Methodology for the Use of Machine Learning, Applied in Predicting the Level of Success in Legal Cases

Wilver Auccahuasi[a], Lucas Herrera[b], Karin Rojas[c], Kitty Urbano[d], Brayan Peláez[e], Pedro Flores Peña[f], Yuly Montes Osorio[g], Grisi Bernardo[h], Madelaine Bernardo[i], Sandra Meza[j], Christian Ovalle[k], Francisco Hilario[l], Milner Liendo[m] and Fernando Sernaque[n]

[a, d] *Universidad Privada del Norte, Lima, Perú*

[b] *Universidad Continental, Huancayo, Perú*

[c] *Universidad Tecnológica del Perú, Lima, Perú*

[f] *Universidad Nacional Mayor de San Marcos, Lima, Perú*

[g] *Universidad ESAN, Lima, Perú*

[e, h, i, l, n] *Universidad César Vallejo, Lima, Perú*

[j] *Universidad Científica del Sur, Lima, Perú*

[k] *Universidad Autónoma de Ica, Ica, Perú*

[m] *Universidad Privada san Juan Bautista, Lima, Perú*

Abstract

ICTs have allowed the applications of artificial intelligence to grow exponentially, where different applications are being presented, based on the application of neural networks as prediction mechanisms for different processes and applications, in the present work the use of the Neural networks for the legal case prediction process, in which the analysis of approximately 200 cases was used between cases that had "positive and negative" final results, the expected results after implementing the solution in the MATLAB tool, they presented us effectiveness results in a value of 93%, as a conclusion we can indicate that the model provided allows us to be applied in other conditions as well as to be scaled, taking into account the historical data that may be available for the training process.

Keywords 1

Artificial Intelligence, methodology, cases, legal, protocol.

1. Introduction

Information and communication technologies are allowing the development of new ways of analyzing data, a proof of this are the new applications using artificial intelligence, for this it is necessary to have historical information that can serve us to describe models and applications that exploit these data, in this context, when we talk about judicial processes, it is not known initially if the process has options to have good results, in this work we will develop a model to describe a method that leads us to estimate whether a new legal case has a chance of winning, then we present the state of the art:

In the present work we are going to make a general calculation about the relationship between Artificial Intelligence and Law, seen as a conversation at the same level where we see contributions, criticisms and challenges, which we are going to verify with the analysis of examples, The first step that was made was the analysis on the topics Artificial Intelligence and Law as individual topics where contributions and challenges will be analyzed comparing with the modern theories that are

found for theoretical-political and legal bases on the development of Artificial Intelligence systems applied to Law, then reflection of the theoretical and practical contributions was given from where we will define conclusions on the topics, in the last years the technological advance has inference in the juridical impacts. In China the first trial was implemented through the use of an application developed so that when you click after filling in the fields it automatically emits its sentence where more than 100 crimes are included, the creator of the program has designed to make standardized decisions on the length of sentences, an alternative on impartiality since it is believed that people may have been convicted by their personal or social characteristics. With time and technological advancement, technology has entered the different areas, one can think of the future of lawyers only as counseling, formalized and proceduralized and will be systematized, when we mention the term that technology can replace human beings this creates uncertainty and concern in people. Computer applications in the legal field are growing in an excessive way, but in the area of law it is still an uncertain field in which we can implement models of legal activity with the consequent benefit which seeks to enhance the quality of legal activity, its main interest is to emphasize ways to improve the systems of legal operations and vice versa [1].

In this work we want to evaluate the possibility of implementing some type of Artificial Intelligence as an auxiliary tool for lawyers, what we seek is to make a brief and clear analysis of the activities of lawyers, verify the types of applications that can provide solutions to legal problems with concrete applications with the use of IT and Artificial Intelligence which we will illustrate all the above with the example ARPO-2, which is a prototype in the field of legal documentation retrieval. The methodology for the application of AI is not very different from the others applied, therefore any methodology can be applied, but what we must take into account for this work consists of 8 steps [2].

In the 1950's, the use of artificial intelligence in law began with the first system for queries on legal information, which simulated aspects of human intelligence such as memory and symbol recognition, where intelligent legal systems appeared, which helped the lawyer with the preparation of working documents. Expert systems are computer programs with the assistance of human experts capable of solving problems. Expert systems use reasoning with production rules, systems that satisfy the conditions however there are legal constraints based on rules. When there was a change of law a reprogramming of the whole system was performed limiting the inability to simulate analogical reasoning. On the legal profession will use three kinds of premises or normative standards, in conjunction with each other so that Thursdays will justify their decisions in particular cases, using legal doctrines. Another fundamental characteristic that must be considered for the conceptualization of the components that allow the individualization of a case, based on objective and subjective situations, is the skepticism to the facts. The justifications provided by the legal expert system based on jurisprudence will be driven by the final and subjective components of all antecedent cases [3].

In the current times there are situations or inconveniences that apparently can not be solved, but with the phenomenon of globalization brings thousands of operations that are performed en masse, however, everything can be eliminated these obstacles with the implementation of artificial intelligence and blockchain technology for analysis, drafting and others reducing their cost and risk associated with legal-commercial transactions, for which we must analyze the bases and possibilities of implementation of artificial intelligence and blockchain technologies, once evaluated the possibility of acceptance of the system, logic and legal practice for which we will use methods of analysis and interpretation of documents for the application of this method the first step is to know the concept of artificial intelligence and logical-legal reasoning to demonstrate its existence for a long time [4].

In this research we will call legal expert systems (SEJ), with the intervention of artificial intelligence (AAAI), thanks to the intervention of the interdisciplinary nature of the sciences it has been possible to achieve that matters outside the legal world can be affected directly contributing to its development, which is not only part of the daily life of the common inhabitant, but on the contrary, the lawyers of the territory, who in some situation have been validated in a computer or similar artifacts, to make their task much easier, either by consulting information, storing it, sharing it, etcetera. In this way, on-line databases of laws, jurisprudence, ideology, the purchase of books

electronically, the use of social networks for research or work contacts, and video tutorial clips can easily explain legal topics through portals such as YouTube among others that are various tools that offer technology in all areas [5].

In this paper we aim to address what are the limits and possibilities that we can implement in the future jurisdictional function which are exercised by computer equipment which we call expert systems in the area of law which is a sensitive area on Artificial Intelligence and an expert system so that the limits and possibilities field of legal reasoning in the future could be replaced judges and other legal operators by computer systems. The first thing is that we are going to consider the meaning of artificial intelligence, we can understand by this term the process by means of computer equipment which is performed by human beings so that some kind of reasoning is required. Then we will look for the meaning of expert systems that means to realize a program which contains data of expert levels so that they can facilitate the information where we can define that the artificial system is a set of logical procedures of artificial intelligence to be able to adapt to certain analyses [6].

Undoubtedly, technology has become a transcendental part of contemporary life, advancing to the point of being able to be autonomous because the leading companies in the electronic and digital market have in their organizations centers, and engineering and development laboratories seeking to innovate every day to improve and expand their portfolio of products or services, they have drawn increasingly shorter spaces to show and launch products that satisfy the capitalist consumer society. for this reason, the analysis of existing laws to respond to robotics with artificial intelligence in civil law will be performed. For this process we must analyze the laws that protect each field. When we see this problematic we find the necessity to realize the update of incorporating the computer science towards the legal subject [7].

When we talk about AI it will lead to changes in society where we can expect to see performance in all types of tasks which are interconnected. There will be great alternatives on the application of AI and on the implementation in the area of law which will have to deal with the disruptive technology that will revolutionize healthcare. The big question will be how to design and above all how these technologies will work within the medical branch to create confidence in the use of the device especially in the legal area which is urgently required, the other problem is the big question that an AI robot could replace the human, hence the implementation is rushed. In conclusion, on the analysis of the implementation on the elaboration of a social contract as this was directly related to the type of life that was short, idea that is in decline as currently the new contracts that give priority to the collective interest and self-interest, from there we start from the recovery of confidence on the part of customers [8].

In the present work, a method based on artificial intelligence techniques based on neural networks is developed, for the process of predicting judicial cases, according to the documents that are available to present in the legal process.

2. Materials and Methods

The materials and methods that we present are related to the description of the problem until the description of the model implemented in the MATLAB tool, it is represented in figure 1:
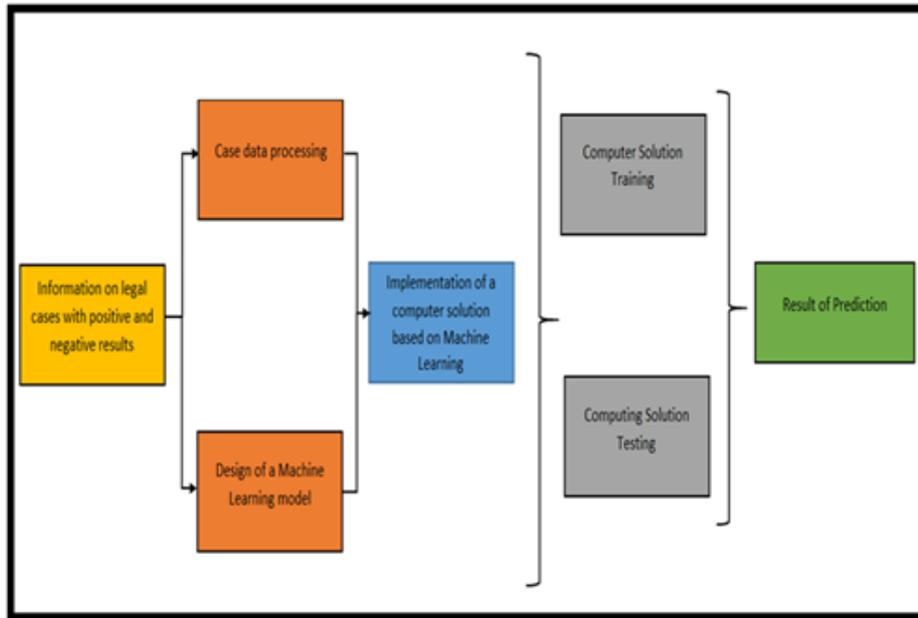
Figure 1: Block diagram of the proposed methodology.

Information on legal cases with positive and negative results: The information collection process is carried out by collecting and registering the judicial cases of previous processes.

Case data processing: Having the historical cases, the following process consists of separating into two groups, a group with positive cases considered as won cases and negative cases.

Design of a Machine Learning model: Having the data of the positive and negative cases, the computational model is designed, based on the input data and creating the main characteristics, which will be the evaluation criteria.

Implementation of a Computer Solution based on Machine Learning: The implementation for the final verification is carried out using the MATLAB computational tool, through the training and simulation of the implemented neural network.

Figure 2: Characteristic vector of the computational model.

In figure 2, the vector of characteristics is presented, which will serve as input for the neural network

1. **Laws:** legal considerations of work.
2. **Dismissal:** documents about retirement from work.
3. **Sanctions documents:** documents on possible sanctions received.
4. **Fee receipts issued to the company:** record of all payment receipts received.
5. **Work attendance record:** records of income to the company to work.
6. **Responsibility position documents:** Documents proving responsibility at work.
7. **Documents issued in work activity:** list of documents issued in the work activity, signed by the applicant.
8. **Retirement documents:** documents that prove the termination of the employment relationship, such as dismissal or retirement.
9. **Work accident documents:** list of documents that prove any accident or work incident.

Figure 3: Feature vector detail

Computer Solution Training: Having the 300 records, the cases that will be used in the training stage were divided, so 200 cases were taken, made up of 100 positive cases and 100 negative cases, which will be used for the training of the computational model.

Computer Solution Testing: Similarly, for the stage of the computational model tests, we proceed to have 200 cases of which 100 cases with positive results and 100 cases with negative results, with this both in training and tests are carried out with balanced data.

3. Results

The results that are presented are related to the explanation of the developed application, where it is presented in figure 4, in which we have two groups of processes, the first where it is dedicated to the entry of the values of the vector of characteristics, the values entered are related to a quantitative value of each characteristic, in order to be evaluated and to obtain a predictive value. A second group of processes is dedicated to the processes related to the computational model, where we have the process of loading the historical data that will be used in the network training process, as well as the network creation process and finally the process of predicting the expected result, the estimated values that are expected are between the values of 0 to 1, indicating their corresponding estimated percentage, for example if we obtain a value of 0.75 it indicates 75% of being positive.
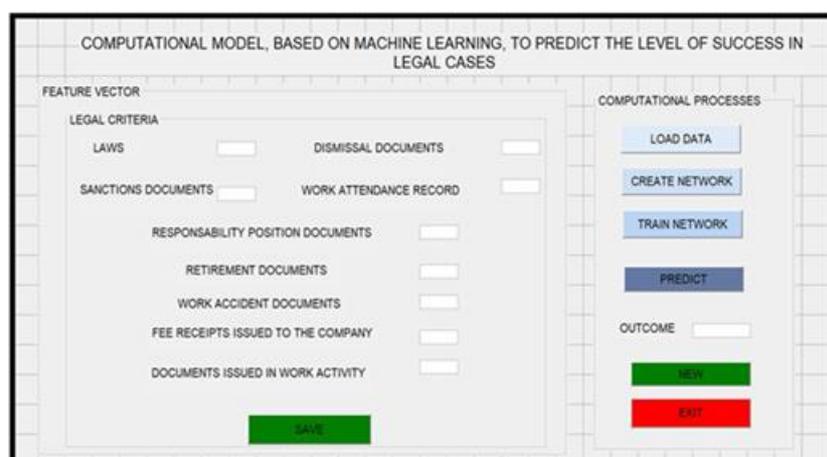
Figure 4: Computer application for the computational model

Figure 4 shows the application made with the MATLAB tool, where it can be seen that the objects in the image are grouped into two groups, the first group is characterized by indicating the

characteristics of the model, where its corresponding value is entered, in a second group are the processes necessary to run the model.

Figure 5: Entering the values of the characteristics

Figure 5 shows the components of the vector of characteristics. In practice, in order to execute the application, an approximate value must be calculated for each characteristic, with a value between 0 and 100, where 0 indicates that there is no relevant information with respect to the characteristic and 100 indicates that there is relevant information; intermediate values indicate the proportion of information. In the fields to be completed, only numerical values should be filled in.

Figure 6: Processes to run in model

In the training button, the code related to the training of the network is executed, for which it is necessary to have the historical training data loaded and to have the network created, the process consists of training the network created with the training data, when we finish these procedures, the last process is to execute the model with the trained network and with the data loaded in the characteristics screen, to obtain this result it is necessary to execute the predict button with which it indicates us a value as a result of the prediction process, this value is in the range from 0 to 1, where 0 indicates that there are no options to have positive results in a judicial process and 1 indicates that there are all the options to obtain good results, intermediate values indicate the probability of winning as it can be 0.75, 0.85, as well as intermediate values indicate the probability of winning as it can be 0. 75, 0.85, as well as values that indicate the probability of not having good results such as 0.25, 0.35.

4. Conclusion

The conclusions that we can indicate are related to the experience of being able to work in a process specifically related to qualitative issues and work them towards a quantitative approach, analyzing the characteristics that appear in legal cases, managing to take them to a quantitative value of direct correspondence with which to be able to estimate a value resulting from an analysis and classification by implementing a neural network.

The result of working with the neural network presented us with a level of effectiveness of 93%, with which we can work and with the option of improvement when carrying out training processes, increasing the number of historical cases, which would improve the process. training and increase the level of effectiveness, the presented model can be scaled for other legal purposes.

5. References

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