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AI under the test of "beyond any reasonable doubt" in interpreting criminal law

IA sob o teste de "além de qualquer dúvida razoável" na interpretação do direito penal

Mario Caterini[1]
Università della Calabria (Italia)
mario.caterini@unical.it

Abstract

The paper illustrates the possibility of using AI not only as an instrument to check the facts in a criminal trial but even to interpret and resolve significantly legal matters. Currently, the "expert systems" developed for this purpose take advantage of the judicial precedents as the basis of knowledge: given that, it is argued that these algorithms in a Constitutional State can not work based on the statistical rule of "more likely than not", but they should be programmed according to the "political" alternative rule of 'beyond any reasonable doubt', which should be extended even to the doubt in interpreting the law. Thus, in the case of opposing judicial precedents, AI systems should suggest the most favorable interpretation for the defendant, and the judge should dissent only by explaining why he does not hold plausible the most favorable judicial precedent.

Keywords: artificial intelligence; criminal law construction; principle of legality; reasonable doubt; *favor rei.*

Resumo

O artigo ilustra a possibilidade de usar a IA não apenas como um instrumento para verificar os fatos em um julgamento criminal, mas até mesmo para interpretar e resolver questões jurídicas significativas.

[1] Professor of Criminal Law and Director of the Institute of Criminal Studies 'Alimena'". Università della Calabria. Dipartimento di Culture, Educazione e Società. Via Pietro Bucci, Edificio Cubo 18/B, piano 5, CEP 87036, Arcavacata di Rende, CS, Italia.

Atualmente, os "sistemas de inteligência" desenvolvidos para tal fim tiram partido dos precedentes judiciais como base de conhecimento: visto que, argumenta-se, estes algoritmos em um Estado Constitucional não podem funcionar com base na regra estatística de "mais provável do que não", mas devem ser programados de acordo com a regra alternativa "política" de "além de qualquer dúvida razoável", que deve ser estendida até mesmo à dúvida na interpretação da lei. Assim, no caso de precedentes judiciais opostos, os sistemas de IA devem sugerir a interpretação mais favorável para o réu, e o juiz deve discordar apenas explicando por que ele não considera plausível o precedente judicial mais favorável.

Palavras-chave: inteligência artificial; construção da lei criminal; princípio da legalidade; dúvida razoável; *favor rei*.

The Laws in Nature are written
in the language of mathematics
GALILEO, Il Saggiatore (1623)

Introduction

The necessity of satisfying the need for certainty, traditionally recognized as an indefectible requirement that must characterize criminal law and expressed by the principle of legality could guide the jurist in appreciating the entry of AI into the criminal system. Indeed, the use of algorithms could lead to greater predictability of the applicable rule and would guarantee judgments free from ideologies, political leanings and feelings, often hidden behind the judge's sentence.

The recourse to the judicial precedent to resolve similar cases, typical of common law systems but increasingly established in practice also in civil law systems, could thus be an operation entrusted to machine learning. Starting from these premises, this Article aims to demonstrate how, to date, the progress achieved by AI and the related advantages that it would bring in criminal law, however, risk leaving in the background the respect of those same principles of supranational and constitutional origin that would safeguard theoretically better. Criminal law is, in fact, based on specific guarantees in favor of the defendant, and a "modern" legal system based on the use of AI cannot allow any evasion of such guarantees, first of all, that of "beyond any reasonable doubt" (BARD standard)[2], a corollary of *favor rei* both in Civil law and Common law systems.

In the American Criminal system, the standard foundation is the Constitutional Charter and, more precisely, the "Due Process Clause"[3], which explicitly recognizes it as a fundamental requirement of the Due process celebrated by the U.S. Constitution[4].

[2] There is not a universal legal definition of the BARD standard: for instance, in the U.S. its meaning depends on the specific instructions judges give to jurors, e.g. Victor v. Nebraska, 511 U.S. 1 (1994), according to which a reasonable doubt which "would cause a reasonable and prudent person, in one of the graver and more important transactions of life, to pause and hesitate before taking the represented facts as true and relying and acting thereon". On the constitutional rationales of the BARD standard see Whitman (2008), Sheppard (2003, p. 1165), Waldman (1959, p. 299), Dripps (1987, p. 1665).

[3] Fifth Amendment to the United States Constitution states: «No person shall ... be deprived of life, liberty, or property, without due process of law». The clause in Section 1 of the Fourteenth Amendment to the United States Constitution states: «...nor shall any State deprive any person of life, liberty, or property, without due process of law».

[4] See *In re* Winship, 397 U.S. 358, 364 (1970): the Supreme Court held that "Due Process Clause of the Fourteenth Amendment protects the accused against conviction except upon proof beyond a reasonable doubt".

In the European context, the reasonable doubt is stated by the Article 6 of Directive 2016/343/EU, according to which «any doubt about guilt must be resolved in favor of the suspected or accused»[5]. Therefore, this paper aims to analyze the conditions of compatibility of the use of AI by the judge with the principle of reasonable doubt, under the specific aspect of the interpretation of the law.

How can the fundamental compliance with this standard be facilitated with the entry of AI into the criminal system, if the expert system is programmed to indicate which precedent is the most strengthened and, therefore, statistically most used in similar cases? The expert systems can "select" the precedent applicable to the concrete case and give the judge the "solution" for which to opt according to a statistical criterion but, to date, they cannot explain the legal reasoning on the grounds of the sentence.

Briefly illustrating the current applications of AI in the criminal justice system, this Article will recognize the potentialities of the algorithms – but also their criticalities[6] and risks[7] – as an aid for the judge and will highlight that the technological achievements exploitable in the legal field should lead to the programming of expert systems that allow choosing, among several plausible interpretative options, not the statistically most frequent one, but that one most favorable to the defendant.

A criminal law inspired by the *favor rei*, therefore, requires that the algorithm proceeds to a selection of the precedent not based on the statistical logic of "more likely than not", but on that of the most favorable interpretative option, providing that it is rationally valid and therefore plausible.

The Article will highlight that it is necessary to support this implementation of the *favor rei*, from a procedural point of view, by a burden of confutation for the judge who opts for a more unfavorable judgment dissenting from the most favorable interpretative solution for the defendant selected by the expert system. Given the increasing *de facto* "legitimacy" of the judicial precedent as a source of law even in civil law systems, it will highlight that the actual compliance with the *favor rei* would require the judge to explain with the sentence the implausibility of the most favorable interpretation option selected by the AI.

It will be concluded observing that in a criminal system in which AI wants to find place, the effectiveness of the principle of *favor rei* can be considered satisfied only if the advantages offered by such systems of Artificial Intelligence will be supported by their use in compliance with constitutional and supranational principles by the judge, *i.e*. by the use of "reasonable doubt" as a specific interpretative canon.

The wished mechanical soul of the judge

That judge 'inanimate being' of whom Montesqueiu spoke about, what was he if not a kind of robot[8]? Indeed, it can be said that on the basis of the separation power doctrine, the Enlightenment theoreticians intended the law as a kind of algorithm and imagined the judge –

[5] For a comparative analysis of the BARD standard, both in Common Law and Civil Law systems in Europe and on its connection to the presumption of innocence, see Caterini (2015, p. 141-193).

[6] The main reference is to the lack of legal reasoning transparency because the expert systems cannot explain why a specific solution is adopted to solve a specific problem. In the criminal field, this need for legal reasoning transparency is connected to the Due process guarantees: on this aspect see Rizer, Watney (2018, p. 214-215). Furthermore, it could also refer to the secrecy of the criteria that govern the functioning of the algorithms: among others, see Kehl, Guo, Kessler (2017).

[7] Among others, the most serious is the risk of discriminations in the *risk assessment* of recidivism. On the topic see Angwin, Larson, Mattu, Kirchner (2017).

[8] «*Mais les juges de la nation ne sont [...] que la bouche qui prononce les paroles de la loi; des êtres inanimés*», Montesquieu (1748).

already in the Year '400, like a *geomĕtra vel arithmeticus*[9] – similar to a syllogistic machine[10]. An 'automatic justice' achievable with modern technologies is indeed the full affirmation of the original enlightened aspiration and, lastly, that of the Constitutional State (Borruso, 1997a, p. 37; Borruso, 1997b, p. 656).

The same perfect judicial syllogism supported by Beccaria shows its clear affinities with current computerized reasoning: avoiding any form of interpretation – always characterized by a political point of view – where law is considered a pure logical-formal prodromal premise to a univocal solution[11]. Indeed, the easiest computerized operations would be those of a logical nature in which the jurist makes syllogisms or formal reasoning. Therefore, the reasons for using the algorithmic procedure in law lie in need of certainty that would be guaranteed in an easier way[12]; needs whose satisfactions would require a particularly clear, not ambiguous and formal language that only algorithms would guarantee.

Then, the computerization of law seems to tend to a further specification of the legal language, going toward the need for clarity of the eighteenth-century matrix and thus trying to overcome the obscurity of the laws, denounced by illuminists (Beccaria, 1780, p. 19). In the first place, it would be a kind of 'purification' of the 'natural' language traditionally used in the legal system in favor of a 'formal' language able to reproduce legal rules, according to models suitable for computer systems. Therefore, the cybernetic jurisprudence would realize the principle *in claris non fit interpretatio*: clarity would be guaranteed by a language of 'symbols' (Cossutta, 2003, p. 112) that would break down the arbitrary interpretation in favor of the automatic implementation of law where a protasis is inevitably followed by the same apodosis anytime. The 'formalization' of the abstract type of offense and the concrete one would determine the mathematical predictability of the juridical consequences of a case so much that you get to affirm that the *ius dicere* could be transformed in the execution of an algorithm[13].

Algorithms and expert Systems in the legal world

As is well known, an algorithm is a finite sequence of repeatable and univocal instructions that indicate a combination of actions carried out to solve a problem, transforming data input into data output[14]. It is also known that automatic or robotic decisions are those in which

[9] In 1402 the French theologian J. Gerson guessed like this the judicial reasoning, as reported by Tierney (1997, p. 230, at note 66).

[10] The axiomatic method applied to the law has further origins in Thomasius, Heineccius and Wölfl' s works. Cf. Maffei (2016, p. 181); Taddei Elmi (2014, p. 89). See Leibniz (1935, p. 31), which believed it could reduce all human reasoning to a kind of calculation that would serve to discover the truth, within the limits of what is possible *ex datis*, e.g. considered what is given or known. In Leibniz's reasoning, just as the objectivity of numbers is independent of the mathematicians themselves, being valid regardless of whether there is something or someone which counts, so law – which operates through logic – values regardless of whether there is something or someone which has to be judged, or whether it is a human or a machine that judges; Leibniz (1951), Pagallo (2005). See Zagrebelsky (2018, p. 34), which argues that the Leibniz's thought on the basis of the legal positivism in some ways has constituted the premise for legal-informatic models. About the preludes obtainable from the thought of Hobbes about the geometric systematization of positive law and the formalization according to a calculable model, see Cossutta (2003, p. 124 ff.); Scorsi (2006, p. 15). Bombelli (2015, p. 47-68).

[11] Beccaria (1780, p. 15) held that "for each felony, the judge has to make a perfect syllogism: the main one has to be a general law; the lesser one (has to be) the action in compliance, or not, with law; the consequence, the freedom or the sentence. When the judge is forced or would like to make only two syllogisms, the door to uncertainty is opened".

[12] Weber (1995) wished a "formal legal thinking way", because only "formal law" is calculable […], predictable in its application and the capitalism needs "a calculable law like a machine".

[13] Regarding the transition to the digital system, Papa (2020, p. 80) speaks about the previously unknown scenario in interpreting the law, because "every rule meaning can be purified, 'cleaned' from the text noise and identified under its perspective of regulation".

[14] For an exhaustive algorithm definition, see Sipser (2013, p. 182).

decisions involve the so-called reasoning algorithms that, given some premises, achieve conclusions based on these premises through logical programming expressed in a language such as a system that can perform automatic operations based on that preliminary knowledge[15]. However, the reliability of these decisions depends on the reliability of the premises, i.e. the database used and, on the other hand, on the reliability of the procedure used[16].

Methods currently used do not try – as in the past with disappointing results (Clément, 2017, p. 104; Ferrié, 2018, p. 498) – to reproduce precisely, i.e. to replicate, the process of human thought. However, they are defined as expert systems based on knowledge (Knowledge-Based Systems or KBS) because using the knowledge based on the related domain, they aim to resolve problems that usually require the specific competence of a skilled person[17]. Therefore, purpose of an expert system is to give the same answers that the skilled person would give, even if in a different way. The system should also be able to explain the decisions made and the logic behind them[18]. Moreover, in recent times, artificial intelligence has shown us a change in the functioning paradigm of the algorithms, which is not limited to deducing consequences in a determinist way from axioms predetermined by the programmer.

However, through automatic learning systems (machine learning), they produce the inference criteria that remain mostly unknown to the programmers themselves[19]. The reference is to the so-called neural networks that can self-correct themselves, getting models from the so-called big data, operating through those analogical procedures that should distinguish human reasoning and, in particular, the interpretative one (Di Giovine, 2020, p. 952-953). "After all, these predictive algorithms are not built to answer why a specific thing will happen, but only to indicate with the greatest possible accuracy, the probability that it will happen"[20].

In the legal system, therefore, it can be said that the automated decision currently does not try to imitate the mental process that the human judge[21] should carry out. Instead, they

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[15] Sartor (2016, p. 133). On the programming language, see Sartor (1992).

[16] Hart (1988, p. 13). See also Lucatuorto (2006, p. 222), which argues that the efficiency of the expert system depends on the amount of the memorized knowledge inside of the application and that is formed not only by mere facts, but also by procedural knowledge.

[17] Many years ago, Feigenbaum defined an expert system as a program for calculation that takes advantage of knowledge and reasoning techniques to resolve problems that otherwise would need the ability of a skilled person :see Feigenbaum (1977, p. 1018), which also argued that an expert system has to have the ability to justify or to explain why a specific solution is adopted to solve a specific problem.

[18] In the criminal law context, this need of "transparency" of the AI's reasoning is connected to the guarantees of the Due process: on this matter, see Rizer, Watney (2018, p. 181, 214-215). If it is not possible to identify the rationales of a decision elaborated by algorithm, the produced effect would be undermining the confidence in the legal system and its observance from people: cf. Tegmark (2017, p.351). Moreover, the needs for transparency are connected to the right to appellate decisions of an AI system: on this matter and the impact of the AI on other fundamental rights, see the European Union Agency's Report for fundamental rights, https://fra.europa.eu/en/publication/2020/artificial-intelligence-and-fundamental-rights, 2020, 13.

[19] Researches highlighted that the functioning of the algorithms is not conformed with the creation and explanation of phenomenon causes and effects; rather, it is entirely statistical. The software remains a black-box, a box in which information interacts without understanding why it achieved a certain result, proceeding that it is different from that one used by the human mind in a trial: "In traditional criminal investigations, police "move data to the question". They may want to know, say, who killed X or who stole from Y. So they gather evidence, moving data to the specific question at issue. Big data analysis does the opposite: store everything, and then "move the question to the data"; cf. Henderson (2018, p. 527- 532).

[20] Simoncini (2020, p. 53). The studies on the legal semantic web recently obtained important results about the automatic reasoning on the rules, developing the so-called juridical ontologies, i.e. knowledge portrayal systems based on standard and the semantic web criteria, able in catching several juridical knowledge perspectives: from basic concepts, included deontic ones, to the domain's type of offence: on this topic, see Francesconi (2020, p. 5-7).

[21] Taruffo (1998, p. 316-317) highlights the difficulties in putting the legal reasoning in prearranged models: "If one considers the evident features of complexity, variability, flexibility and discretion that are typical of judicial decisions, any approach aimed at interpreting the judicial reasoning according to logical rules and models may appear as doomed to failure. In fact, the history of the logical theories of judicial reasoning is largely a history of misunderstandings, errors, manipulations and defeats. [...] On the one hand, one may observe that the main attempts to "computerize" the reasoning of the judge were so rough, and unable to

base on correlations between words and other parameters and prepare models derived from judicial precedents to solve the concrete case[22].

This process of automation of the juridical discourse, it would be said, goes through different steps of artificiality[23]. Some products, already in place, provide very advanced jurisprudential research tools that can rough out the judge's possible leanings[24]. Other tools, developed mainly in the academic field, tend instead to build real decision-making software potentially able to calculate the ending of a litigation and thus to replace the judge[25].

Unlike traditional search engines which are even more advanced[26], the former can 'understand' human language, identify the correlations between words to get their meaning, make logical connections, and propose solutions with the probability of success in litigation[27]. The latter, decision-making software, taking advantage of progress in natural language processing and automatic learning, statistically processes some lexical groups of words in judgments to verify their frequency, but cannot identify the reasons for a decision or make a real legal analysis. Therefore, the so-called reasoning algorithm cannot develop legal reasoning as the human mind does, but rather it replaces the judge only in preparing a decision based on the judicial precedents. It is also evident that the fact is that automatic learning and analysis are more accurate than those related to legal reasoning.

The Authors of these researches find similarity with the legal realism, observing that « «judges primarily react to the facts of the case, rather than to legal arguments»»[28]: ultimately, according to these researches, the judge primarily 'reacts' to the fact and, therefore, the algorithm based on previous judicial decisions will also work in the same way. The success of Compas software in the USA for calculating recidivism, also supported by American

interpret the complex nature of decision-making, that they could not succeed in producing reliable models of the judge's reasoning. These attempts, one might add, are a good proof of the impossibility of interpreting such a reasoning in terms of AI. On the other hand, one may consider that the decision-making procedure is so complex, variable, uncertain, fuzzy and value-laden, that it could never be reduced to logical models. Any logical model, one might say, would necessarily leave aside important features of the decision-making reasoning that cannot be reduced to logical forms. Therefore, such a model would be basically false as a description and inappropriate as a prescriptive model for judges".

[22] See Rouviére (2018, p. 530) and Godefroy (2018, p. 1979-1985). For an explanation of the different software developed for the advantage of legal systems, until the LUIMA, that would permit to distinguish between facts and legal issues by the extrapolation of the rules from several legal documents and so not only from judicial precedents, see Ashley (2017, p. 313-349).

[23] On the subtle difference between algorithms that support the judge and algorithms that suggest a decision see Rulli (2018, p. 537).

[24] In the U.S., we can refer to the IBM Watson/Ross system. In Europe and more precisely in France, we can remember *Predictice* in civil law, that boasts the analysis developed in one second of several million of legal texts and whose database is made up of laws, Court of appeal and Court of Cassation. After the law's approval on *République numérique* of October 6, 2016, France, in Europe, is currently the country where the discussion,about "predictive justice", is the most bright. In fact, the Administration of the Courts and the Court of Appeal has to make available online all the judgments delivered in France, which amount to around 3 million by year. It has caused the creation of an enormous database open access, pushing toward a software creation able to commercially take advantage of the information.

[25] The main reference is to the algorithms developed in 2016 by a group of researches of the University of London, that can give previsions believed particularly reliable on the trials possible results of the European Court of human rights. The algorithm, analyzing the Court case-law (584 judgments), revealed itself able in evaluating the violation, or not, of the Articles 3,6 and 8 of the Convention in new case-law presented to the Court, with a percentage of success up to 79%. Cf. Aletras, Tsapranis, Preotiuc-Pietro, Lampos (2016). See also Vols, Medvedeva, Wieling (2020, p. 237-242). Another example could be the software called *Case Crunch Alpha* (www.case-crunch.com), elaborated by students of Law at the University of Cambridge, that 'has challenged' one hundred among the best jurists in predicting the solutions of litigations at *Financial Ombudsman*, winning the challenge because of it correctly predicted the 88,6% in relation to the 62,3% of skilled people.

[26] Like, still in France, *Doctrine.fr* e *JurisData Analytics*, defined as a *Search engine* by the European Commission for the Efficiency of Justice (CEPEJ) in the *European Ehical Charter on the use of Artificial Intelligence in judicial systems and their environment*, 18, (December, 3-4, 2018), https://rm.coe.int/ethical-charter-en-for-publication-4-december-2018/16808f699c.

[27] For explanation on these softwares, in Italy see Castelli, Piana (2018, p. 156-157) and Gabellini (2019, p. 1307-1309).

[28] Cf. Aletras, Tsarapatsanis, Preotiuc-Pietro, Lampos (2016), which found that "our empirical analysis indicates that the formal facts of a case are the most important predictive factor. This is consistent with the theory of legal realism suggesting that judicial decision-making is significantly affected by the stimulus of the facts".

jurisprudence[29], is a concrete example of the greater compatibility of expert systems with the fact and not law.

Apart from the doubts about its actual predictive capacity, highly disputed (Louden, Skeem, 2007), and the perplexity about its legitimacy due to the risks of discrimination[30] and the secrecy of the criteria that govern its functioning (Kehl, Guo, Kessler, 2017), this system deals with the previsions of future facts (the realization of crimes) based on past facts (criminal involvement, relationships/lifestyles, personality/attitudes, family, and social exclusion), therefore conditions that only marginally concern the legal argument[31].

On the other hand, in this context, the aim is to explore the even more complex capacity of expert systems in providing support to the judge in interpreting the law and their compatibility with criminal law principles[32].

AI and the strengthening of the judicial precedent role

Considered the above exposed, AI in Law it is destined to strengthen the importance assumed by previous judicial precedents, at least, according to the current knowledge. It is also evident that if this could be approved in an easier way in common law systems, it should be different in civil law ones, such as the Italian one. Indeed, in these last law systems, the judge has to apply the law according to the principle of strict legality, but in practice it is increasingly undermined by the recourse to the judicial precedents[33]. In fact, in civil law systems where the use of AI is more developed – in Europe, especially in France – the problem has arisen, although mainly in civil law, considering that the software currently developed works on this law field. In this context, the doctrine has spoken about *factualisation du droit*: the algorithm processes facts and legal topics in the same way as mere computer data useful for calculation (Croze,2017, p. 174-175; Jeuland, 2017; Cholet, 2018, p. 223 ff.). Therefore, law becomes mere information among the many, and every fact considered by the algorithm, such as the judicial precedent, becomes a legal source, legitimate or not.

At first glance, this kind of reasoning seems to remind the theory supported by that part of the doctrine according to which *quaestio facti* and *quaestio iuris* are not divisible, neither theoretically nor practically[34]. In reality, unlike the modern robotic model, this thesis rejects

[29] The Compas system (*Correctional Offenders Managment Profilying for Alternative Sanctions*) makes a statistical analysis based on 137 information obtained by a defendant interview and his legal information, compared with the statistical ones related to the population sample. A company owns the rights and software use licenses, so the algorithm's criteria are covered by industrial secret. The Supreme Court of Wisconsis affirmed that the software use does not compromise the right to a fair trial: cf. State of Wisconsin *v.* Eric L. Loomis, 881 N.W.2d, 749 (2016), www.courts.ca.gov/documents/BTB24-2L-3.pdf. On the topic see Julia Dressel & Hany Farid (2018, p. 1 ss.), which estimate that, for twenty years, the Compas system has been used for more than one million cases.

[30] The risk of discriminatory decisions is high, despite the algorithms to calculate the *risk assessment* are programmed to avoid that race or socioeconomic status influence the risk assessment. In the American doctrine, we can mention, for instance, the Iowa Risk Revised (IRR), which works using the job, the housing status, and potential previous crimes, factors inevitably influenced by race: recently, see Villasenor, Foggo (2020, p. 295 ff.). See generally Arthur Rizer & Caleb Watney (2018, 210-213); Huq (2019, p. 1043 ff.). See also O'Neil (2016, 14,40,162), which argues that the algorithms could introduce the bias of the judges in the criminal trial, because a human being programmed them: in fact, the Big data reproduce the same inequalities of the past, codifying the past's rules rather than inventing the future.

[31] About the Compas system and its many problematic aspects, in Italy, more recently, among the others, see Basile (2019, p. 19 ff.); Quattrocolo (2019, p. 142); Gialuz (2019, p. 12); Donati (2020, 421-428); Celotto (2019, 47-60).

[32] On the AI other possible effects in Criminal law see the complete overview of Basile (2019, p.19).

[33] On the topic, among many, Ferrajoli (2001, p. 44 ff.), Caterini (2012, p. 99 ff.), Cavaliere (2017, p. 653 ff.), Ronco (2018, p. 1387 ff.), Amarelli (2018, p. 1406 ff.) and Aldrovandi (2018, p. 147-190).

[34] On the indistinguishable difference between fact and law, even if under different aspects, among many, see Ubertis (1979, p. 25), Mazzarese (1992, p. 294-320), Vogliotti (2007, p. 54-56), Orlandi (2007, p. 501-508), Quattrocolo (2011, 61-63) and Cassibba (2016, p. 66-67). In a different sense, see Barberis (2005, p. 233), Comanducci (1992, p. 223-225) and Cordero (1966, p. 620).

the myth of the judge *bouche de la loi*: interpretation is seen as a unitary cognitive operation that puts the reconstruction of the fact and its legal framework in a homogeneous context. To identify the *quaestio facti*, according to this doctrine, it is necessary to make a selection of the fact according to its legal qualification[35]. In the meantime, the legal judgment always implies one which is based on the fact, because the former does not refer to a rule which is isolated from the fact.

The rule acquires a sense because it refers to the concrete case, with an unsolvable link between the fact as roughed out by the rule, and the rule itself as well as chosen and interpreted[36]. Thus, the doctrine proposes an incorporation beetwen fact and law[37], incorporating the *quaestio facti* in *quaestio iuris*[38]. Instead, the '*factualization*' of the algorithmic law proposes a different and inverse operation: the law becomes one of the many other facts considered by the algorithm, incorporating the law in the fact. All this would determine an *ius dicere* 'genetic' mutation. Indeed, the algorithms do not look for the applicable rule according to the traditional principle of "*iura novit curia*" and do not explain why judges make a decision rather than another but merely reduce the 'judging' in the recourse to judicial precedents[39]. So, this kind of solution would be coherent with the trend to simplify the explanation of the sentence through the strengthening of the role of the precedents, not only in the civil jurisprudence, but also in the criminal one. If this trend would be implemented in an expert system of AI, there would also be the risk of circumventing the guarantees related to the justification of Court decisions[40]. Indeed, in the Civil law legal system, deciding means above all to motivate, in a dialectical way, and cannot be restricted in an application of compliant judicial precedents according to binary logic.

Almost always, the juridical interpretation entails selecting an alternative, explaining the reasons for this preference (Irti, 2016, p. 84-85; Contento,2004, p. 69-72; Monateri,1998, p. 203; Guastini,1995, p. 19), without replacing that with the apparent mechanical objectivity of an algorithm that cannot give the causal explanation of an alternative to choose (Bichi, 2018, p. 223-225).

"More likely than not" vs. "beyond any reasonable doubt"

Therefore, the interpretation almost always admits several plausible options, as long as they are rationally well-founded[41]. In several hermeneutic outcomes, the algorithm could choose according to the criterion of "more likely than not", a statistical parameter that among the judicial precedents selects the most consolidated and most frequent one. Indeed, it has been demonstrated that AI gives tools based on a statistical approach even with innovative

[35]"There is not an immediate knowledge of the fact, rather a legal recognizing"; cf. Irti (2017, p.21)

[36] Ubertis (1979, p. 70). On the circular or spiral judicial reasoning's character, see Hassemer (1968); Esser (1972). In Italy, see Taruffo (1989, p. 321); Barberis (1990, p.257); Zaccaria (1998, p. 155); Orlandi (2007, p. 501 ff.).

[37] Using a definition of Papa (2020, p.86), we could say that there is a "creative connection" between fact and law that culminates in the judge-man judgment.

[38] Kelsen (1966, p.12) gave the premises for the judicial syllogism passing through the incorporation of the *quaestio facti* in the *quaestio iuris*: "in law the AI will not be able to live in the present. It will always give meaning to the past facts according to reminiscence".

[39] On the general topic of the judicial precedent in Italy, among many, see Manes (2018, p. 2222-22249), Donini (2018, p. 79-101), Fildebo (2018, p. 1-19).

[40] Skeptical on the real functioning of these guarantees Di Giovine (2020, p. 960-961).

[41] Gatys *et al.* (2016, p. 326 ff.), which suppose that if the juridical interpretation is compared with art, as a person's inspirational result it does not mean necessarily prohibiting the access to AI, also because algorithms have already been developed in typical artistic performance, like painting.

computing and self-learning skills and it is able to catch various correlations among information and quickly giving back an answer.

In the case of several hermeneutic solutions, the algorithm – in place of the intuition of the judge – could choose according to the criterion of "more likely than not", i.e., a parameter that selects the most consolidated and most frequent one among the judicial precedents. In this way, algorithms would be useful to calculate the main judicial leanings, whose determination today is, instead, left to the intuition of the judge[42].

Moreover, allowing the algorithm based on judicial precedents to operate according to the rule of "more likely than not" raises doubts, especially in Criminal law[43]. In reality, among several interpretative options, all plausible, the choice between them cannot be made according to a free conviction of the judge as uncritical intuition, neither can it depends on the AI statistical operations. Previous research outlined a possible way toward overcoming the excessive discretion of the judge which has allowed the jurisprudence to give entrance to the choices of criminal policy, ethical reasons, feelings or ideologies[44]. This way could also find an implementation in the algorithmic judgment – precisely concerning the invalidity of the criterion of "more likely than not" – to attempt to remedy at least its most striking frictions with some fundamental criminal legal system principles[45].

Based on interpretation in compliance with the fundamental principles of criminal law, this thesis has two essential points. The former concerns the hermeneutical solution favorable to the defendant that the judge should choose among more plausible options (Ronco, 2006, p. 80 ff.; Cadoppi, 2016, p. 147 ff.). The univocal exegetical choice that should also contribute to greater legal certainty, understood as possibility of predicting interpretative outcomes and not simply as pervasive *vis* of the punitive power[46].

Therefore, we should consider the *favor rei* a principle that completes the criminal law system, useful to solve even the doubts on the interpretation of the law (Ferrajoli, 2000, p. 81-83), derived by "generalizing induction"(Irti, 2017, p. 24) from constitutional principles and supranational Charters, and that should be established as a hermeneutical rule[47]. The second point concerns the procedural side of the thesis, closely related to the former. Indeed, since crime is that fact which corresponds to a legal type and ascertained according to the rules of the Due process, it is clear that these rules contribute to determining crime itself: the substantive rule of favorable interpretation must be combined, from a procedural point of view, with the obligation of explanation of the decision, indicating the reasons that led to

[42] On the criteria to establish when leanings could be consolidated as a judicial lawmaking, in Italy see Perrone (2019, p. 75-77).

[43] In fact, at least under the probatory perspective, the criminal system is different from the civil one: the former is characterized by "beyond any reasonable doubt"and the latter by "more likely than not". So, the burden of proof differently works in civil and criminal trial, being different in order to the "degree" which is necessary to pass a sentence of guilt. See Underwood (1977, p. 1299 ff.), which highlighted that in the American jurisprudence sometimes judges are reluctant in recognizing the usefulness of two different probative standards whose choice varies depending on being that civil or criminal. In the Italian doctrine see Tonini (2010, p. 238). In the Italian jurisprudence, cf. Cassazione penale, 20 giugno 2013, n. 37373. *Diritto e giustizia online*, 2013, 13th September, with paper of De Francesco, *Il giudice penale dirime ogni ragionevole dubbio, spiegando perché le opzioni contrarie vanno respinte.*

[44] For detailed studies on this thesis, in Italy, see Caterini, (2016, p. 509 ff.); Caterini (2017a, p. 169-190). In the American doctrine, see Wistrich *et al.* (2015, p. 855). Lastly, regarding civil matters and especially contracts, see Niblett, (2010, p. 234 ff.).

[45] For a short presentation of robotic judgment's main critical aspects under constitutional perspective in Italy, see Donati (2020, p. 428-430).

[46] In the American legal system, the favorable interpretation for many aspects coincides with the rule of lenity. In the case of ambiguity in legal texts, it provides the most favorable interpretation for the defendant. The reasons at the base of this doctrine, whose origin is judicial, lie in the greater predictability of the decisions and the principle of the separation of power. On the origins of the rule of lenity and its premises, among the others, see Scalia (2018): Scalia, Garner (2012); Price (2004, p. 906-921); Solan (1998, p. 134-144); Hopwood (2017, p. 695-750); Jeffries (1985, p. 189-219); Karkkainen (1994, p. 401-477); Popkin (1993, p. 865-889).

[47] Contento (1995, p. 109). In this sense, see Article 22 (2) of Rome Statute of the International Criminal Court.

choosing a more unfavorable interpretation instead of another more advantageous one for the defendant.

On the other hand, this burden could not be carried out by merely presenting the reasons supporting the chosen hermeneutical option plausibility[48]: to this part of the justification (*pars costruens*) should be added that of confutation (*pars destruens*), i.e. the explanation of the reasons why the most favorable interpretative option is implausible or illogical and, as such, to exclude. To induce choosing the most favorable interpretative option for the defendant, it would not be necessary that this is the only 'right' one; rather, it is indispensable that the interpretation is one of the plausible ones, excluding only those merely deceptive and without any hermeneutical value. Therefore, even in the context of cultural pluralism characterized by not absolute solutions, the decision should not base itself on mere opinion, but on a rationally valid argument, on a qualified doctrine or jurisprudence, even if not necessarily uncontested (Massimo Donini, 2010, p. 1089). In essence, on a well-founded "conflict of reasons"(Irti, 2016, p. 123).

In addition to serious doctrinal leanings that could be classified and computerized, the logical procedure proposed above could be more easily based on the Supreme Court's precedents useful to demonstrate a not-implausible favorable interpretation[49]. That seems to be an appropriate way to integrate the role of judicial precedent with the principle of *favor rei*: a kind of obligation to follow the precedent only if *in bonam partem*, especially if it is of the Supreme Court (Caterini, 2012, p. 118-129).

Currently, in fact, many factors – as well as computerization – push «towards a lesser "obsession" with the written law as the exclusive reference point of *nullum crimen*, and towards greater recognition of the judicial precedent as one of the factors able in producing law» (Cadoppi, 2012, p. 97). However, it is equally necessary to tend towards solutions in which this law in action produces its effects only if it is favorable to the defendant. Therefore, a kind of 'creation' of the law through the judicial precedent as long as *in bonam partem*[50].

The principle of "*in dubio pro reo*", which is a *favor rei* corollary, should therefore be applied not only in the ascertainment of the fact but should be extended to reasonable doubt on the law interpretation[51]: it should not apply the different rule of the "most likely than not", which allows choosing, among several interpretations, the one considered the most "fair" or – in the statistical perspective of a knowledge-based system – the one calculated as the most consolidated precedent[52]. If the judge cannot exclude with the explanation of the decision the plausibility of the most favorable precedent for the defendant, then the different judgment

[48] Cf. Jellema (2020, p. 1-25), which argues that the plausibility of the chosen interpretative option depends on two conditions and if they subsist, the BARD standard could be held achieved: "guilt is only established BARD if (1) the best guilt explanation in a case is substantially more plausible than any innocence explanation, and (2) there is no good reason to presume that we have overlooked evidence or alternative explanations that could realistically have exonerated the defendant".

[49] In Italy, the reference is to the Court of Cassation. See Cadoppi (2016, p.147), which holds that if the Court of cassation can interpret the rule in the meaning of the acquittal, unless that interpretation is a clamorous judicial mistake or even some judge's unbelievable mala fides, it means that that interpretation has to be considered plausible. Maybe it is not the best interpretation, as long as the best interpretation exists; however, it is a plausible interpretation.

[50] On the replies to the predictable objection regarding this thesis conflicts with the principle of legality, see Caterini (2017c, p. 277-284).

[51] Indeed, the BARD standard could be used to the elements of the law and not only to the fact. Compare with Apprendi v. New Jersey, 530 U.S. at 477: in the sentence, the Supreme Court used the term "elements"rather than "facts"; cf. United States v. Gaudin, 515 U.S. at 512. On the epistemological equivalence between fact and law, see Lawson (1991-1992, p. 859-904); for different theories, see Friedman (1991-1992, p. 916).

[52] Gaboriau (2018, p. 209) highlights that the judicial precedent quantitative supremacy compromises the independence of the judge and his duty of impartiality, because the party to which the jurisprudence is not favorable is in an institutional inferiority position.

criterion of "beyond reasonable doubt" according to the paradigm of *in dubio interpretatio pro reo* should be applied (Caterini, 2017b, p. 507-510).

Conclusion

From what has been laid out above, it is necessary to distinguish also, in the future robotic judgment, the criteria that should characterize it, depending on whether developed in the criminal field or not[53]. At this first and partial conclusion, it does not seem an impediment that the standard of "beyond any reasonable doubt" in favor of the most favorable law interpretation is a canon traditionally used in the criminal trial to ascertain the fact and not for interpreting the law. In addition to the arguments mentioned above, we can also mention the Art. 6 of the European Directive 2016/343/EU: «any doubt as to the question of guilt is to benefit the suspect or accused person», a general concept that should include the doubt on the interpretation of the law (Caterini, 2019, p. 330-336). Considering that the observations made concern only the criminal robotic judgment – because the *favor* in case of doubt works for the defendant only in the criminal trial[54] – it is now possible to make a brief conclusion[55].

Although judges do not always provide evidence of significant legal rationality[56] – precisely because they are human, with their ideologies[57] – at the moment, the alternative of a robot criminal judge would probably frustrate even more the individual guarantees (Luciani, 2019, p. 95). On the other hand, the influence of AI in the legal system does not seem so far away, and even criminal judges and attorneys will have to deal with machine learning expert systems[58]. So maybe it would be useful to manage the problem by not ignoring the proficiency and principles of legal science[59], thus avoiding cybernetic solutions are elaborated by some political Authority or even by information technology companies that currently influence many aspects of our lives[60]. Therefore, it could be possible overcoming one of the fundamental problems of applying AI to the criminal trial through the algorithmic implementation of the *in dubio interpretatio pro reo*.

The functioning of an expert system based on jurisprudential precedents, indeed, could operate by calculating a series of interpretative options from which it should choose not the statistically most frequent, but the one most favorable to the defendant. In this way, the

[53] In Italy two monographs of jurists which propose mathematic models to apply to the law stand out: Asaro (2013) and, with specific reference to the civil law, Viola (2018).

[54] In the civil legal system, the judge can not restrict himself to not decide (non liquet), however, he has to decide in favor of the plaintiff or the defendant, even in case of a gap in the set of rules: it is just for this reason that sources and interpretative instruments complete the set of rules, like the analogy, traditionally extraneous to Criminal law, at least apparently. Indeed, even in case of uncertainty or obscurity of the law, the civil judge has to decide without using general principle that, differently from Criminal law, can lead him toward the decision**.** On the topic, see Taruffo (2001, p. 11-31).

[55] For an incisive summary of the main advantages and obstacles in using the machine learning in Criminal law, see Di Giovine (2020, p. 953).

[56] The legal logic used by the judges, for the legal realism, is only declared, but not practised. Among the others, see Troper (1999, p. 476-494).

[57] Just the judicial mistakes significant effects due to heuristics and to the mind and cognitive *bias* of the person represent an important premise to justify the use of the algorithms in law; cf. Nieva Fenoll (2019, p. 31-46).

[58] For instance, in March 2018, the Committee of Experts on Internet Intermediaries of the Council of Europe published the study Algorithms and Human Rights. Shortly after, considering the «AI increasing importance in modern society» and its «expected benefits since its potentialities will also be used at the service of the justice's efficiency and quality», the European Commission for justice efficiency (CEPEJ) adopted the *European Ethical Charter on the Use of Artificial Intelligence in Judicial Systems and their environment*. In this document, several reservations on the AI used in Criminal law are expressed, limited to possible discriminatory effects: «In criminal matters, their use must be considered with the greatest reservations in order to prevent discrimination based on sensitive data, in conformity with the guarantees of a fair trial». On the topic see Covelo De Abreu (2019).

[59] Favorable for using AI in Criminal law cases, at least in the easy ones, recently, Di Giovine (2020, p. 962); Gialuz (2019, p. 21) highlights the necessity of collaboration between programmers and jurists.

[60] On the necessity in ruling the algorithms, see Celotto (2019, p. 47 ff.).

principle of strict legality – understood as the presumption of innocence until proven guilty and not as "Law is a Sword, Law is a Shield"[61] – would not undergo a real violation, otherwise quite evident if the judicial precedent and not the law was used by the machine to legitimize a more unfavorable decision[62].

Essentially, suppose we would take advantage of the robotic judgment: in that case, this could happen only in the case of a sentence of acquittal or more favorable than the other possible ones[63]. Therefore, it should develop an algorithm not only technologically optimized, but also oriented to precise 'political' leanings to overcome the mere statistical data[64]. Philosophy, after all, has taught that technology is not neutral, but makes politics (Galimberti, 1999; Severino, 2009). Of course, it should not implicate the judge's exclusion from the decision-making process, but support for the judge, a kind of mixture between *Humanitas* and *techne* (Carcaterra, 2019), typical of a defined "synesthetic" Criminal law (Papa, 2020, p. 86).

That would be useful to reduce the response time of the judicial authority, improve the law implementation predictability, and guarantee the judicial leanings uniformity[65]. Indeed, to achieve these objectives, the European Ethical Charter on the Use of Artificial Intelligence in Judicial Systems also has not a basic idea of replacing the judge, but an auxiliary role of A.I (Simoncini, 2020, p. 54).

In the case that interests, this aid would consist in indicating to the judge the most favorable law interpretation to the defendant derived from the range of judicial precedents. This option, using computer language, should be a kind of default option[66].

If the judge, to streamline himself some of that «effort in thinking» (Carnelutti, 1949, p. 41 ff.) would agree with this cybernetic suggestion, the burden of explanation would be simplified, referring to the algorithmic elaboration of the judicial precedents. If, on the other hand, the judge would opt for a more unfavorable hermeneutical choice than the one suggested by the robot, then the burden of explanation should be reinforced in the mentioned confutative meaning[67]. In a procedural perspective, legal certainty is seen as discursive rationality capable of opposing the supremacy of technology[68]. Ultimately, in such cases, the judge can not restrict himself to illustrate only the reasons useful to demonstrate the most unfavorable logic interpretation. He or she should also explain why the most favorable interpretative option suggested by the expert system is implausible.

Indeed, as previously said, a logical interpretation of a rule does not in itself exclude the logicality of an alternative interpretation of the same rule[69]. It would ensure complete control

[61] On the comparison of the opposite legality points of views, as a shield or a sword, see Fletcher (1998, p. 206 ff.). In Italy, see Caterini (2012, p. 118-119).

[62] Antoine Garapon (2018, P. 196) observes that today, it can mean that digital systems introduce new legality, that finds regularities in the judge's reasoning among the selected elements and the decisions made. It permits to establish several correlations, that become binding in practice, even if they do not coincide with the application of law.

[63] This solution does not seem incoherent with the principles expressed in the Regulation 2016/679/UE (April 27, 2016) about the personal data, referring to people's protection and regarding personal data treatment. Article 22, in fact, establishes that the person concerned has the right to not being exposed to a decision, exclusively based on the automated treatment that produces legal effects that involve him, unless he has expressly approved. Supposed that this rule probably could be applied in a criminal trial: in the case of more favorable treatment, probably the approval would be given, in the opposite case, the automated decision would be impeded just from the probable lack of that.

[64] Kehl, Guo, Kessler (2017, p. 34) well highlight that Politics that have the decision power have to give priority to the values considered by the algorithm, independently from supposed technical precision necessities.

[65] Di Giovine (2020, p.962) wonders if it is a real desiderable effect, since the machine learning could assure a superior stabilization of the jurisprudence.

[66] On the explanation of the sentence in case of support of AI, see Nieva Fenoll (2019, p.103); Santosuosso (2020).

[67] On the right to explanation in the AI decisions recently, see Gacutan, Selvadurai (2020).

[68] The reference is to the discorsive theory of law: see Habermas (2017).

[69] This model would pass the implicit explanation admitted by the jurisprudence, according to which there is no explanation lack if there is not an explicit decision on a defense argument, if the judge explained the legal reasons that support his reasoning since

of the explanation of the decision on those occasions where the principle of legality requires more guarantees for the defendant, i.e., in case of conviction or unfavorable decision.

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