Will Artificial Intelligences will be our Judges and Arbiters in the future and what role it will be taken by Simulators

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Abstract

This paper proposes an overview on the potential use of AI (Artificial Intelligence) and M&S (Modeling and Simulation) to develop innovative solutions in a new emerging sector defined Legal Analytics. The analysis of previous and existing achievements respect to actual potential advances with special attention to new integrated solutions for Arbitration..

Keywords: Artificial intelligence, Modeling, Simulation, Legal Analytics Genetic Algorithms, Artificial Neural Networks,

1. Introduction

Man has always been fascinated by the idea that a "Superior Justice" can postpone its activities, be it the one mentioned in the myth of Er in Plato's Republic or by the ordeals of the past inspired by multiple Religions. The reasons are many, but they certainly include objectivity and the balance of judgment as well as the quality of the same. The technological revolution has long led to think of an artificial cognitive capacity and science fiction itself has hypothesized robots, or rather Artificial Intelligence (AI), capable of being law enforcement officers, prosecutors and/or judges, often sketching caricatures of utopian societies in this sense. In general, on this issue, it is advisable to refer to the concept of AI, a complex system capable of demonstrating its intelligence in dealing with problems, since AI is obviously also the brain of any robotic system that can be conceived in this context. This paper proposes a view about the potential to develop innovative solutions based on AI and Simulation to address pragmatical aspects in judgement with special attention to arbitration on industrial contracts and the advances in this area.

2. State of the Art

Adopting a professional and technical view, it must be emphasized that there are scientific articles dated over half a century ago that have addressed the problem, for example by thinking about how to intelligently find and correlate information on jurisprudence (Buchanan & Headrick 1970) and in the following years the study of these issues continued, again for example in the field of jurisprudence, using expert systems which however have shown great limits due to possible inconsistencies on the set of rules to be defined (Susskind 1986). The studies are followed up leading to interesting results, for example with reference to cases related to legal disputes in commercial matters, where the AI retrieved similar precedents and used them to elaborate legal arguments, highlighting analogies and counter-examples, but also providing indications of final

judgment (Ashley 1991).

From these considerations it emerges that in terms of scientific and applicative interest, as well as methodological and technological demonstrations, positive indications have already been obtained for many years.

It should be emphasized that the needs that emerge in relation to legal proceedings also include efficiency and cost profiles, very critical aspects at the system level: that is, there is a keen interest in creating aids in this field that speed up processes and reduce costs. legal proceedings, ensuring their fairness and reliability. There are examples in Europe and North America of the use of basic systems as support, with limited cognitive abilities, for judges, so much so that applications in this sense have also been developed in Italy, often linked to peculiarities of our law (eg quod non est in actis, non est in mundo): this includes software assistants for the judges of the Court of Cassation to deal with files, but also to self-compose routine charges (Asaro 2012).

In the current situation, it is evident that these embryonic systems have often turned out to be far from being "intelligent" and "crucial" in solving legal problems. More recently and in many Countries, effective solutions have been activated on IT platforms that support negotiation in the case of divorces, custody, condominium disputes (Matlack, 2016). Another application area in which work has begun is that of contracts and arbitration as sectors in which AI and Simulation can give an interesting aid in the resolution of claims (Governatori et al. 2018). In general, in 2017, Ashley drew up an appreciable survey on how AI have demonstrated their potential in the legal field and there are application cases in multiple sectors: recovery of precedents, contextualization and correlation of jurisprudence, generation of judgments, risk assessment legal action, legal argumentation as well as investigation aid.

3. Today Situation and Opportunities in Arbitration

What has changed today, compared to what has been studied in past years? Surely digitization has made a vastly larger database accessible to look for references and cases; and the ability to formalize and structure legal data appropriately is certainly one of the fundamental aspects that requires particular attention to record success in this field. With reference to this condition, today it is possible to adopt more robust and effective Artificial Intelligence methodologies than in the past (e.g. machine learning): more onerous techniques from the computational point of view are now supported by modern processing capabilities and open new frontiers.

Furthermore, AI techniques have evolved and integrated allowing to find new effective solutions for this application context overcoming some critical issues. For example, a great added value has the exploitation of the cognitive, correlation, but also self-explanatory abilities of modern artificial intelligence techniques that converge in what is called Legal Analytics (Nissan 2017). In this perspective, the challenge to achieve the competitive advantage associated with the use of AI is the ability to make the legal reasons for its results understandable.

In fact, when the "judgment" generated by an AI is also accompanied by its justification, it is then that an assumption of controllability of the outcome is realized which favors its use in the legal field, in which it can more easily become a support negotiation and dispute resolution. From this point of view, advanced techniques such as Fuzzy Logic and Analytic Hierarchy Process can be a great help to generate an explanation of the proposals produced by an artificial intelligence and become a force multiplier in this field (Chen & Wang 2009; Bruzzone et al. , 2011).

Taking a concrete example, in arbitration relating to contractual disputes, the use of AI has a huge potential impact and, with the aforementioned self-explanatory methods, significant advantages can be obtained in terms of costs, time and effectiveness of the procedure. In these cases, the availability of AI and the inclusion in the agreements that contemplate arbitration of a clause that provides for its use for the arbitration itself could provide a competitive advantage in the decision or in the settlement of disputes to the subjects who are endowed with that instrument (be they states, other public or supranational bodies, private individuals operating in the legal field or entrepreneurs).

4. The main questions

We then come to the question of the title: "Will we have Artificial Intelligences as judges or referees?"

The question alludes to a subject undergoing concrete development with great potential and opportunities, as shown by recent scientific articles on the subject (Re et al., 2019); but it seems appropriate to provide a specifically articulated answer by taking two distinct points of view: engineering and legal.

4.1. Engineering Point of view

The engineer's response is positive, but pragmatic and articulated: potentially the thing is feasible indeed this is already, in part, in place, but it must be specified for each application sector, developed and made reliable with tests and experimentation. Critical is the involvement of AI people, simulation community and other experts alongside engineers and scientists to define the margins and criteria for assessing the reliability of the new AI for Legal Analytics. Furthermore, it is necessary to proceed carefully with the verification and validation part and in the creation of the entire architecture in an integrated way with the existing processes and the different systems (e.g. databases). In fact, a critical aspect in this regard is the risk of loss of trust by the sector or the community as a

result of errors or problems; it is clear that the use of AI in this field is a sensitive issue and these aspects must be carefully treated both from a technical and communication point of view; in a similar way it will be necessary to consider the risk that the spread of these aspects does not risk a "mechanization" of the legal processes leading to a progressive reduction of the human presence even below those levels that are desirable to guarantee the same principles of law. Also in this case, the involvement of the aspects not only in the development, but in the updating and maintenance of these systems will be fundamental. It will be equally fundamental to develop AI, as it should always be done, so that they can act and interact with humans in order to become an effective tool, perhaps even with the ability to consider fundamental aspects of "philosophy of law", but also prepared to interact with the subjects involved to consider the peculiarities related to the cases in place with respect to the limits of the models.

Obviously, the fundamental aspect is to be able to model the legal context and develop these new AI. If we refer to the aforementioned case of an arbitration, in addition to having a specific AI, there is a need to activate it, configure it, customize it and define its context with reference to the specific contract; all activities that require specific and highly qualified scientific and legal competence and a transdisciplinary approach, therefore requiring in-depth study, training and development of new skills. These considerations therefore highlight how Legal Analytics and its AI are potentially a new business sector with a truly strategic value (Bruzzone 2019); from this point of view, these issues go very well with the new discipline of Strategic Engineering which, by combining models, AI and Data Analytics, aims to support decisions in many sectors including the legal one.

4.2. Legal Point of view

The answer from a juridical perspective is that certainly AI and its applications have progressively gained the attention of the law and jurists, in connection with the own function of the one and the others in configuring the regulation of the facts that concur to compose the reality. A discipline (regulation), the juridical one, which gives form to a normative order conceived as abstract and applied in practice, called to dictate the conforming canons of social relations.

Socio-economic evolution is due to technology and technique, the synthesis of which is constituted by the so-called digital society which has complex manifestations and impacts on the cultural and economic levels, as well as that of intersubjective relationships and, in general, social relations. Internet, Smartphones, Social Networks, Big Data, Cloud Computing, Drones, Robots, Smart Cars, Internet of Things & Internet of Everything, Blockchain, Smart contracts, FinTech do not constitute future hypotheses, but rather belong - albeit each with different intensity and frequency compared to the

others - to the widespread daily life of a large part of the world population. The same is happening for AI, which appears on stage with a double soul: on the one hand, a further component of the catalog of the manifestations of modern technology events that characterizes contemporary digital society; on the other hand, an instrument that is grafted into the aforementioned characteristic phenomena of the latter, becoming a factor that determines its further development, usually enhancing its effects.

In this way, the law and the jurist are presented with classic issues, including that of the defense of the fundamental rights of the person and, within it, for example, the problem of the protection of confidentiality and personal data that is addressed by the General Data Protection Regulation (EU Regulation 27 April 2016, n.679, so-called GDPR, which repealed the EC Directive n.95/46 by dictating a new uniform discipline for the national experiences of the EU Member States) which is related to art. 2 of the Italian Constitution and art. 8 (more than art. 7) of the EU Charter of Fundamental Rights; which imposed the revision of the so-called Privacy Code (which was provided for by Legislative Decree 10 August 2018, n.101); and which awaits to be completed by the EU Regulation so-called e-privacy (which is still a proposal and will result in the repeal of Directive 2002/58 / EC) more directly related to art. 7 of the aforementioned Charter (which has to do with the protection of private, family, domestic and communications life, while Article 8 - to which the GDPR is more directly connected - provides for the protection of personal data). The eruption of AI - and the evolution of its applications - insinuates itself into this plot as a new fact that deserves attention.

In fact, there are also new questions. Sometimes because the more traditional ones are accentuated or, in any case, take a different attitude, in relation to the risks, interests, needs that are associated from time to time to technological and technical innovations, which they have gradually brought (or even only increased), touched and placed: it happens – referring to the example made above - with reference to the protection of confidentiality and personal data, in relation to the greater potential damaging to the so-called digital privacy that are attached to the use of AI, especially to an opaque pervasiveness of the algorithm, i.e. the opacity with which the algorithm can penetrate and draw from the digital dimension and achieve dominance within it. Sometimes because new issues and events arise, which build on virgin lands: this is the case of civil liability for damage caused by machines equipped with AI or, more generally, caused by events determined by choices, decisions taken by a system, a structure equipped with AI, or of the *smart contract* as a technical modality, negotiation technique for the execution of the contractual program; or fintech which has multiple articulations within which the AI can gain space (e.g. the digital acquisition of customers, financial advice, the execution of investment and

divestment operations, etc.).

5. Incoming Future

The achievement of new frontiers by technological and technical innovation – here by AI – gives rise to applications, therefore to unprecedented effectual events with respect to which existing models, categories, legal disciplines may prove to be insufficient: simply imperfect, or lacking or, certainly, inadequate for the outcome of an evaluation not only specialized (technical-formal, purely legal), but also axiological. For this reason, it is not necessary to wait for the novelty to cross the border beyond which it enters the field of bioethics: the innovation – due to the risks it announces, the interests with which it comes into contact and, therefore, the values with which it interferes – requires the verification and, if anything, the revision of the existing legal rules if (perchance) they do not result, with respect to it, an expression of an adequate reconciliation of the interests and values at stake, in accordance with the methodology of their balancing oriented to the rationality of the composition of the contrast and, where provided, by the value hierarchies reported by the highest sources (the Constitution, but not only).

The picture outlined, in which the AI is placed in the image that can find the gaze of the law and the jurist, however, is further enriched because, for the law and the jurist, it is not – together with what it uses – only an object to configure, but a tool to use. Thus, AI can be applied, for example, in different areas: the drafting of judicial documents in the context of the lawyer profession, which can be of assistance in giving content to the documents; the negotiation of contracts, with a view to identifying the negotiation solution that represents the ideal composition, on an objective-rational level, of the opposing interests of the parties in a formal position of conflict having regard to the expectations expressed by each and the context conditions; similarly – it would also seem – of the interpretation, in particular, of the good faith clause, being able to isolate, on this level, the point of equilibrium on which to center the evaluation of correctness, with respect to which to measure the remoteness of the contested behavior, limiting thus interpretative discretion or making the manifestation more controllable by reinvigorating the role of motivation; of the judicial or arbitration decision.

These are uses of AI that to a large extent appear rich in implications. Only the former can be dismissed as an instrumental use of AI purely ancillary to the activity of those who use it, to whose control and, therefore, to whose responsibility the contents of the acts it makes its own remain entrusted, which constitute segments of its activity even if generated with the help of AI applications. The task reserved to the latter in relation to the other types of employments exemplified is more delicate, since it touches the categories of private autonomy and the judicial function, the role of the interpreter and, in particular, of the judge, but also of arbitrators—. The critical aspects of the use of AI in the interpretation and application of the law appears greater if it is imposed and a binding character is attributed to the results it leads to, but it persists even if the attribute is not assigned to them. of the absolute imperative.

This is because not only the slavish entrusting of the interpretation and application of the law, of the decision of the case to the AI, but also the more moderate alternative of recognizing a profitable role to the AI in the outlined areas postulates the adhesion to an ideological option that excludes the incalculability of law (or at least considers it marginal). This is a topic discussed, the very idea of law its notion, its consistency, being discussed, resulting - as far as it is concerned here - unsatisfying and reductive the establishment of a correspondence to a catalog of operational rules drawn from jurisprudence (not even selected, being able to rely on the doctrine of stare decisis or binding precedent peculiar to common law systems, but) reconstructed including those statistically prevalent isolated with a survey carried out with a rigorously casuistic criterion; the usefulness of the appropriate rule is also naturally limited, which is tailored on the factual circumstances to the specifically peculiar one and only accidentally identifiable in others; in fact it is important to consider that the risk of giving an incalculable antithetical right to the "juridical calculability" that Max Weber considered co-essential to capitalism is by no means negligible.

A risk that today comes first and foremost from the regulatory text which is unstable (changeable, provisional, due to the rapid changes in the reality with which it is confronted); of questionable workmanship (linguistically, but also conceptually); of heterogeneous origin (due to the permeability of the domestic system, first of all, to European Union law, often contingent and the result of compromises between different legal traditions); lacking systematicity (for the aforementioned concurrent reasons).

6. AI and Simulation Potential Roles

In arbitration it is evident that the evaluation should consider different aspects dealing with impact of decisions on different parties as well as consistency of these decisions respect the contract, laws and regulations. From this point of view the role of AI is fundamental in identifying the references to be used and their consistency with the context under evaluation, while simulation could allow to estimate the impact of the different alternatives judgements in order to correct them in order to obtain a balanced solutions that respects the rights and is able to achieve an effective equilibrium ~~point~~ between divergent interests, maximizing mutual satisfaction. A ~~very~~ preliminary idea about this approach is summarized in figure 1 and ~~it~~ could be used to create an Artificial

Arbiter integrated with a Simulation able to finalize decisions in case of industrial plants. In this scheme, the identified correlations by Artificial Neural Networks (ANN) are used to identify the alternative decisions while the simulator allows to evaluate their impact and to compare the results keeping even in consideration proposals from the different parties. A smart Optimizer, potentially developed by Genetic Algorithms (GAs), could be effectively used to look for most promising decisions combining different aspects. These decisions are evaluated by Simulator that uses the Neural Models and recombined up to identify the best combination. Indeed, GAs demonstrate a great potential as smart optimizers considering the high numbers of alternative combinations and the presence of complex responses, while ANN have been chosen for their ability to guarantee self-learning and fine-tuning capabilities of the models.
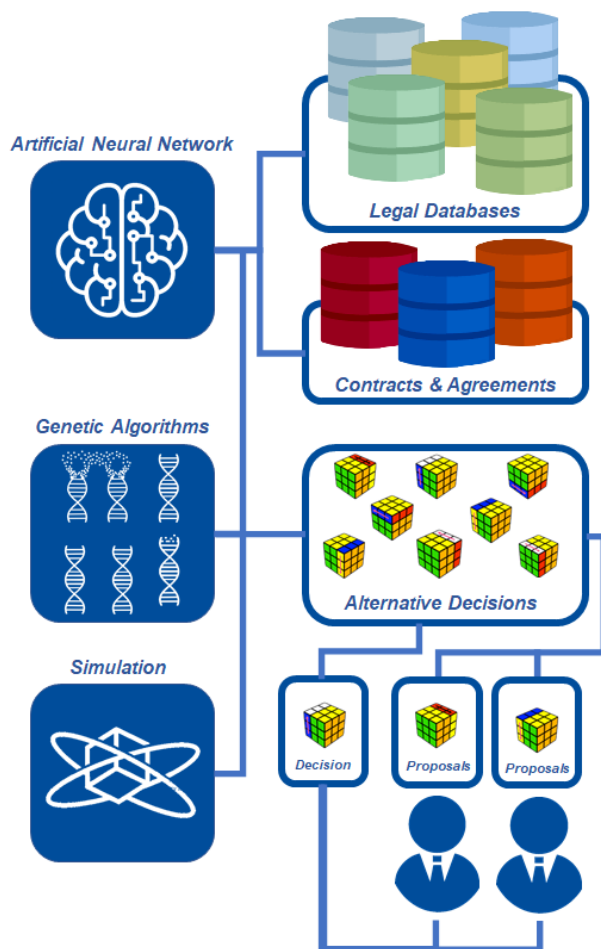

Figure 1 – General Architecture

7. Conclusions

The fundamental aspect is to be able to model the legal context and develop these new AI and use Simulation to quantify scenario & consequence of different decisions. In arbitration, AI & Simulation require to be activated, configured, customized and to define the context with

reference to the specific contract; all these activities are based on highly qualified scientific and legal competences and transdisciplinary approaches so they require study, training & development of new skills.

So Legal Analytics & Simulation for Legal AIs are potentially a new business sector with important connection to the Strategic Engineering, the new discipline based on combining Models, AI & Data Analytics to support decisions in many sectors including legal one

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