

## **Deductive predictive justice: first test with 66% success score on doubtful matters<sup>1</sup>**

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Index: 1. Introduction to predictive justice 2. Deductive and inductive model 3. Test and success score 4. Conclusions.

### **1. Introduction to predictive justice**

Predictive justice<sup>3</sup> is classified as a branch of law that studies possibilities of predicting an outcome of a trial by means of some calculations<sup>4</sup>. It can also have recourse to Artificial Intelligence<sup>5</sup>.

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<sup>1</sup> Translated by Jasna Geric.

<sup>2</sup> The present paper was written with the assistance of Centro Studi Diritto Avanzato.

<sup>3</sup> Entry in the Enciclopedia Treccani, 2018. See also VIOLA (ed.), *"Predictive justice and interpretation of the law through mathematical models"* (Papers of a conference held at the Istituto dell'enciclopedia Italiana Treccani), Milan, 2019, with speeches by Stefano AMORE, Giuseppe BUFFONE, Tiziana CARADONIO, Veronica CASALNUOVO, Caterina CHIARAVALLI, Pietro CHIOFALO, Gianfranco D'AIETTI, Gaetano DANZI, Valerio de GIOIA, Mirella DELIA, Michele FILIPPELLI, Jasna GERIC, Pierluigi GILLI, Andrea GIORDANO, Manuela RINALDI, Serafino RUSCICA, Piero SANDULLI, Matteo SANTINI, Stefano SCHIRÒ, Marco SCIALDONE, Giulio SPINA, Luisa Iolanda CALVAGNA. See also QUARTA, *"Giustizia e predizione: l'algoritmo che legge il futuro"*, in Giustizialinsieme, 2019 as well as LUDOVICI, [La Giustizia Predittiva come strumento necessario per l'affrancamento dal precedente vincolante](#), in *la Nuova procedura Civile*, 1, 2021.

According to DANZI, *"Il fattore tempo nella giustizia predittiva e nella certezza del diritto"*, in *La Nuova Procedura Civile*, 2, 2021, art. 11 Preliminary Provisions "begins by affirming a fundamental principle of law and legal civilisation: "the law applies only to future events". But the future is nothing but the world to come, and consequently the aforementioned Art. 11 can be construed as: "the law applies only to future events". Art. 11 of the Preliminary Provisions, therefore, contains a true "principle of the futurability of the law". The law is predictive by its very nature because it tends to regulate future human behaviour, and consequently builds "temporal roads", which future events will have to undoubtedly cross. It is true that there are exceptions to Art. 11 of the Preliminary Provisions, but these, if anything, confirm the rule".

<sup>4</sup> We read in the entry *"Giurimetria"* in the Enciclopedia Treccani, 2020 that George Boole's work *"The Mathematical Analysis of Logic"*, can also be brought up in this context: he worked on formal logic that was developed by using mathematical/algebraic operations (Stilo, L., *"Dall'algebra di Boole all'informatica moderna passando attraverso la capacità di ragionamento del computer"*, on [ilnuovodiritto.it](http://ilnuovodiritto.it), 2017).

On the other hand, certainty has always been deemed to be necessary in a system of law; legal certainty means that clarity, knowability and unambiguousness of the rules and their consistent and prompt application by the authorities in charge, especially by judges, provide citizens with reasonable certainty as to the legal consequences of a conduct or situation (Onida, V., *"Calcolo giuridico e tutela dell'affidamento, in Calcolabilità giuridica"*, edited by A. Carleo, Bologna, 2017, 71).

In the past, Max Weber had already spoken of the predictability and calculability of the law, while quite recently the same topic has been raised not only by Frosini, Losano, Borruso and Bellomo, but also by Irti, according to whom "the rationality of calculation also lends its support to the law. The entrepreneur counts on the functioning of the administrative apparatus and the application of the law. Therefore, they count on presumptive judgment, in the sense that, when a dispute arises, the concrete event will be traced back to the regulatory case in point: the entrepreneur is familiar with that particular case, which enables them to calculate

From 2018<sup>6</sup> onward, the topic has reached record levels; proof of this are:

- almost a hundred dedicated events in 2022 at numerous Courts of Appeal, Universities, Associations;
- many research projects<sup>7</sup>;
- several projects of private companies<sup>8</sup> (GiuriMatrix and OneLegale projects);
- many initiatives at the Courts of Brescia<sup>9</sup>, Bari, Genoa, Pisa, Milan and others, and at Italy's Supreme Court;
- a draft law called "Prodigit" (No. C. 3593);
- references to predictive justice made on the occasion of the inauguration of the judicial year 2023<sup>10</sup>.

## 2. Deductive model and inductive model

Two models have currently been developed<sup>11</sup>:

- one deductive, where the law is applied to the case, integrated by the parties' defence, predicting, thus, a probable judgment;
- the other inductive, where case law precedents are utilised to

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the legal future" (Irti, N., "Per un dialogo sulla calcolabilità giuridica, in *Calcolabilità giuridica*", edited by A. Carleo, Bologna, 2017, 22).

<sup>5</sup>We read on Hyperlex.ai, 2022, that *Predictive justice is a technology based on artificial intelligence (AI), which consists of calculating the probability of a court decision. Predictive justice tools rely on large datasets and probabilistic calculations to determine the chances of winning a case.*

For more information, see FIAMMELLA, "Intelligenza artificiale ed etica, tra progresso ed evoluzione", on Altalex.com, 2018.

<sup>6</sup>We read in OLIVA SANTOS, "Giustizia predittiva", *interpretazione matematica delle norme, sentenze robotiche e la vecchia storia del «Justizklavier»*, in *Rivista Trimestrale di Diritto and Procedura Civile*, volume 3, 1, 2019, 883, that at the beginning of July 2018, a conference on "robotic decision-making" was held in Rome. And almost at the same time a book came out, also in Italy, entitled "Interpretation of the law through mathematical models and subtitled "Trial, a.d.r., predictive justice". On the other hand, offers and proposals of computer programmes designed for the courts were debated in France for at least a year. In Spain, quite recently, a major multinational with a strong publishing house has launched Giurimetria, a statistical and predictive jurisprudential analysis tool. According to its advertisement, "Giurimetria provides you with answers to complex questions such as: How long will this trial last? What are my chances of success? What is the best line of argument to use for this particular case, with this magistrate and with a certain lawyer representing the other party?" [...] "By means of jurisprudence, you can obtain indicators, trends and predictions of outcomes of a concrete legal case. By analysing and classifying millions of documents, by extracting key data, such as the winning party in the ruling, the sentence proportion, the court, among many others [...] you will receive clear answers as to the chances of the outcome of your case and the likely duration of the trial". It is, therefore, a fact that in Europe, in our sectors, spurred on by the economy (we shall return to this topic later), interest has been aroused anew in the predictability of judicial decisions and, to this end, in the use of mathematics and electronics.

<sup>7</sup>See a project of the Scuola Superiore Sant'Anna, as well as an augmented justice project, completed by the GiurIA consortium (Directors: Gatt, Caggiano, D'Aietti, Viola), in line with the objectives pursued by the European Union and the CEPEJ. Both projects set operational and verifiable goals in the short and medium term. Relying on an interdisciplinary approach, they aim to achieve the introduction of decision-support systems by developing/using controlled, documented and transparent artificial intelligence systems (machine learning algorithms) with the aim of: speeding up legal activities; measuring and analysing hermeneutic activities of many interpreters; offering tailor-made solutions to cases brought to the attention of judicial bodies.

<sup>8</sup>Also worth mentioning is the Deontologicus software, which uses AI.

<sup>9</sup>See also MORELLI, *Giustizia predittiva: il progetto (concreto) della Corte d'appello di Brescia*, in Altalex.com, 2019

<sup>10</sup>Speech by Attorney General Mr Luigi Salvato.

<sup>11</sup>See VIOLA, "[Giustizia predittiva: è preferibile un modello deduttivo](#)", on Altalex.com, 2020.

predict a probable judgment<sup>12</sup>.

Strictly speaking, it should be pointed out that:

-prediction represents a set of experimentally verifiable forecasts that can be deduced: in other words, prediction is deductive<sup>13</sup>;

-prediction is a supposition as to what will happen or how events will unfold in the future, based on more or less certain clues, inductions, hypotheses or conjectures<sup>14</sup>; prediction is namely inductive.

### 3. Tests and success scores

In order to attempt to work out the best model for 'predicting' the probable judgment<sup>15</sup>, it was decided to proceed with experimentation<sup>16</sup> (like in sciences) of cases that gave rise to an ascertained jurisprudential contrast.

Some<sup>17</sup> rulings for referral to the Joint Sections were used, picked at random from the civil matter, as they usually contain both the opposing theses<sup>18</sup> and possible numerical prevalence<sup>19</sup> of one over the other; subsequently future contents of the Joint Sections' rulings were predicted/forecasted (starting from six months in advance), and then the correspondence between predicted and decided was verified.

Results of 12 cases that were examined<sup>20</sup> are listed below:

-8 judgments were correctly predicted (66.6%) by means of the deductive model<sup>21</sup>;

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<sup>12</sup>For example: if a prevailing orientation is identified in the ruling for referral, then it will be deemed that the prediction of the ruling in the Joint Sections will be compliant with the prevailing orientation.

<sup>13</sup>In the Vocabolario Treccani. FERRARI, *Profili giuridici della predizione algoritmica*, Milano, 2022, 86; PERLINGIERI, *L'incidenza della utilizzazione della tecnologia robotica nei rapporti civilistici*, in *Rass. dir. civ.*, 2015, 1244.

<sup>14</sup>In the Vocabolario Treccani, Predictability is usually based on the analysis of time series, on the assumption that what happened in the past might happen in the future.

On this occasion, we would like to point out that new Article 425 paragraph 3 of the Italian Code of Criminal Procedure (after Cartabia) mentions the "reasonable prediction of sentence".

<sup>15</sup>The utility could extend to mediation; on this point BRUNO, [Mediazione e prevedibilità della sentenza](#), in *La Nuova Procedura Civile*, 4, 2020.

<sup>16</sup>It is the world's first test conducted using the deductive model applied to the law.

<sup>17</sup>Twelve cases were examined, drawn from issues from the years 2016 to 2022. The number of cases is not representative, but indicative. The work is constantly being updated. All the cases can be found here.

<sup>18</sup>It is an essential element of the deductive model.

<sup>19</sup>It is an essential element of the inductive model.

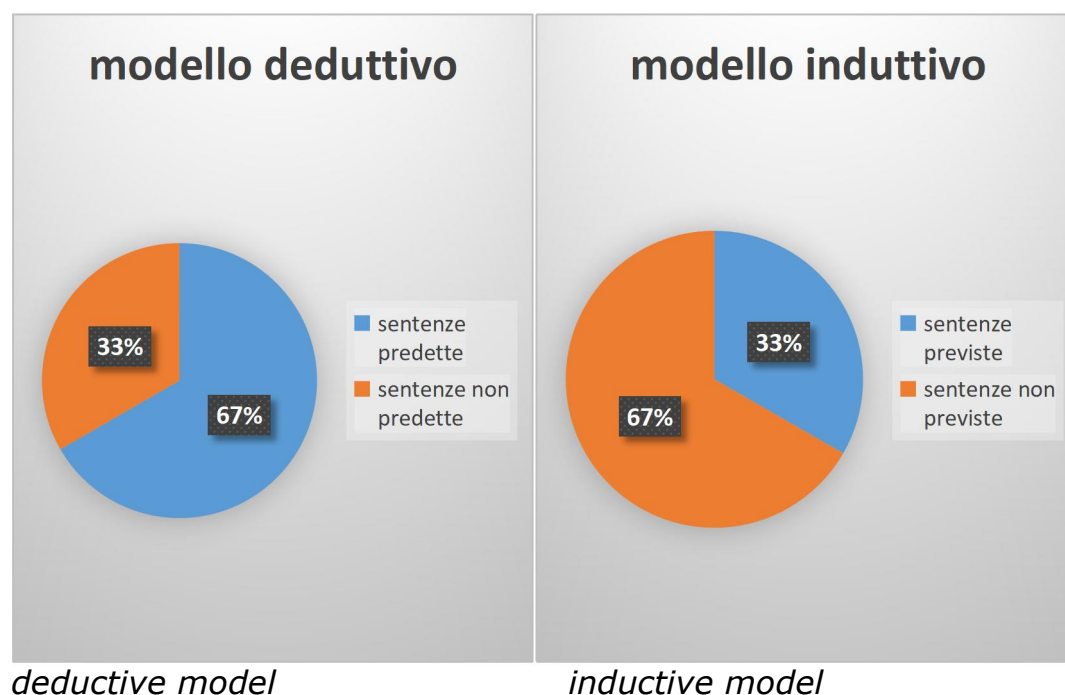
<sup>20</sup>The 12 cases are the same for both the deductive and inductive models; sometimes the results, regardless of the model, were the same, while in other cases, they were different.

<sup>21</sup>It is based on the assumption that the judge applies the law (Art. 101 Const.), in the light of the parties' defence (Art. 24 Const.); the law postulates interpretation, which is bound by the wording of Art. 12 Preliminary Provisions. The formula used is explained in full in VIOLA's book, [Interpretazione della legge con modelli matematici](#), Milan, DirittoAvanzato, 2018 as well as in VIOLA's extract, [Fatto e Diritto con un approccio giurimetrico](#), in *La Nuova Procedura Civile*, 3, 2022.

It is pointed out that the machine learning, which is used to upskill Artificial Intelligence, follows in the footsteps of a predominantly inductive model; we read in MORO, *Intelligenza artificiale e professioni legali*. *La*

-4 judgments<sup>22</sup> were correctly predicted (33.3%) by means of the inductive model.

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questione del metodo, in *Journal of Ethics and Legal Technologies*. 1, 2019, 29 that owing to the centrality of automatic big data analysis, statistical learning and stochastic optimisation have replaced deductive logic, converting intelligent inference into the inverse model, solved by the inductive maximisation of a certain probabilistic quantity. Artificial intelligence and the Internet have thus become the all-important converging technologies of the contemporary world, reinforcing their growing dominance, as they interact with each other and mutually involve each other, while still depending on machine learning algorithms.

CORASANITI points out in *"Tecnologie intelligenti"*, Milan, 2023, 48 that programming errors can be spotted quite easily, while those related to data acquisition and their retrieval, especially if on the Web, are much more difficult to pinpoint promptly and, above all, spontaneously.

For more information about this, MILLER, FOTI, FOX, *Breiman's two cultures: You don't have to choose sides*, 2021 as well as BREIMAN, *Statistical Modeling: The Two Cultures (with comments and a rejoinder by the author)*, in *Statist. Sci.*, 16, 199 - 23.

In LISI's view *"Che senso ha oggi concentrarsi sull'intelligenza Artificiale nel mondo della giustizia, se non abbiamo il controllo dei nostri dati e addirittura perdiamo interi incartamenti perché magari ne affidiamo la custodia ad una chiavetta USB?"*

On the relapse into metaverse, see SARZANA di S'IPPOLITO, *Il diritto del Metaverso - NFT, DeFI, Gamefy e Privacy*, Turin, 2022 as well as CASSANO-SCORZA, *Mataverso, Diritti degli utenti - piattaforme digitali - privacy - diritto d'autore - profili penali - blockchain e NFT*, Pisa, 2023.

<sup>22</sup>The inductive model presents problems of application where there are no guidelines indicated as prevailing, in the ruling for referral; therefore, in 4 cases it was not possible to predict the judgment, but this means that in these cases the prediction ultimately failed, since it is not usable: therefore, these 4 cases were considered non-prediction. In any case, if they had been considered non-usable cases, then:

- the entrenched forecast (inductive model) would have been 4 out of 8 cases (50%);
- while centred prediction (deductive model) would have been 5 out of those same 8 cases (62.5%).

## **Conclusions**

It follows from the above that:

-the deductive model has a higher success rate as to issues that are subject to conscious contrast.