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## History of Technological Evolution in the Brazilian Judiciary System and the Application of Artificial Intelligence

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### Abstract

Artificial Intelligence systems have been increasingly developing, demonstrating new forms of implementation and utilization, being employed in many sectors. In this regard, aiming to keep up with social development and enhance the development of procedural acts, the Brazilian Judiciary System has been seeking to implement new forms of technology over the years. Although gradually, an evolution can be observed in the sector, such as options that circumvent the use of physical documents and a departure from conducting all acts in person. This has led to the implementation and development of Artificial Intelligence systems within the judiciary, aiming to further improve the Brazilian judicial system. Therefore, this present work seeks to provide a historical overview of the advancements that have occurred in the Brazilian Judiciary System regarding its technological evolution, describing the initial modifications as well as the current applications of Artificial Intelligence. Additionally, it presents their objectives and capabilities. Thus, in conclusion, this paper demonstrates that the progress made over the years is immeasurable, and the application of Artificial Intelligence systems in the Brazilian Judiciary System is already becoming consolidated, with the potential for even greater growth in the coming years.

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## 1. Introduction

Developments in Artificial Intelligence (AI) have brought greater possibilities and innovations in all fields of study and work, being also noted in the field of Applied Social Sciences, specifically in Law, within Brazilian courts and forums, which have been striving to improve and innovate over the years, in line with societal changes, by implementing new means to facilitate procedural proceedings.

In this regard, the objective of this present work is to compile the technologies implemented in the Brazilian Judiciary System, progressing through its stages until the actual application of AI systems (i.e., software that reproduces human characteristics, such as reasoning and learning, in favor of digital automation). The research was conducted in a qualitative bibliographic manner, relying on legal doctrines, and analyzing concrete data published in articles, as well as journalistic reports, regarding Artificial Intelligence systems already implemented in the Brazilian judiciary.

To accomplish this, the paper is structured into two chapters. The initial chapter offers a comprehensive outline of the progressive inclusion of technologies within the Brazilian Judiciary System. It traces the transition from a time when processes were predominantly physical and acts were carried out in person to the introduction of incremental advancements like fax and email, and, eventually, the focus shifts to the implementation of systems specifically designed to digitalize these processes. In the subsequent section, a targeted analysis is undertaken to explore the application of Artificial Intelligence systems in the Brazilian Judiciary System. This analysis covers a comprehensive presentation of numerous AI systems that have already been implemented, alongside a detailed examination of their objectives, advantages, and capabilities.

In the end, it is concluded that technology continues to advance at an accelerating pace with the Brazilian legal sphere seeking to keep the pace with this progress. This highlights the substantial advancements already made and the potential for further breakthroughs by means of integrating innovative AI systems.

## 2. Technologies in the Brazilian Judiciary System

Brazil is currently experiencing a technological evolution, which extends to the development of AI systems in various sectors, including the field of law. This progress is evident in specialized legal services and within the Judiciary, where the implementation of systems aims to streamline procedural acts and processes [1]. It is worth highlighting that the field of law has always been influenced by social changes over time. Therefore, with the evolution of technologies, it is no different. Just as legal norms adapt to new times and customs, legal practices also follow a similar flow, adapting to the implementation of new means for carrying out procedural acts [2].

In the field of human and social sciences, particularly in the context of Law, it is crucial to examine the changes that technological advancements can bring. These advancements are relentless in their growth and refinement, and the potential and scale of their impact in the short and long term remain uncertain. It is essential to carefully assess the implications of these developments and their potential consequences within the legal structure [1].

Undoubtedly, it was in the last decade that the justice system, in its broadest sense, started to undergo numerous transformations, although in a somewhat passive manner. This marked a positive leap towards the implementation of technologies in the application of law [3]. This phenomenon became even more apparent between the years 2020 and 2022, largely due to the emergence of the COVID-19 pandemic.

Advancements such as the Law 10.259 of 2001 [4], which regulated the establishment of Special Federal Courts and enabled the use of electronic means for conducting procedural acts via the internet, allowing, for the first time in history, the replacement of physical original documents.

Following the enactment of this regulation, the Regional Federal Court of the 4th Region developed the software called “E-proc.”, used by the Federal Civil Courts for the processing of their cases and continues to be utilised to this day. This marked the first regular use of virtual case management by a Brazilian court [5].

Another positive innovation during that time, concerning the use of technology in the Brazilian Judiciary System,

was the Provisional Measure No. 2.200-2/200<sup>†</sup> [6], which established the National Institute of Information Technology, aimed at promoting the use of technological means in the country. This measure fostered the emergence of the Brazilian Public Key Infrastructure (ICP-Brasil), which enables the issuance of certificates and digital identification of citizens. Ensuring the validity of updated legal documents attached to the cases [5].

In February 2006, the approval of Law No. 11.280/2006 took place [7], changing the text of the clause that had previously been prohibited, thereby modifying the Article 154 of the 1973 Brazilian Code of Civil Procedure [8], by adding a single paragraph that provides for the possibility of courts regulating the use of electronic means, provided that certain requirements are met, such as legal validity, use of ICP-Brasil, and authenticity [9]. Another law published in 2006 was Law No. 11.341 [10], which was responsible for amending the sole paragraph of Article 541 of the Brazilian Code of Civil Procedure of 1973<sup>‡</sup> [8], which allowed the use of judgments available on the internet and electronic media as a source of argumentation for the cases of special appeal provided for in Article 105, item “c” of the Federal Constitution<sup>§</sup> [9].

In a similar vein, aiming to implement technological modifications in the Judiciary, there is the Law of Electronic Procedure No. 11.419/2006 [11]. Considered a fundamental milestone in judicial progress, it established the electronic processing of cases, replacing physical processes [3], whereby: the filing of the case, procedural acts, and issuing of judgements started taking place electronically, eliminating the need for paper, volumes, or certifications. This has reduced procedural delays and ensured the effective application of the principle of procedural reasonableness [12]. It is worth noting that this system increased security and allowed greater transparency, integrity and agility in the procedural acts carried out [13].

However, it should be emphasised that despite the advancements, the implementation of technologies and electronic processes in the courts occurred in a slow, gradual, and disorganised manner. This is because the judicial entities lacked a unified integration method, as each court used its own systems developed by private companies, which incurred costs and licensing requirements for operation [5].

In this situation, in addition to the internal difficulties related to the systems used in each location, such as document format, size, and quality, which already prevented the necessary interchange between entities, another significant factor was the inevitable confusion faced by public servants and lawyers who needed to access and navigate different systems. These systems were often not intuitive and easy to understand, and they varied from region to region [14]. To initiate the establishment of organisation and homogeneity within the judiciary, the National Council of Justice (Conselho Nacional de Justiça, CNJ) introduced Resolution No. 185/2013 [15], what would be a system for computerisation of the judicial process, namely the Electronic Judicial Process (Processo Judicial Eletrônico, PJe), to be used by the Courts.

Thus, with the use of the electronic judicial system, there has been an increase in productivity, meeting a greater demand that had a significant stock of information to assist in the development of processes.

The advancements and benefits of the electronic process were essential for the beginning of a new phase in the application of law, which was further highlighted in the context of the COVID-19 pandemic. It provided the possibility of remote work for judges, lawyers, and public servants during the mandatory period of social isolation that persisted in Brazil. In this regard, although some courts in the country have not yet embraced process virtualization, given that Law No. 11.419/2006 [11] did not establish sanctions for the lack of implementation, most courts have already shown interest and are adapting, within their possibilities and the current scenario, to working through electronic means. Currently, the Supreme Federal Court is practically 100% digitized, reflecting its

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<sup>†</sup> The Provisional Measure has not been converted into law to this day but remains in effect since its publication on 24/08/2001, prior to Constitutional Amendment No. 32/2001, which amended certain articles of the Federal Constitution, particularly Article 62, which governs the legal regime of provisional measures.

<sup>‡</sup> Article 541 Sole Paragraph. When the appeal is based on jurisprudential dissent, the appellant shall prove the divergence by means of a certified copy, authenticated copy, or citation of the jurisprudential repository, whether official or accredited, including in electronic media, where the divergent decision has been published, or by reproducing a judgment available on the Internet, with indication of the respective source, mentioning, in any case, the circumstances that identify or resemble the confronted cases.

<sup>§</sup> Article 105, item “c”: writs of *habeas corpus*, when the coercer or the petitioner is any of the individuals mentioned in item “a”, or when the coercer is a court subject to its jurisdiction, a Minister of State, or the Commander of the Navy, the Army, or the Air Force, without prejudice to the competence of the Electoral Court

commitment to digital transformation [16].

In the ongoing progression of technological advancements, an important development is the establishment of the Infojud System (Judicial Information System), which was developed through a collaboration between the National Council of Justice (CNJ) and The Brazilian Federal Revenue Office. This system enables judges to access data pertaining to the assets of defendants involved in legal proceedings, utilizing information available from the Federal Revenue Service [17]. Similarly, in 2008, the National Council of Justice also established the Renajud System (Judicial Restrictions on Motor Vehicles), which enables the visualization, origin, and removal of restrictions on vehicles. This technological platform is directly linked to the National Department of Traffic (Denatran), facilitating greater efficiency and agility in providing information to interested parties [18].

The Code of Civil Procedure of 2015, Law No. 13.105/2015 [19], also provided for the adaptation of the law to regulate procedures related to electronic processes, particularly in Articles 193 to 199. This chapter directly addresses electronic practices and procedural acts [20].

Another noteworthy innovation is the use of recorded hearings, which were made possible by the Electronic Process Law, replacing the previously used written documentation, as stipulated in Article 279 of Law No. 9.245 of 1995\*\* [21], responsible for amending the provisions of the Civil Procedure Code concerning summary procedures [22]. Regarding the possibility of conducting legal proceedings through videoconferences, with the COVID-19 pandemic, the National Council of Justice implemented the Emergency Videoconferencing Platform for Legal Proceedings [23].

Initially, the available tools were used as a secondary option for conducting legal proceedings, with traditional methods such as in-person hearings and physical documentation remaining the primary approach. However, as mentioned before, due to the pandemic restrictions and the necessity of isolation and social distancing, the use of these tools became mandatory and essential, being the only alternatives to avoid a pause in judicial proceedings, which would have caused unimaginable setbacks. The tools proved to be highly effective in ensuring the continuity of work [9]. It is also worth highlighting the ruling issued by the Superior Court of Justice (STJ), which approved the use of WhatsApp as a means of serving legal documents. The court's decision stated that “declaring nullity in this case would constitute an endorsement of excessive and useless formalism” [24]. These innovations have contributed to achieving a reasonable duration of legal proceedings by reducing delays and modernizing the judiciary.

This digital transformation that has taken place is what many scholars refer to as the first wave of transformation, which has enabled greater efficiency in delivering services to society, accompanied by increased productivity [25], in addition to generating a vast database of legislative activities in Brazil, which can be used for training AI systems, this marks a movement towards a second phase of modifications that will be addressed next.

### 3. Artificial Intelligence Employed in the Brazilian Judiciary System

Artificial Intelligence is being used to improve the provision of public judicial services, with the aim of automating procedures, routine tasks, and supporting decision-making through the application of data science [26]. It should be made clear that in the 1960s, for example, there were already some computer systems using “mechanical jurisprudence” [27] and “jurimetrics” [28]. However, it was not established as artificial intelligence, nor did it have the capabilities of contemporary practices [29].

During the 1970s, software programs were developed based on “jurimetrics” [30], which consists of the use of data and statistics applied to law [31], implemented in the Brazilian Judiciary System during the 1980s and 1990s [2], being the catalyst for the application of artificial intelligence, which has evolved to reach the cutting-edge state of technology in use in the Brazilian Judiciary System.

In August 2018, the Supreme Federal Court (STF) implemented the platform called “Victor”, named after the late STF minister Victor Nunes Leal (1960-1969). This platform, developed in collaboration with the University of

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\*\* Article 279. The evidentiary acts performed during a hearing may be documented by means of stenography, shorthand writing, or any other suitable method of documentation, with transcription being made if so, determined by the judge. Sole paragraph. In jurisdictions or courts where stenography, shorthand writing, or any other method of documentation is not feasible, testimonies shall be recorded in a report containing only the essential information.

Brasília (UnB), aims to apply machine learning methods to optimize the analysis of general repercussions of the Supreme Federal Court [26]. Thus, the “Victor” software was developed using artificial intelligence focused on Natural Language Processing, which means it has the ability to understand human speech and writing using methodologies and statistics to classify legal documents and general repercussions, as well as perform processing tasks [26], sparing court officials from performing repetitive and mechanical tasks, allowing them to dedicate their time to more complex duties within the scope of the Supreme Court.

As for the Superior Court of Justice (STJ), it has its own artificial intelligence system called “Sócrates”, which has been under development since May 2019 in two distinct phases, 1.0 and 2.0 [32]. The functions of each phase are as follows: In phase 1.0, the Socrates system aims to facilitate the process screening by identifying relevant information and categorizing cases. It helps streamline the initial analysis of cases and improves the efficiency of the court's workflow. In phase 2.0, Socrates focuses on identifying possible legal controversies in special appeals. The tool can indicate the constitutional provision used to file the appeal, identifying jurisprudential divergences, or highlighting the alleged violations of legal provisions. This advanced functionality assists the court in analyzing and deciding on complex legal issues more effectively.

The functionalities performed by “Sócrates” are made possible using the “Athos” tool, an AI system capable of semantically comparing legal documents. By employing advanced natural language processing and machine learning techniques, “Athos” can analyze and identify similarities and differences in legal texts, enabling it to efficiently compare and match relevant information across a vast database of legal documents [33]. This capability enhances the accuracy and efficiency of the analysis performed by Socrates, supporting the identification of legal controversies, and assisting in the decision-making process within the Superior Court of Justice [32]. The “Sócrates” system has about 8 million and 317 thousand documents, referring to 2 million and 256 thousand cases, and is considered the largest database, in Brazil, of an artificial intelligence project [26].

Another tool used by the Superior Court of Justice (STJ) is the “e-juris” artificial intelligence system, a platform developed for extracting case law and legislative references from court decisions. This mechanism is employed by the Jurisprudence Secretariat of the higher court, allowing for efficient retrieval and analysis of relevant legal precedents and legislative sources. The “e-juris” system utilizes advanced algorithms and natural language processing techniques to extract and categorize information from the court's extensive database of judgments. It provides valuable support to the work of the Jurisprudence Secretariat in ensuring the accuracy and accessibility of legal information for judges, lawyers, and the public [32].

Similarly, the Superior Labor Court (TST) has developed an algorithmic system used for process management tasks, known as “Bem-te-vi”. Launched in 2018, the system initially aimed to verify whether the court's goals were aligned with the guidelines set by the National Council of Justice (CNJ). It analyzed the duration of cases within the chambers and their respective topics. Recently, the system has also been employed to assess the timeliness of processes, ensuring that they are handled promptly and efficiently. The “Bem-te-vi” system enables the TST to monitor and evaluate its performance, making data-driven decisions and promoting greater transparency and accountability in the administration of justice [34].

Another AI system that has been used in 1<sup>st</sup> and 2<sup>nd</sup> instance courts, particularly in the Courts of Justice of the states of Acre, Alagoas, Ceará, Amazonas, and Mato Grosso do Sul, is the “LEIA” Precedents. The main objective of this system is to analyze the convergence of cases that are being processed in both first and second instances. The “LEIA” Precedents system can identify similarities and patterns in the cases, aiding in the efficient management and decision-making process. This technology helps to streamline the judicial workflow, reduce duplication of efforts, and promote consistency in legal outcomes across different levels of the court system [35].

Thus, based on this analysis, the system suggests the linking of cases, allowing the judge to adjudicate them together. Up to the moment of the research, 242 thousand linkages have already been indicated in 168 thousand distinct cases, leading to greater efficiency and expediency in resolving the demands, contributing to a more streamlined and consistent judicial process, reducing the need for redundant analysis and promoting faster resolution of legal matters. This not only benefits the court system but also enhances access to justice for litigants by expediting the handling of their cases [35].

Furthermore, the Court of Alagoas has an AI system called “Hércules”, which was a finalist in the “Innovation Award - Exponential Judiciary”. Its purpose is to identify repeated petitions, meaning the system groups similar documents to streamline the procedural development. By recognizing patterns and similarities in petitions,

“Hércules” eliminates the need for redundant processing and enables more efficient handling of cases. This not only saves time and resources but also contributes to a more expedited and effective judicial process [36].

The Court of Justice of the Federal District excels in the field of artificial intelligence, with four projects currently in the production phase: “Amon”, “Artiu”, “Hórus”, and “Natureza Conciliação”. Furthermore, two projects are nearing completion: “Toth” and “Saref” [37].

Regarding each system specifically, “Amon” is a facial recognition system that has been in use since June 2020 and aims to manage access control to the Court's premises. “Artiu” is an AI system that assists in the management of judicial orders by locating the appropriate department to which they should be sent, as well as classifying and prioritizing their execution according to their urgency [37]. “Hórus”, on the other hand, aims to automatically input digitized processes into the PJe system<sup>††</sup>, by classifying documents and retrieving processing data [37]. Lastly, “Natureza Conciliação”, based on machine learning, classifies procedures within the scope of the Center for Judicial Dispute Resolution and Citizenship (CEJUSC) [37].

The Court of Justice of the State of Roraima utilizes the artificial intelligence systems “Mandamus” [38] and “Scriba” [39]. Regarding the AI system “Mandamus”, the final outcomes are expressed in natural language [38], the decisions are then analyzed and sent to another system, which classifies the urgency and, in collaboration with the Court Officer who operates through a mobile device, informs whether the recipient has received the procedural summons or notification. This system allows for a copy of the mandate to be sent via email, WhatsApp, or Telegram [26]. The “Scriba” system, on the other hand, is used during hearings and can share audio, video, and documents in real time. Additionally, the hearings are automatically recorded and attached to the electronic case files [39].

In the field of tax executions, the Rio de Janeiro Court has the “Vitória” system, which automates all procedural steps in the state. It verifies the validity of citations, updates debt values automatically, and facilitates the search and seizure of assets for process security [40].

The Pernambuco Court of Justice has the “Elis” system, based on deep learning, also focused on tax executions. Its objective is to identify cases and perform triage, analyze active debts, assess possible prescription or expiration issues, as well as draft decisions and sign orders with the magistrate's consent [26].

Furthermore, the “Larry” system used in the Paraná State Court of Justice can analyze cases and classify them based on their similarity. Additionally, the artificial intelligence provides the judge with their three most recent decisions related to the topic, assisting them in making decisions for the judgment of cases [26].

It is worth noting that the “Larry” system was developed by the Information Technology and Communication Department (DTIC - TJPR) of the court in conjunction with the technology solutions incubator in Londrina. Currently, it is being trained to generate drafts of judgments and rulings [26].

The “Sinapse” system, used by the Court of Justice of Rondônia, enables judges to view previous decisions on the same subject, besides providing draft phrases and complete rulings that to be used as a reference [41].

Furthermore, at the Federal Regional Court of the 3rd Region (TRF-3), there is the “SIGMA” system, which generates decision models based on previously used templates. This system is considered the most advanced artificial intelligence in the current Judiciary [42]. The operation of this system is carried out through “SINARA”, an algorithm developed for the identification of legal texts, generating results for the creation of reports, legal documents, and decision templates that can be later modified by the judges [26].

In a similar vein, The Federal Regional Court of the 1<sup>st</sup> Region utilizes a sentence database, which aims to generate information through searches of judicial documents already produced by the Court [43].

The Federal Regional Court of the 4<sup>th</sup> Region has 4 AI systems, which are named “classification of topics in the vice-presidency and appellate courts”, “analysis of case subjects”, “automatic screening of cases based on the initial petition”, and “suggestion of template models” [43]. Based on their suggestive names, it can be inferred that these systems respectively assist the court staff in identifying topics for admissibility analysis by the Vice-Presidency and

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<sup>††</sup> Created to put an end to the paper-based processing in the Judiciary, the Electronic Judicial Process (PJe) enables judges, court officials, and lawyers to carry out procedural acts directly within the system. Additionally, it ensures the reliability of the judicial process through the use of digital certification.

Presidency of the Appellate Courts; classifying cases by subject to avoid reassignment based on jurisdiction, as well as automatically analyzing cases and providing template suggestions [43].

The Federal Regional Court of the 5<sup>th</sup> Region has the “Jurisprudence Laboratory with Artificial Intelligence - JULIA” system, which assists all those involved in the judiciary in conducting jurisprudential research on the official website of the Court [43].

Regarding labor justice, there is the “GEMINI” system, in use at the Regional Labor Courts (TRT) of the 5th, 7th, 8th, and 20th regions. Its function is to use AI to draft and distribute matters in the court offices [44].

#### 4. Conclusion

This paper provides an overview of the trajectory of the introduction of new technologies in the Brazilian Judiciary System, serving as a reference on how future advances should be approached. It brings us to the present day, where the implementation of artificial intelligence in courts and tribunals has become a significant development. The main objective is to clarify the objectives, resources and importance of the technologies already implemented to accelerate the speed of judicial proceedings.

Through an analysis of the most significant advances in the application of artificial intelligence, it is evident that there has been a gradual acceptance of these improvements. This acceptance can be attributed to their remarkable ability to increase the efficiency of legal resolutions by simplifying and speeding up the processing of lawsuits. As a result, these technologies ease the burden on the judicial system and contribute to speeding up the overall process.

The evidence presented highlights the exponential growth of artificial intelligence in the Brazilian Judiciary System, increasingly occupying a prominent role, increasing the capacity of applications, and promoting the creation of larger and more robust databases. This, in turn, stimulates progress and innovation in the field.

Overall, the use of artificial intelligence in the Brazilian Judiciary System is transforming the landscape of judicial proceedings, paving the way for greater efficiency, better access to justice and, ultimately, a more effective and responsive judicial system.

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