paid.[113]

Second, counsel and machines are working together using rule-based and supervised learning in an environment with limited data or where causal inference may require revision.

Supervised learning requires human interaction; a lawyer and an engineer must train the machine to define a set of desired outcomes.[114] iFlytek sent their programmers to work with judges and court staff as part of a research and development team. The judges told the technicians their needs and the technicians sought algorithmic solutions to solve judicial problems.[115] In arbitration, counsel points the engineer towards the type of documents that prove breaches to the contract for a range of input. In sizeable arbitrations where attorneys need to review or produce large numbers of documents and other information in preparation of their case,[116] technology assisted review can outperform young associates in terms of accuracy, speed and memory. Such products include Brainspace[117] and Relativity.[118] Lawyers prepare a protocol with search terms and then select documents to create a sample, which serves as the basis for the machine to predict which documents are useful for the case. The lawyer, of course, will review the documents to determine whether they are relevant and useful. In this way, supervised learning systems predict which documents lawyers would select as relevant and not privileged.[119] This is extremely effective as long as the training

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112 Lee, *supra* n. 10, at 115.
113 *Ibid.*, at 115. *See also* George G. Zheng, *China's Grand Design of People's Smart Courts,* 7Asian J.L. & Soc'y 561, 574–575 (2020), doi: 10.1017/als.2020.20.
114 Scherer, *supra* n. 11, at 8.
115 Zheng, *supra* n. 113, at 566–567.
116 Klaus Sachs, *Time and Money: Cost Control and Effective Case Management,* in *Pervasive Problems in International Arbitration* 113 (Loukas A. Mistelis & Julian D.M. Lew eds, Kluwer Law International 2006).
117 Brainspace, *Electronic Discovery*, www.brainspace.com/usecases/ediscovery.
118 Relativity, *Review & Productions in Relativity*, www.relativity.com/ediscovery-software/review/.
119 Susskind, *supra* n. 7, at 271.

sample data is properly labelled. When the program incorrectly classifies a test as relevant, supervised learning does require further human feedback.

Unsupervised learning juxtaposes supervised learning in that it requires no or virtually no human interference. In this type of machine learning, there are no pre-set assumptions or predefined outcomes; the program detects the concurrent elements that generate the expectation that will occur in the future. This happens with modern translation programs.[120]

Through the collaboration of algorithms developed with rule systems and supervised learning, humans and AI can enhance their respective complementary strengths. To take advantage of this collaboration, the arbitration community must understand how machines enhance the work that lawyers can do to achieve this symbiosis.[121] To further illustrate this point, the following seven examples are proposals for the development of a complementary human-AI relationship in the context of arbitration.

5.4 Concrete proposals for the development of a complementary human-AI relationship in arbitration

The following section presents six proposals for the development of a complementary human-AI relationship in arbitration. First, Jus Mundi, Kluwer Arbitration Practice Plus, and others provide tools that facilitate this collaboration. Normally, a lawyer needs to invest hours to research conflicts of interest, but for an algorithm this same task takes seconds. The author has spent days searching for information about an arbitrator and the arbitrator's appointing counsel to find the existence of conflicts of interests and determine whether to challenge the arbitrator. By contrast, in a matter of seconds, Jus Mundi's *Conflict Checker* tool presents conflict of interest research putting forward relationships between the arbitrator and the appointing counsel, detailing the cases in which the arbitrator and counsel have been together. Kluwer Arbitration Practice Plus has an added value because it links arbitrators', experts' and counsels' profiles with related publications and awards.[122]

Second, with software such as TreeAge Pro, lawyers can create decision trees, as shown in Figure 1, to represent a case problem, evaluate and compare legal strategies, and study certain outcomes. TreeAge Pro provides basic tools for model

[120] Scherer, *supra* n. 11, at 8.
[121] Iansiti & Lakhani, *supra* n. 54, at 128.
[122] Kluwer Arbitration Blog, *Wolters Kluwer Launches Data-Driven Enhancements to Arbitrator Tool Within Kluwer Arbitration Practice Plus* (19 Nov. 2021), http://arbitrationblog.kluwerarbitration.com/2021/11/19/wolters-kluwer-launches-data-driven-enhancements-to-arbitrator-tool-within-kluwer-arbitration-practice-plus/ (accessed 5 Mar. 2023).

building and analysis. Once the tree is created, TreAge Pro helps to calculate the value of each option, considering probabilities. With the Tree Diagram Editor, a program embedded in TreeAge Pro, lawyers can create model structures to represent the legal problem, including decision points and expected events. In a case, decision trees can help map options on how to settle a case, or evaluate different damage awards and the probability of success.[123]

Third, another useful program is Dispute Resolution Data (DRD)[124] which has a database of 3,500 arbitration cases.[125] The global database collects and reports data relating to international commercial arbitration and mediation dispositions. According to DRD, 52% of these cases ended with a settlement. With DRD, a party with a strong position could try to predict, depending on the particulars of the case, when it should settle.[126]

Fourth, Ross helps law firms research case law.[127] Ross works with International Business Machines Corporation's (IBM) Watson technology, the robot that won the *Jeopardy* contest.[128] Ross tries to emulate the legal research of a lawyer. Ross uses AI to understand natural language questions, analyses unstructured information, and provides analytical answers to specific cases from case law. Ross reads hundreds of databases, processes the information, evaluates the relevant data, and delivers an answer.[129] Ross can also assist in the preparation of briefs by extracting citations and key points from precedent. Similarly, Ross can currently serve in those cases where judicial assistance to arbitration is sought.

But this AI tool may further assist arbitrators and counsel by having access to an unlimited universe of databases. In other words, when Ross reads hundreds of databases, it could evolve by having access to arbitration databases such as Clout, DRD, Jus Mundi, Investor State Law Guide, Kluwer Online, Oxford Online, Juris Legal, and produce fast results decreasing the time invested in research. Nonetheless, if the user would have to pay for access to each of these platforms, this could create a gap in information sharing. In this regard, law schools that have access to many of these databases will be better positioned to cooperate in the process to allow the machine learning to better and more accurately function and predict, as well as to assist law firms and arbitrators with this specialized research.

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123 Tree Age Pro, www.treeage.com/.

124 DRD, www.disputeresolutiondata.com/about_drd.

125 Brian Canada, *A Data-Driven Exploration of Arbitration as a Settlement Tool: Does Reality Match Perception?* 11 NY Disp. Res. Law. 46–48 (2018), doi: 10.1093/law-mpeipro.

126 *Ibid.*

127 Andrés Oppenheimer, *¡Sálvese Quien Pueda!* 200 (Vintage Español, New York 2018).

128 Jeopardy is a tv game show featuring a quiz competition that reverses the traditional question-and-answer format. A television presenter provides contestants with general knowledge clues in the form of answers. Contestants must respond with a question identifying the person, place, thing, or idea that the clue describes.

129 *Ibid.*

However, humans will always be necessary when they can access information that AI cannot, where there exists an unknown known human experiential element, or because the scope of the input information is limited to some but not all paid subscription services collection tools.

Fifth, with the information that Ross obtains, IBM could develop a machine similar to IBM's Project Debater that could develop legal arguments for arbitration. Today, Project Debater is the first AI system to debate complex issues with humans. IBM aims to help humans construct persuasive arguments to make well-informed decisions by providing evidence-based arguments and limiting emotions. Project Debater digests large amounts of information and builds a structured discourse on a topic to refute its opponent.[130] With further development, technology such as Project Debater or ChatGPT can assist lawyers in drafting a brief or arbitrators in developing the rationale for an award.

Finally, there exist legal analytics programs such as Lex Machina, which can help counsel structure their arguments, and iFlyTek, which can assist arbitrators in detecting inconsistencies in evidence.[131] Through mining data from court dockets, Lex Machina shows counsel how likely a judge is to grant or deny a motion for summary judgment by using the most persuasive language.[132] iFlyTek may assist arbitrators to better compare the testimonial and documentary evidence submitted to look for conflicting fact patterns, and alerting the arbitrator about inconsistencies.

For the sake of clarity regarding human-machine interaction, the activities of a human in arbitration are broken down in the next section.[133]

6 FRAGMENTATION OF WORK IN ARBITRATION

By breaking a decision into its elements, we can think about which parts of the lawyers' activities will decrease in value and which will increase as a result of improved machine prediction. As machine prediction gradually replaces human prediction, the human prediction's value will decay. While prediction is a key component of a decision, it is not the only component. The other elements of the decision (judgment, data, action), and explanation to the client remain, for now, in the realm of lawyers; they are complements to prediction, i.e., they increase in value as prediction becomes cheaper.[134]

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130 IBM, AI Research, www.research.ibm.com/artificial-intelligence/project-debater/about/ (accessed 2 Jun. 2019).
131 *See supra* nn. 76 and 113.
132 Lex Machina, *supra* n. 76.
133 *See* Figure 1.
134 Agrawal, Gans & Goldfarb, *supra* n. 5, at 76.

When referring to decision-making in arbitration, we immediately think of awards or procedural orders. Given the current data availability challenges in arbitration, it is useful to start with less complex activities. The appointment, confirmation and challenge of an arbitrator are activities in which arbitral institutions and law firms are most often involved; regardless of the subject matter of the dispute, they are routine activities; they follow the well-known repetitive processes that can most easily be codified and performed by algorithms.[135] With two case studies below, the author analyses to what degree it is feasible to use AI in arbitration and how AI could assist in the confirmation of an arbitrator based on a system of rules.

6.1 Can we use AI to find the best candidate?

To determine whether we should use AI for certain activities in arbitration, it is necessary to analyse the set of decisions for a certain degree of predictability. For example, let us consider a scenario where we had to identify the best candidate to arbitrate a mining investment arbitration.[136] For this, the workflow of activities needed to identify the candidate is broken down to find whether AI could play a role.

Table 3 is an AI canvas[137] proposed by Agrawal, Gans, and Goldfarb that allows separating the workflow into tasks. It could be used by an arbitral institution or a law firm to find the best candidate and appoint him/her as an arbitrator. The appointment of an arbitrator requires prediction. Who will be the best arbitrator for this case? This may be easy, but first we need to define what is meant by the 'best arbitrator'. The strategy of an arbitral institution or law firm can help identify this. Arbitral institutions will have multifaceted missions, such as considering nationality, diversity, proficiency in certain languages, including young arbitrators, among others.

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[135] D. Acemoglu & David Autor, *Skills, Tasks and Technologies: Implications for Employment and Earnings*, 4 Handbook Lab. Econ. 1076 (2011), doi: 10.1016/S0169-7218(11)02410-5.

[136] Agrawal, Gans & Goldfarb, *supra* n. 5, at 134.

[137] An AI Canvas is a tool to decide whether employing a prediction machine will improve matters. An AI Canvas maps out an AI strategy. It helps to organize what is needed to know into seven categories in order to systematically make an assessment. *See* Agrawal, Gans & Goldfarb, *A Simple Tool to Start Making Decisions With the Help of AI,* HBR (17 Apr. 2018), https://hbr.org/2018/04/a-simple-tool-to-start-making-decisions-with-the-help-of-ai#:~:text=The%20AI%20Canvas%20is%20a,you%20are%20trying%20to%20predict (accessed 5 Mar. 2023).

Table 3 AI Canvas for Appointing an Arbitrator

Prediction	*Judgment*	*Action*	*Outcome*
Predict whether an arbitrator will be the best candidate among the ten candidates to resolve an ICSID arbitration in a mining dispute against Costa Rica initiated by investors from Canada and the Netherlands.	Determine the relative value of accepting the best arbitrator versus the cost of a false positive (accepting a non-top ten arbitrator) versus the cost of a false negative (losing a top ten arbitrator) versus not identifying a top ten arbitrator.	Find the best candidate to appoint as an arbitrator	An exceptional arbitrator with experience in mining, international law, and investment law measured by his or her efficiency in reducing the costs of the arbitration while conducting it efficiently with great knowledge of the merits who is fluent in Spanish and English and who is not a national of either the Netherlands or Canada.

Input	*Training*	*Feedback*
– Nationality – Diversity – The arbitrator's CV – Career Analysis – All cases in which he or she has been involved either as counsel or arbitrator – Exhaustive internet search – Publications and conferences – Academic Positions – Member of organizations	– Nationality – Diversity – The arbitrator's CV – Career Analysis – All cases in which the arbitrator has participated – Exhaustive internet search – Publications and conferences – Academic Positions – Member of organizations	Update with the results of how he or she conducts the arbitration proceedings, the decisions he or she issues and the resistance of the awards to support the nullity of awards rendered.

Arbitral institutions and lawyers have many strategies that implicitly or explicitly define who the 'best arbitrator' is. They may be simple like mining arbitrations and awards, or broader goals such as an arbitrator who has conducted many cases or their proclivity to allow for extensive document production. They may want an arbitrator who has a mix of qualitative or quantitative skills to decide.

Table 3 assumes that the strategy of the arbitral institution is for the 'best' arbitrator to have the greatest impact on the arbitral proceedings globally. This subjective notion is strategic; it is international rather than local and seeks impact rather than maximizing diversity or creating diversity, although it does consider diversity. For AI to predict global impact in arbitration, we need to measure it. What training data do we have that allows us to be an agent of global impact in arbitration? One option would be to identify the arbitrator who does not have a single award vacated in any jurisdiction around the world. This choice would be subjective.

While the arbitral institution may set an overall impact on the arbitration as a goal for a particular machine, the value of accepting a particular arbitrator is a matter of judgment. How costly would it be to accept a weak arbitrator about whom we had mistakenly predicted that his or her award would not be set aside? How costly would it be not to appoint a highly qualified arbitrator whom we had mistakenly assessed as weak? The evaluation of the *trade-off* is an element of the AI.[138]

Once we specify the objective of the prediction, identifying the necessary data is easier. We need the arbitrator's CV, his or her nationality, whether he or she speaks Spanish and English, and experience in mining and international law, to predict how he or she will do in the arbitration. We can also use their publications, review previous awards they have rendered or cases they have been involved in, review Arbitrator Intelligence Reports, call acquaintances or other lawyers, and use the feedback to improve the predictions. The predictions will tell us which arbitrator to appoint but only after judging the cost of making a mistake.

This is the first stage, short-term future we will see or are already experiencing with tools like GAR ART. Next, we delve a little deeper into more complex decisions such as the confirmation of an arbitrator.

6.2 Confirming an arbitrator through the rules system

For the analysis of whether to confirm an arbitrator, it is useful to specify that such decisions have six elements. When someone or something decides, it takes *data* from the world that allows *prediction*. Prediction is possible because there has been *training* about relationships between different types of data and what data will be most associated with a situation. By combining prediction with

[138] Agrawal, Gans & Goldfarb, *supra* n. 5, at 139.

judgment about what matters, a decision can be made. The decision leads to a consequence, called a *result*, which can be fed back to improve the prediction.[139]

To explain what judgment is and to illustrate a practical application of AI to arbitration, we introduce a decision tree, using a routine activity that requires a complex decision: the confirmation of an arbitrator. In an arbitration seated in Cairo, Egypt, the claimants ask the arbitral institution to confirm Arbitrator X; the defendant opposes such confirmation arguing that Arbitrator X served as party counsel against them in another arbitration unrelated to this dispute more than five years ago.

Figure 1 represents this example using a decision tree. At the root of the tree there are two branches representing decisions that can be made to 'allow the arbitrator, i.e., confirm' or 'not to confirm'. Extending branches are branches representing the prediction that the arbitral institution is unsure: 'annulment' versus 'enforcement'. Let us remember that the arbitration is seated in Cairo, Egypt. Following Shehata, an award in Egypt is 77.3% more likely to be enforced than to be set aside (22.7%)[140]; based on the above, the arbitral institution may predict that courts in Cairo will enforce the award with a 77.3% chance against a 22.7% chance of setting it aside.[141] This is the prediction. The consequences are at the end of the branches.

What decision should the arbitral institution make? Here comes the judgment; that is, the process of determining the reward of a particular action in a particular environment, for purposes of the example the reward would be to have courts enforcing the award and denying its annulment. It is about exercising the objective that the arbitral institution is seeking, such as avoiding potential grounds for setting aside the award. Judgment involves determining the 'reward function', the relative reward and punishment associated with taking certain actions that produce a certain result: to confirm or not to confirm the arbitrator.[142]

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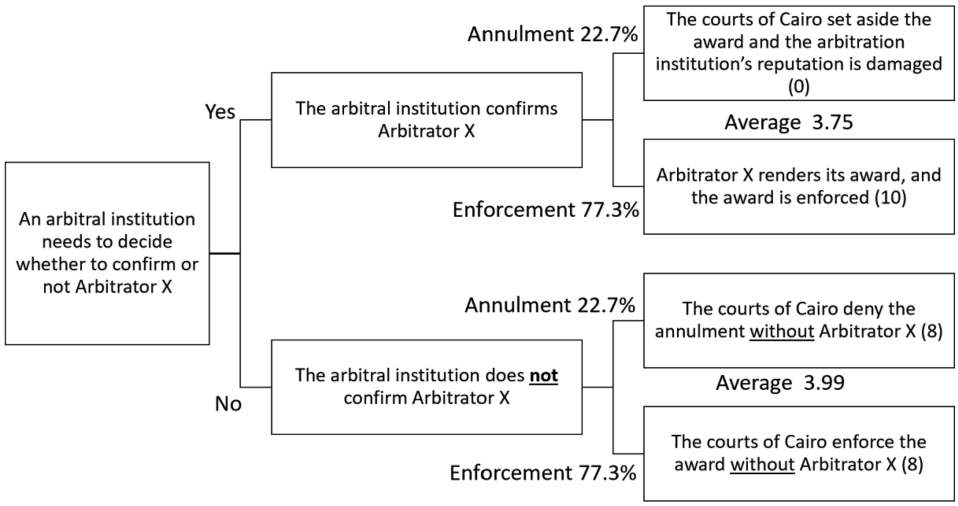
139 *Ibid*. at 74.

140 Ibrahim Shehata, *Arbitration in Egypt: A Practitioner's Guide*, 326 (Kluwer Law International 2021).

141 Of course, we could have different assessments if we only use cases dealing with appointment of arbitrators, challenges to arbitrators, and impartiality of arbitrators.

142 Agrawal, Gans & Goldfarb, *supra* n. 5, at 79.

Figure 1 Average payoff from confirming or not confirming Arbitrator X



Suppose the arbitral institution decides to confirm the arbitrator, who renders an award, and the courts enforce this award (this decision is rated 10 out of 10), but not to confirm Arbitrator X (as 8 out of 10) rather than annulment of the award (a big, fat 0). These alternatives give the arbitral institution a framework for deciding. If, based on data, we predict that the judiciary in Egypt annuls awards at a rate of 22.7%, and the judgment of the payoffs is having an award set aside or not confirming Arbitrator X, an arbitral institution can work out its average payoff from confirming versus not confirming Arbitrator X. Based on this, the arbitral institution will be better off not confirming Arbitrator X (an average payoff of 3.99) than confirming the appointment (an average payoff 3.75).

This predictability of the rules system could be improved if arbitral institutions had a database with all the case law of the world's jurisdictions that would allow them to aggregate more data to incorporate in their decisions.

A few questions about the time and new skills needed by lawyers and arbitral institutions to work better with AI are next addressed.

7 WHEN WILL THIS HAPPEN AND WHAT NEW SKILLS ARE NEEDED?

When the price of a fundamental good or service drops dramatically, the population uses it more.[143] This is a basic principle of economics, and it is happening

[143] *Ibid.*, at 9–15; Agrawal, Gans & Goldfarb, *Power and Prediction,* 36 (HBR 2022).

today with AI. Technological change makes things that were once expensive cheap. When prediction becomes cheap, there will be more applications and complements to predict in arbitration. Prediction will be used to make decisions. But at some point, the prediction machine may become so accurate and reliable that it may change the way arbitral institutions and law firms make decisions.[144] Three aspects merit attention.

First, there is a difference between humans and software: scale. A single lawyer cannot draft all the briefs or compile and organize all the evidence required for a case like *Abaclat,* where 180,000 bondholders initially appeared before the arbitrators. Unlike arbitrators, law firms and arbitral institutions are structured to provide services more efficiently than a single lawyer. Managing work at scale involves designing an operating model to deliver the greatest value to as many users as possible, or involves delivering services of increasing complexity. Improving the scale model allows the volume of clients to increase.[145] Once AI is better than humans at activities such as *screening and registration* of requests for arbitration, confirmation of arbitrators, finding the best candidate to arbitrate a case, ruling on challenges, document review, and document production, among others, lawyers will rely more on predictive machines and new opportunities will arise. For example, arbitral institutions and other providers such as Jus Mundi, Kluwer Arbitration Practice Plus, Arbitrator Intelligence, GAR ART, DRD will need more lawyers who can train the AI; they must equip themselves with specialized skills to classify arbitral decisions, fragment tasks, design decision trees, collaborate with engineers to develop data mining, train the machine, and interpret counter-intuitive results. Lawyers will have to learn to delegate to machines. Secretaries General of arbitral institutions will now have to address issues of AI implementation through rule systems and machine learning, as well as accessibility and sustainability of AI. More than a simple reassignment of responsibilities, a new architecture is required for the operating model that involves building the arbitral institution on a new foundation embedded in data analytics and AI, from the review of the request for arbitration to the annulment of an award.[146]

Second, change will come not only from technology *per se* but from new players, i.e., from the liberalization of legal services. When systems such as Jus Mundi, Kluwer Arbitration Practice Plus, Arbitrator Intelligence, GAR ART are able to make better predictions, it is worth asking whether in the decades ahead these providers will take on a greater variety of work than they do today.[147] For example, Jus Mundi and other providers could not only be consulted by judges

[144] Agrawal, Gans & Goldfarb, *supra* n. 5, at 9–15.
[145] Iansiti & Lakhani, *supra* n. 54, at 30.
[146] Wilson & Daugherty, *supra* n. 109, at 142.
[147] Susskind, *supra* n. 7, at 274.

when they have to appoint an arbitrator,[148] but could even serve as appointing authorities.[149] Perhaps they will evolve into dispute resolution platforms and arbitral institutions.

Third, we cannot ignore the role of financing in technological development. Technology requires not only genius, but capital. Just as the financial system was an essential factor in the industrial revolution, so too it will be for AI. The financial system that rewards investors with profits will generate greater investment and technological development. Therefore, arbitral institutions and law firms will invest in these developments in the face of future profits or savings to arbitration users or their clients.[150] If lawyer labour is expensive and predictive machines produce cheaper high-quality results, what interest would arbitration users, law firms, and arbitral institutions have in continuing to use humans? It is more economical to use a prediction machine, especially if the machine is more productive and accurate than the human.

In the second stage, the use of these predictive machines will naturally cause loss of jobs, and consequently a loss of meaning in the lives of some humans.[151] Regardless of how much more vigorous technological advancement takes place, regulation can prevent the use of AI. The following section explores the second stage, where AI will have the freedom to decide cases dependent on the degree of regulation of it.

8 SECOND STAGE: AI MAKING ARBITRAL AWARDS

Machine learning can reach conclusions or perform tasks at a high level but, today, it cannot explain or justify its behaviour. The resulting questions are (1) whether this so-called *black box decision-making* problem is of concern to users of international arbitration; and (2) whether current arbitration rules will be able to withstand the future development of AI, or act to their detriment. Figure 2 illustrates how the New York Convention would look if it were a computer. Over seventy years old, the New York Convention exists as one of the pillars of arbitration.[152] At its inception in the 1950s, predictive machines were in their infancy: the Universal Automatic Computer I (UNIVAC I), the first commercial computer, was used as a predictive machine for the US presidential election.

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148 UNCITRAL Model Law, Art. 11.3.b.
149 UNCITRAL Arbitration Rules, Art. 6.1.
150 William N. Goetzmann, *Money Changes Everything* 197–198 (Princeton University Press 2016).
151 Lee, *supra* n. 10, at 173.
152 The New York Convention refers to the Convention on the Recognition and Enforcement of Foreign Arbitral Awards, signed in New York on 10 Jun. 1958, entered into force on 7 Jun. 1959.

Figure 2 Universal Automatic Computer I

Source: *Time*, *The Story Behind America's First Commercial Computer*, https://time.com/4271506/census-bureau-computer-history/

Despite the precision of machines and their future development over time, in law, predictive machines still maintain a major problem today: they cannot reason. Instead, they simply analyse probabilities. Legal analysis, providing a reasoned decision outlining the premise on which a prediction is based, is one of the fundamental elements of legal decision-making. The Inter-American Court of Human Rights has held that reasoning safeguards due process; provides credibility to the decision; justifies conclusions; makes it possible to know the facts, motives, and norms on which the judge based his or her decision; and indicates that the court analysed parties' arguments.[153]

Scherer has identified three goals for providing a reasoned decision. First, goals of legitimacy underlie reasons; they help the losing party understand why he or she lost and make the decision more acceptable to him or her. Second, there are incentives. If the decision is published, this not only helps the parties but also third parties in similar situations to adapt their conduct in the future. Finally, reasons support the consistency that allows the same holding to be followed; otherwise, reasons also help to understand why the arbitrator has departed from a prior pattern.[154]

Notwithstanding the above, programmers have great difficulty in instructing or programming machines to be able to issue reasoned legal decisions and describe

[153] *Case of Hernández v. Argentina,* Preliminary Objection, Merits, Reparations and Costs, Judgment [2019] Series C No. 395, I/A Ct HR, para. 122.

[154] Scherer, *supra* n. 11, at 22.

the logical basis that a human could produce. This is true outside of the legal sector as well, since AI programs generally are unable to explain the results they obtain. This is due to the AI models' nature: either they follow the instructions coded in a system of rules or they use probabilities to solve problems in machine learning models. Decision trees like[155] Figure 1 follow pre-established rules. Therefore, one can identify the causes that lead to a certain outcome based on such rules and explain the model. In contrast, machine learning models, such as document production using Brainspace, do not have predefined rules, they look for a hidden pattern recognition to extract the required algorithm.[156] Therefore, the process by which they obtain results and make decisions, in most instances, is a 'black box' that cannot be explained.

Just as expressing sufficient reasoning for a decision may be a concern for the human rights world, so too is it in the arbitral world for certain types of arbitration. Regarding investment arbitration, the ICSID Convention demonstrates the importance of reasoning by allowing a party to seek the to annul an award based on the grounds 'that the award has failed to state the reasons on which it is based'.[157] Along the same line, in commercial arbitration, the ICC Rules of Arbitration provide that the 'award shall state the reasons upon which it is based'.[158] However, for the 118 jurisdictions[159] that have implemented the United Nations Commission on International Trade Law (UNCITRAL) Model Law on Commercial Arbitration, there is a caveat to the necessity to provide reasoning. Article 31.2 of the Model Law states that '[t]he award shall state the reasons upon which it is based, unless the parties have agreed that no reasons are to be given'.[160] Similar provisions exist in the ICDR[161] and London Court of International Arbitration (LCIA)[162] Arbitration Rules.

In drafting the Model Law, the UNCITRAL Working Group considered that reasons may improve the quality of the arbitral decision. However, it also noted that awards that did not state reasons could be rendered more quickly and were

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155 *Ibid*.
156 *Ibid*.
157 ICSID Convention, Art. 52.1.
158 ICC Rules of Arbitration, entered into force on 1 Jan. 2021, Art. 32.2.
159 UNCITRAL, *Current Status UNCITRAL Model Law on International Commercial Arbitration, 1985 With Amendments 2006*, https://uncitral.un.org/es/texts/arbitration/modellaw/commercial_arbitration/status (accessed 5 Mar. 2023).
160 UNCITRAL Model Law on International Commercial Arbitration 1985 with amendments as adopted in 2006, Art. 31.2.
161 ICDR International Arbitration Rules, amended and effective 1 Mar. 2021, Art. 33.1 ('The tribunal shall state the reasons upon which an award is based, unless the parties have agreed that no reasons need be given').
162 LCIA Arbitration Rules, effective 1 Oct. 2020, Art. 26.2 ('The Arbitral Tribunal shall make any award in writing and, unless all parties agree in writing otherwise, shall state the reasons upon which such award is based').

subject to fewer challenges. It also noted that in arbitration of goods, where the quality of the goods complied with industry or contractual standards, awards were generally sufficient without reasons.[163] The Working Group decided to adopt the solution contained in Article 32(3) of the 1976 UNCITRAL Arbitration Rules which allows parties to waive the reasons requirement. Scherer comments on her experience that clients do not care about reasons, they care about whether they are going to win or lose and they want to know the answer as soon as possible.[164] Companies (the main users of arbitration) and business people do not have in their minds the objectives of reasons: legitimacy, consistency, moral concerns, or the development of law.[165] Companies and business people tend to keep their disputes confidential; therefore, objectives of legitimacy, incentives, and consistency seem of more limited application in international commercial arbitration.

We observe that in the 118 jurisdictions that follow the UNCITRAL Model Law, there is a narrow window of opportunity for machines to decide disputes. The proliferation of algorithms that supplant mediators, arbitrators and judges in disputes arising from electronic commerce allow us to infer that soon computer programs will be able to resolve more complex cases.

Today, legal services platforms offer to resolve disputes without humans or with limited human assistance. In 2011, Colin Rule, former director of dispute resolution at eBay and PayPal, founded Modria.com. Mondria uses algorithms to analyse case information and issues a decision. If the consumer is dissatisfied with the decision, eBay offers an appeal that works without humans. According to Colin Rule, Mondria.com has already resolved 400 million disputes between consumers and sellers. Already, three times more legal disputes are resolved with virtual platforms on eBay than all the lawsuits heard in US courts.[166]

In principle, it will be those fewer complex disputes that can be resolved without human intervention in arbitration. But, today, arbitration laws may be an impediment. The French *lex arbitri* expressly requires the arbitrator to be a natural person: 'La mission d'arbitre ne peut être exercée que par une *personne physique jouissant du plein exercice de ses droits*'.[167] The English Arbitration Act states: 'The authority of an arbitrator is personal and ceases on his death'.[168] Similarly, the

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[163] Howard M. Holtzmann & Joseph Neuhaus, *A Guide to the UNCITRAL Model Law on International Commercial Arbitration: Legislative History and Commentary* 838 (Kluwer Law International 1989).

[164] Maxi Scherer, *The Future of International Arbitration: Virtual Hearings and AI-Arbitrators?*, Mexican Bar Association (16 Apr. 2020).

[165] Charles Mitchell & Steve Odland, *Survey: CEOs Are Worried About 3 Things this Year – and No. 1 Is Whether You Plan to Quit*, www.cnbc.com/2019/01/28/the-3-biggest-challenges-facing-ceos-in-2019-and-how-to-solve-them.html (accessed 28 Jan. 2019).

[166] Oppenheimer, *supra* n. 127, at 206–207.

[167] Code de procédure civile, Art. 1454 ('The arbitrator's mission can only be exercised by a natural person in full exercise of his or her rights').

[168] Arbitration Act 1996 UK, s. 26.

UNCITRAL Model Law refers to 'When a *person* is approached in connection with his possible appointment as an arbitrator'.[169] Arbitration was designed for an era where technology had a role much more limited than its developing capacity today. For example, the New York Convention refers to 'telegrams', a service no longer available in countries such as Belgium, India, the United Kingdom, and the United States.[170]

If we want to capitalize on AI's benefits, we need new rules.[171] This section will not exhaust the subject, but will explain some proposals for consideration. In the absence of data, it will be necessary that 'all' arbitrations adopt provisions such as the UNCITRAL Rules on Transparency,[172] notwithstanding parties redacting confidential data. Data should be sanitized; i.e., anonymized data. All personal details should be redacted to make the award anonymous, if needed. We expect arbitration users to be aware of the advantages of data collection, and the benefits they may bring to the use of AI in arbitration.[173] The fact that a decision is dictated by a machine will not be a ground for annulment, unless biased algorithms are demonstrated. To detect bias in algorithms, the lawyer will have to understand whether the algorithm was developed in a system of rules or through machine learning; this will be needed to identify whether errors are attributable to the programmer or to the data *per se*.

The new rules should allow the parties to comply with due process, but their conception will evolve. In UNICTRAL Model Law jurisdictions, if a party requests a hearing, the tribunal must hold the hearing.[174] But perhaps a hearing will not be useful for an algorithm ruling the case, and therefore, the hearing will be unnecessary. Rules may support that when an algorithm is ruling a case, due process will not be breached if a hearing is not held after being requested by a party. To start, parties and lawyers will need to accept and recognize the legitimacy of the machine's discretion. Additionally, new rules will certainly require the support of the state for judiciaries to recognize the awards in their various jurisdictions, because today, only the determinations of judges are binding and can be enforced by the coercive power of the state to deprive people legitimately of their money, and property.[175] Of course, the parties will be able to submit to the jurisdiction of platforms where the enforcement of virtual decisions is self-

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169 UNCITRAL Model Law, Art. 12.
170 Kevin Connolly, *Belgium Ends 19th-Century Telegram Service,* BBC News, www.bbc.com/news/world-europe-42359914 (accessed 5 Mar. 2023).
171 Susskind, *supra* n. 7, at 101.
172 *UNCITRAL Rules on Transparency in Investor-State Arbitration under a Treaty* (2013).
173 Alpaydin, *supra* n. 28, at 157–158.
174 UNCITRAL Model Law, Art. 24(1).
175 Susskind, *supra* n. 77, at 78, 83.

executing without the need of the state. Nonetheless, if the arbitration requires the assistance of the judiciary, then, UNESCO's recommendations for Member States:

> [come at issue to] enhance the capacity of the judiciary to make decisions related to AI systems as per the rule of law and in line with international law and standards, including in the use of AI systems in their deliberations, while ensuring that the principle of human oversight is upheld. In case AI systems are used by the judiciary, sufficient safeguards are needed to guarantee inter alia the protection of fundamental human rights, the rule of law, judicial independence as well as the principle of human oversight, and to ensure a trustworthy, public interest-oriented and human-centric development and use of AI systems in the judiciary.[176]

9 CONCLUSION

It is a privilege to live in this era, observing and experiencing the existing AI as we develop a future fourth industrial revolution that will impact arbitration. The arbitral community can play a central role in shaping the future of law and human-machine relationships.[177] In the arbitration world, our direction will be determined by our ability to capitalize on the potential of AI.[178]

We have laid the foundations of AI through rule or expert systems and machine learning. The main problem facing AI in arbitration today is the lack of data. Even with the information available, there are other problems, such as the amount of data available and flaws in the data, lack of repetitive patterns and inconsistencies, such as in investment arbitration where there is no doctrine of precedent or *stare decisis*.

The magic of AI is prediction. From the beginning of a case, a lawyer gauges his risks and chances of winning or losing an arbitration. For this, there exist arbitration mechanisms that discourage the filing of frivolous claims outside the jurisdiction of the centre or manifestly without merit. Here, predictive machines will help the development of arbitration by making it more efficient.

Taking advantage of this technology requires a revised division of labour. Before using AI, lawyers need to understand machines' and humans' strengths and weaknesses. Machines are accurate when there exists an abundance of data but may have trouble explaining the decision-making process. Humans are skilled at interpreting data and predicting when data is scarce, for example, decisions on security for costs in investment arbitration, or novel cases.

Faced with this scenario, in a first stage, lawyers and machines will work in a complementary way. Predictive machines can give recommendations such as iFlyTek,

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176 UNESCO, *supra* n. 17, at 63.
177 Susskind, *supra* n. 7, at 45.
178 Schwab, *supra* n. 2, at 112.

Lex Machina and Ross, but it will be the lawyer, the arbitrator or the Secretary of the institution who will take the ultimate decision. Tools such as Jus Mundi, Kluwer Arbitration Practice Plus, Arbitrator Intelligence and GAR ART can streamline the search for conflicts of interest between an arbitrator and the appointing counsel. In the coming years, these tools can be optimized by enabling lawyers to train them. Through machine learning, a sample of relevant data that may represent a potential conflict of interest can be created in a matter of seconds. TreeAgee Pro and DRD provide insight into when it makes the most sense to make an offer to end arbitration through a settlement agreement. IBM could devise predictive machines like Ross and Project Debater to reduce time and costs in researching law and crafting arguments, given that machines can process far greater amounts of data than a human.

To determine the feasibility of using AI in the tasks involved in arbitration, lawyers need to analyse the set of decisions through a method and see the degree of predictability. We can set a strategy to see who the best arbitrator for an investment arbitration would be, considering factors such as language, nationality, diversity, experience, among others, and certain subjective goals. Likewise, arbitral institutions can develop algorithms with the system of rules to perform tasks such as confirming an arbitrator.

The big question is when AI will disrupt arbitration. This question hinges on three factors. First, there is a consideration as to how these predictive machines work at scale, i.e., they can easily be downloaded from a cloud and serve hundreds of law firms. Jobs will not disappear immediately but, when they do, new ones will emerge that will require classifying arbitral decisions, fragmenting arbitral tasks to identify the best arbitrator for a case, training the machine, detecting errors in the algorithms, collaborating with engineers for data mining, explaining the results, especially when they are counterintuitive or controversial, and sustaining the responsible use of AI so that the machines do not make a mistake that overturns an award. Secretaries of arbitral institutions will need to attend to issues of AI's implementation through rule systems or machine learning, as well as AI sustainability.[179] Lawyers will have to learn to delegate to the machine while being aware of its limitations. The future demands restructuring arbitral institutions based on use of AI to make decisions more efficiently. In this way, AI may become a pillar of arbitration. Second, change will not only come from technology but from new players such as Jus Mundi, Kluwer Arbitration Practice Plus, Arbitrator Intelligence, GAR ART, that today help to identify an arbitrator or to detect

[179] Sustainability of AI is focused on sustainable data sources, power supplies, and infrastructures as a way of measuring and reducing the carbon footprint from training and/or turning an algorithm. Addressing these aspects gets to the heart of ensuring the sustainability of AI for the environment'. Aimee van Wynberghe, *Sustainable AI: AI for Sustainability and the Sustainability of AI*, 1 AI Ethics 213–218 (2021), doi: 10.13039/501100008131

conflicts of interest. In the future, these institutions may evolve and become appointing authorities or even dispute resolution platforms. Finally, technology develops because funding is available. Given that the labour of a lawyer dedicated to arbitration is specialized and expensive, there are incentives to invest in machines to replace humans.

In conclusion, today, from the distance, we greet the second stage of AI where machines will be able to decide cases. Regulation can be a detriment. Arbitration is underpinned by the New York Convention with provisions that are over seventy years old, and it is worth asking whether those provisions make sense in the face of AI. True, all 118 jurisdictions that have implemented the UNCITRAL Model Arbitration Law have accepted that the parties may agree to the making of an award without reasons. This solves the black box problem, i.e., the impossibility of the machine to issue a reasoned award. However, other limitations cast doubt on whether a machine can decide a case. Therefore, we propose the development of new rules that (1) solve the lack of data with transparency provisions similar to the UNCITRAL Rules on Transparency in Investment Arbitration; and (2) establish that it will not be a ground for annulment if the award is issued by a machine, algorithm or robot unless it is proven that the algorithms are flawed. Any emerging regulations will require due process and support from the judiciary in each country.

Again, this article is not intended to be an oracle of prediction, but a source of collected research from which we can outline, explore and assess alternative futures, which may be possible, probable and preferable. Regardless of the direction in which AI evolves, I can confidently conclude by making Susskind's words my own: 'Tomorrow's [arbitration] world … bears little resemblance to that of the past'.

California Arbitration (CalArb) Announces its 2024 Mentorship Program
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