

VICTOR, the Brazilian Supreme Court's Artificial Intelligence:

a beauty or a beast?

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1. Introduction

Recently, empirical reports from the Brazilian National Council of Justice (CNJ) have shed light on the numbers of the Brazilian Courts. There is a backlog of almost 80 million lawsuits waiting for a final and binding decision (1 for every 2.6 inhabitants). Additionally, Brazil spends almost 2% of its Gross Domestic Product (GDP) with the Judiciary Branch, which is more than any other country in the world.¹

There were many attempts to tackle the crisis of the justice system; however, all of them have failed. For instance, despite the efforts to promote alternative dispute resolution (ADR) mechanisms in Brazil, to date only 10% of the lawsuits end in a settlement.

The implementation of technology in the Brazilian Courts seems to be the only way out. Adopting cutting-edge technology to solve legal conflicts, therefore, is the major agenda of public and private stakeholders on the field², and Brazil has experienced a huge growth in the number of legal technology companies as well as in the digitalization of courts and tribunals.³

In this paper, we decided to highlight the initiatives carried out by the Judiciary Branch to establish partnerships with researchers for the use of artificial intelligence (AI) that assists in the classification and identification

¹ Erik Navarro Wolkart and Daniel Becker. *Da Discórdia analógica para a Concórdia digital* In Bruno Feigelson, Daniel Becker, BECKER, Daniel and Giovani Ravagnani (org.). *O advogado do amanhã: estudos em homenagem ao professor Richard Susskind*. Thomson Reuters, 2019, p. 117-119.

² Bernard Hawadier, *L'avocat face à l'intelligence artificielle*, Librinova, 2018, p. 119 e ss.

³ Erik Navarro Wolkart and Daniel Becker. *Da Discórdia analógica para a Concórdia digital* In Bruno Feigelson, Daniel Becker, BECKER, Daniel and Giovani Ravagnani (org.). *O advogado do amanhã: estudos em homenagem ao professor Richard Susskind*. Thomson Reuters, 2019, p. 116-124.

of claims, and even in the performance of the administrative acts that are necessary for the trial of repetitive cases.

Notably, the Brazilian Supreme Court (STF) recently announced the creation of an AI system, designed in a partnership with the University of Brasilia (UnB), named VICTOR. The AI's nickname is a tribute to the deceased Minister Victor Nunes Leal, the former Justice responsible for the systematization of STF's case law.

Referred to as the 12th Justice of the STF, the AI system, in its initial phase, has the goal of analysing the huge load of appeals presented before the High Court and to automate the evaluation of one of its prerequisites: Victor's pilot version aims to identify cases with *repercussão geral* ("general repercussion"), a requirement for the processing of an appeal before the STF, which will be further explained.⁴

This short paper aims to present VICTOR and discuss its advantages, flaws, and risks, as well as answer the playful question posed in the title: is VICTOR a beauty or a beast?

2. How does VICTOR work?

Before we address how VICTOR's operates, it is necessary to make some introductory considerations regarding AI. We adopt Pedro Domingos' definition, valuable for its simplicity: an algorithm is a sequence of instructions that tells a computer what to do.⁵

Regarding its operation, we can divide the algorithms into two species: *deterministic* and *probabilistic*. Deterministic algorithms follow operations (the path) defined by the programmer. Thus, the information is carried in the system (input), the algorithm does what is programmed to do with it, and the result (output) "comes out" from the system.

⁴ Ricardo Dalmaso Marques, *Inteligência artificial e direito: o uso da tecnologia na gestão do processo no sistema brasileiro de precedentes*, Revista de Direito e as Novas Tecnologias, vol. 3, April - June 2019.

⁵ Pedro Domingos, *The master algorithm: how the quest for the ultimate machine learning will remake our world*, Basic Books, 2015, p. 1.

Referring to the operation of deterministic algorithms, Alan Turing, in the seminal *Computing Machinery and Intelligence*, written in 1950, proposed that, instead of simulating the brain of a human adult and programming all the operations to be performed, it would be more productive to adopt a different strategy: simulating a child's brain with random learning. This is how probabilistic algorithms work.

These algorithms operate creating other algorithms: the data and the desired result are inserted into the system (input), and it produces the algorithm (output) that allows the transformation of the former into the latter. As Pedro Domingos points out, the computer creates its own code so that humans do not have to do it.⁶

Machine learning techniques can then be defined as the practice of using algorithms to collect, interpret, and make predictions based on data. Since they “feed” the system, being the raw material from which the software bases its learning activity, a huge amount of data is essential for the machine learning to achieve its full potential.⁷

The simplest form of machine learning is one that employs supervised algorithms, in which the system is fed with selected and structured data. In this case, the dataset and the expected output are loaded into the system. While being trained, the machine learning model adjusts its variables to relate the inputs to the corresponding output.⁸

The credit score carried out by financial institutions is a good example: the data analysed will refer to the customer's credit history, and the information used to train the system is data that had already been classified whether as positive or negative regarding the credit evaluation.⁹

⁶ Pedro Domingos, *The master algorithm: how the quest for the ultimate machine learning will remake our world*, Basic Books, 2015, p. 6.

⁷ Isabela Ferrari, Daniel Becker and Erik Navarro Wolkart, *Arbitrium ex machina*, Revista dos Tribunais, vol. 995/2018, September 2018.

⁸ Joi Ito and Jeff Howe, *Whiplash: How to survive our faster future*, Boston: Grand Central, 2016, p. 240-241

⁹ Daniel Becker and Isabela Ferrari, *Ad astra per aspera: postergação da LGPD e revisão do art. 20, § 1º*, JOTA, 2020.

A sort of algorithmic structure that works in a supervised way is the artificial neural network with backpropagation.¹⁰ Inspired by the human brain, these artificial networks have learning models based on mistakes and successes, with gradual identification of the best paths and decisions to achieve certain objectives.

The system is loaded with a single objective (output) and several inputs, which are tested in several ways. When the desired outcome is achieved, the most assertive path receives a greater weight (in the mathematical account). Thus, the internal neural layers (hidden layers) start to deliver more accurate results.¹¹

A second relevant category is the non-supervised algorithms. In this case, the data that feeds the system is not classified, leaving the algorithm to find patterns in the entries provided. Thus, these algorithms can organize samples without having a predefined classification. Non-supervised algorithms are useful when it is necessary to discover patterns sets of non-classified data. This technique is used in the recognition and identification of faces and voices, in addition to the creation of decision-making systems in a short time, enabling, for example, the construction of autonomous vehicles and drones. In the health area, the technique is used for the diagnosis of certain diseases, such as diabetic retinopathy.¹²

3. VICTOR

As aforementioned, the Brazilian Justice Systems faces one of the most serious “court crisis” of the world. It is not different in STF. In 2018 only, there were more than fifty thousand appeals filed before this Court, which could decide approximately a hundred and twenty thousand cases a year.

¹⁰ David E. Rumerhart, Geoffrey E. Hilton, Ronald J. Willinans, *Learning Representations by back-propagating erros*, Nature, v. 323, issue 9, October 1986

¹¹ Isabela Ferrari, Daniel Becker and Erik Navarro Wolkart, *Arbitrium ex machina*, Revista dos Tribunais, vol. 995/2018, September 2018.

¹² G. G. Gardner et al, *Automatic detection of diabetic retinopathy using an artificial neural network: a screening tool*, British Journal of Ophthalmology, 80, 1996.

As a comparison, in the 2017-2018 term, the Supreme Court of the United States (SCOTUS) agreed to hear 71 cases, and only 69 cases were effectively ruled.¹³

The first step of the analysis of all the appeals that reach the STF is the presence or not of general repercussion, one of its prerequisites. Before VICTOR, this analysis was made by civil servants, based on binding precedents from the Justices, taking around 40 minutes for each lawsuit. Victor does that in 5 seconds. Therefore, VICTOR is apparently a very welcomed way out to unburden the STF.

In relation to its software architecture, VICTOR has several cutting-edge technologies embedded and a huge dataset of Court records.¹⁴

The dataset used to train VICTOR contains more than a hundred thousand lawsuits and almost three million case dockets extracted during the period of two years (2017-2019). This data represents approximately four terabytes.¹⁵

Its first challenge was to deal with the fact that the court records reach the STF, coming from all the Brazilian Courts (State, Federal, Labour, Military, Electoral Justice), in different formats - for example, unstructured PDF volume which encloses several documents that have not been indexed.

Therefore, no matter whether the file was on pdf, jpeg or any other format, VICTOR's first challenge is to be able to read it. To do so, it applies Optical Character Recognition (OCR), a technology for recognizing characters from an image file or bitmap whether they are scanned, handwritten, typed or printed. Thus, through OCR it is possible to obtain a text file machine-readable and editable.

¹³ Ballotpedia, *Supreme Court cases, October term 2017-2018*, Ballotpedia, 2019.

¹⁴ José Antônio Dias Toffoli and Bráulio Gabriel Gusmão, *Inteligência artificial na Justiça*, CNJ, 2019.

¹⁵ José Antônio Dias Toffoli and Bráulio Gabriel Gusmão, *Inteligência artificial na Justiça*, CNJ, 2019.

More than that, VICTOR reorganizes the image it receives, splitting the legal reasoning, and highlighting the most important of them, allowing whoever has contact with the file later to easily reach the act he or she is searching for.

It is important to understand that, if VICTOR is a key technology that allows the system to classify and to structure raw data, it also means that the system is analyzing all the lawsuits that reach the Supreme Court, and its full content. In a country where most of the cases might reach the Supreme Court if the parties want that (and they usually do), this means that VICTOR has access to valuable data on Brazil's legal system.

How exactly does VICTOR work? The subfield of AI responsible for Victor's architecture is a convolutional neural network (CNN). CNN is a class of artificial neural networks of the feed-forward type, which has been successfully applied in the processing and analysis of digital images, and in experiments involving natural language processing, such as VICTOR.¹⁶

Python, the programming language, is also a key technology, which allows programmers to use different programming styles to create programs, get quicker results and write code almost as if speaking in a human language. Some of the popular systems and applications that have employed Python during development include Google Search, YouTube, BitTorrent *et cetera*. Because Python is a high-level programming language, it abstracts many sophisticated details from the programming code. Python focuses so much on this abstraction that its code can be understood by most novice programmers. Victor also uses Google TensorFlow, which functions by sorting through layers of data (also known as nodes) as part of its learning process. In the first layer, the system determines the basic features of the object. As deeper movements occur, it looks for more refined information

¹⁶ José Antônio Dias Toffoli and Bráulio Gabriel Gusmão, *Inteligência artificial na Justiça*, CNJ, 2019.

regarding the object. The sorting of images is done at a faster rate, thus giving users more valuable information.

Another technology embedded is XGBoost, which is an optimized distributed gradient boosting library designed to be highly efficient, flexible and portable. XGBoost provides a parallel tree boosting that solve many data science problems in a fast and accurate way.

4. Beauty?

Victor undoubtedly is a solution to grant more speed and effectiveness to the proceedings instituted before the STF in a more efficient and productive model if compared to the traditional evaluation carried out by the court civil servants.

As highlighted in the introduction, VICTOR pilot version aims to distinguish the appeals which are apt to be ruled by the STF, regarding one of its requirements (the existence of general repercussion, meaning that the topic addressed in the appeal has social relevance and, therefore, it should be ruled by the STF).

The categories of appeals that will challenge VICTOR comprise: (i) appeals that deal with issues with general repercussion, (ii) appeals that were already dismissed due to their lack of general repercussion, (iii) appeals regarding which there is not enough information neither to establish the presence nor the absence of general repercussion. Regarding the latter, it is important to highlight that VICTOR's database does not comprise subjects that have not yet been sufficiently addressed by the Court regarding the existence of general repercussion.¹⁷

Somehow, what is being done is nothing more than materializing and validating the system of precedents brought by the reform of the Civil Procedure Code on 2015. This reform approached the Brazilian Justice

¹⁷ Ricardo Dalmaso Marques, Inteligência artificial e direito: o uso da tecnologia na gestão do processo no sistema brasileiro de precedentes, Revista de Direito e as Novas Tecnologias, vol. 3, April - June 2019.

System, which has its roots in the civil law tradition, to the common law system, such as *stare decisis*. Speaking about VICTOR, Justice Luiz Fux from the STF suggested that by identifying the 27 most recurrent themes appealed the High Court can rule approximately ten thousand lawsuits per year.¹⁸

This screening, the main purpose of VICTOR at this initial moment, for the purpose of identifying topics of general repercussion was indicated as 84%, being able to reach 95%.¹⁹ In addition, while a court clerk takes 44 minutes, in general, to evaluate whether there is general repercussion in an appeal, Victor spends only a couple of seconds.²⁰

It is feasible to conclude that it allows the possibility of the research and use of the processed data, facilitating the identification of the parties and the object of the appeals, and that it also allows the relocation of court clerks in other activities.

5. Beast?

According to its developers, VICTOR is a software that does not exercise automated decision-making; it only supports court clerks in the triage of the appeals. However, experience teaches us that it is not that easy to segregate hybrid decisions and the influence of a software support to the cognitive activity of human reasoning, as it was shown to the world in the United States case *Loomis v. Wisconsin*, 881 N.W.2d 749 (Wis. 2016), *cert. denied*, 137 S.Ct. 2290 (2017).

Is it possible to appeal or to file a motion against VICTOR's general repercussion evaluation? Unfortunately, not. There is no provision in Brazilian laws for an appeal against this sort of decision. And there is more.

¹⁸ Conjur, *Fux mostra benefícios e questionamentos da inteligência artificial no Direito*, Consultor Jurídico, March 2019.

¹⁹ Nilton Correia da Silva, *Document type classification for Brazil's Supreme Court using a Convolutional Neural Network*, Legal AI, October 2018.

²⁰ Ricardo Dalmaso Marques, *Inteligência artificial e direito: o uso da tecnologia na gestão do processo no sistema brasileiro de precedentes*, Revista de Direito e as Novas Tecnologias, vol. 3, April - June 2019.

Currently, the appellants are not informed when VICTOR is used since its pilot-version is randomly picking up appeals to evaluate. This is a violation of Brazilian laws, specifically the Brazilian Data Protection Law, which is expected to enter into force on May 2021, and provides that automated decision-making should be fair, transparent, and informed.²¹

Another serious issue involving VICTOR is related to stakeholders' hearing and its costs. Even though the AI belongs to the STF and, therefore, is public, the costs and its code are not. Nobody knows how much it cost for the public purse nor how the code works. It lacks the transparency required by Brazilian Laws. The first problem is a serious issue of accountability. The last one is a technology concern.

As mentioned in the second chapter, understanding the decision-making process and the programming of probabilistic and self-programmable algorithms is a Herculean task.²² It is said that "*developing a machine learning algorithm is very difficult; the only thing considered more difficult than programming it, is to audit it and explain it*".²³

AI autonomously modifies its structure while operating, according to the data. Therefore, there is a huge gap between the programming activity and the behaviour of the AI due to the complexity of its operation; the mere observation of the output by a human being - even by its own developer - could hardly lead to any conclusion about the internal processes that led the inputs to that output, turning the AI a true black box.²⁴

²¹ Isabela Ferrari and Daniel Becker, *O direito à explicação sobre decisões automatizadas: uma análise comparativa entre a União Europeia e o Brasil*, Revista de Direito e as Novas Tecnologias, vol. 1, October – December 2018.

²² Joshua A. Kroll et al, *Accountable Algorithms*, University of Pennsylvania Law Review, v. 165, 2017.

²³ Andrew Burt, *Is there a 'right to explanation' for machine learning in the GDPR?* International Association of Privacy Professionals (IAPP). Available at: <https://iapp.org/news/a/is-there-a-right-to-explanation-for-machine-learning-in-the-gdpr/> – Access on June 8th 2020.

²⁴ Isabela Ferrari, Daniel Becker and Erik Navarro Wolkart, *Arbitrium ex machina*, Revista dos Tribunais, vol. 995/2018, September 2018.

From this modern computational and statistical engineering, serious problems may arise involving discrimination, prejudice and bias following the opacity and biased datasets of AI systems. Again, it is hard not to remember the jeopardy brought by similar software, such as the COMPAS, brought to light in the aforesaid *Loomis v. Wisconsin* case.

6. Conclusion

Can we trust Victor?

According to what has been reported, the degrees of Victor's precision has been very high - higher than if the same activity had been performed by humans without the use of these technologies. There is little controversy in the idea that the development of technological tools that guarantee stability, uniformity, predictability, consistency, and integrity to courts is a first-tier urgency for every Justice System in the world, especially Brazil.

However, Victor can generate incorrect, unjustified, or unfair results regarding the deleterious consequences from machine learning from biased data sets, to the opacity of these algorithms, and to the discrimination potentially generated by them. The autonomy of machine learning algorithms turns the tasks they perform difficult to predict and even after the decision difficult to explain or rewind the process.

Right now, the way VICTOR was developed might give space to the argument that it is a beast and cannot be trusted. However, it might become a beauty if its transparency, accountability, and legibility are improved and be object to public and private, both technical and social, scrutiny.