Smart System Model for the Recruitment of Teachers

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Abstract

Times change, for many reasons, due to technological development, new ways of doing things and in some cases forced by a global condition, is the case of the present case, where we analyze the teacher selection processes, although many of the Academic activities are developed at a distance, the selection processes also accompany this model, in this process factors that must be presented according to the profile required by the institution are analyzed, in this work a technique is proposed to be able to classify the best candidates in a Teacher selection process, the methodology consists of analyzing three groups of characteristics that the candidates must present, such as the writing exercises, the group interview and finally a demonstration class, in each of them particular criteria are evaluated, a demonstrative example It is presented as a demonstration, where it can be conditioned according to the criteria of each ins As a result, we have a computational model based on neural networks, where the best candidates can be pre-selected or classified in a teacher selection process, the prototype can be scaled and used in different sectors.

Keywords

Artificial intelligence, method, neural networks, selection, teachers

1. Introduction

Among the works related to artificial intelligence since 1936 with Alan Turing, the possibility of working with neural networks artificially begins when relationships are found between the brain and the concept of computing. At present, there are numerous works and advances that are had in the field of artificial neural networks and companies are working on applications of these models for hardware and software [1].

The world of neural networks, being able to simulate the human brain on a computer, seems to be one of the most promising milestones in computing. It is true that this milestone has not yet been achieved, but using machine learning algorithms, it is already possible to train machines to learn in a

similar way to how our brain will. The objective is to put these algorithms into practice using the Keras library. What a neural network is will be explained and the most important parts of its architecture will be defined. Once the basic concepts are understood, the three types of neural networks that are currently most widely used will be described due to their good results: multilayer perceptron, convolutional networks, and LSTM networks, and Keras, a deep learning Python library, will be described [2] [3].

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This study addresses the pre-processing and analysis of the information obtained from a database of a bank in Japan, in which expert professionals have made decisions for approval or rejection of credit lines for 690 users; For the analysis of the information, data mining tools were used until obtaining production rules based on the J48 classification algorithm; From the rules obtained, an artificial intelligence technique is used, expert systems, to model the behavior in the approval or rejection of lines of credit, obtaining a 91 percent reliable tool to emulate the resolution of human experts in making decisions [5].

The constant technological change and the increase in poor eating habits of the population result in low nutritional quality. The present one aims to demonstrate how expert systems contribute to the nutritional health of the Peruvian population, by evaluating the nutritional status and recommending nutritional diets. For this, anthropometric studies and the current state of the patient will be considered. Likewise, the CommonKADS methodology was used to capture through programming logics the knowledge of the nutrition expert, and the Scrum methodology for the development of the expert system [6] [7].

A line of research and development is presented, which allows studying subjects related to Artificial Intelligence (AI), Binary Trees and legal informatics, oriented to the development of an Expert System (SE) model for the resolution of legal opinions, in order to provide legal professionals with a tool that allows them to shorten file processing times, minimizing possible errors in data loading [8].

An application capable of evaluating credit applications in banking institutions is developed, which has been called the expert credit system or SEC. It begins by dealing with the methodology currently followed by banking institutions to evaluate a client. An understandable description of the expert credit system is made. Following is a description of software engineering that is generally followed to develop this type of system. Finally, more representative cases of situations that can occur in a banking institution are considered when the client is evaluated [9] [10].

2. Materials and Methods

The materials and methods are organized by means of an analysis of problems in the field of personnel selection, followed by an organization of the data to be used in a computational model based on neural networks to finally propose a demonstrative application, in figure 1 it is shown presents the organization of materials and methods:
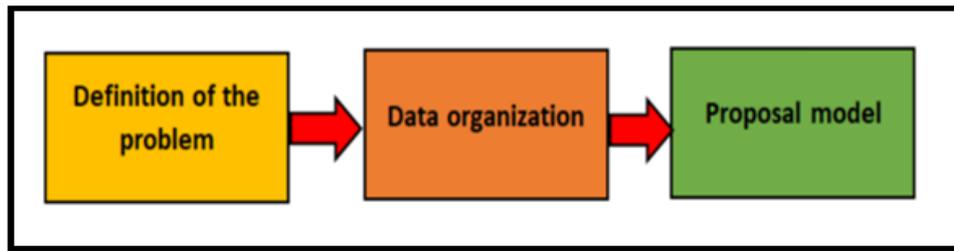
Figure 1: Block Diagram of the Proposal

2.1.   Definition of the problem

The problem that governs the selection of teachers is varied and depends on the institution, the profiles for each position and even more so the capacities that candidates need to have for teaching positions, in normal situations, these selection processes are They are carried out in person, where teachers first carry out a review of personal and academic data, followed by processes such as exams, model classes, and ending with interviews, these processes are very particular depending on each institution, there are many selection criteria.

For schools, certain capacities are necessary in the candidates, for the dictation of courses in secondary education students, other capacities are necessary as well as for the dictation in higher education students, that is why the same procedures or tests are not always repeated in the evaluation. Another important factor in the selection processes is the model class, where the capacities for class dictation are evaluated, evaluating many aspects from the presentation to the understanding of the students, managing to select the most suitable for the last stage that It is the interview, where direct contact is made with the professors asking the necessary questions to get to know the candidate better.

In times of pandemic, such as the one we are living in these times, these procedures are mostly carried out virtually, therefore many problems arise in evaluating, leaving many aspects without evaluating, for this reason the present proposal arises in providing a method to be able to to evaluate the aspects evaluated in the different stages of the online evaluations, thus it can be compared with models of candidates accepted in face-to-face processes, in such a way a classification of the candidate is made by making a comparison with model candidates.

2.2.   Data Organization

The organization of the data is made up of three large groups, each with its own criteria for each group, these criteria are evaluated individually by each candidate, so the value that can be had for each criterion can be a percentage value between 0 % and 100%, the prototype shows how to enter each of the criteria.

We must bear in mind that the criteria taken into account in the proposal correspond to an institution taken as a reference, these criteria may change according to the application and the institution's policies, with which our proposal serves as an example.

Below we present the three groups and the criteria:

Writing Exercise

- Introduction
- Developing
- Organization
- Cohesion
- Grammar

- Analysis
- Content
- Conclusion

Group Interview

- Credentials
- Interest level
- Interpersonal approach
- Communication effectiveness
- Assessment systems
- Methodology

Demonstrative Class

- Class organization
- Class preparation
- Clarity
- Critical thinking stimulation
- Presentation style
- Domain of the subject
- Use of materials
- Availability to answer questions
- Use of time

2.3. Proposal Model

The proposed computational model is made up of a multilayer neural network, with three layers, the first input layer made up of each of the criteria, for the 3 groups we have 23 criteria, so there are 23 inputs, the value of the inputs, corresponds to a numerical value, these are entered into the neural network. In the intermediate layer we have 4 layers of the neural network configuration, and finally we have an output layer that would be the value of the classification, where values between "o" and "1" are expected, where the value " 0 "corresponds to the fact that a candidate is not suitable for the institution and the value" 1 "corresponds to a teacher who complies with the recruitment policies, we can also obtain decimal values, where their interpretation is related to the probability of being suitable, For example, a value of 0.75 indicates a 75% probability of being eligible. In the results chapter we present the possible results.
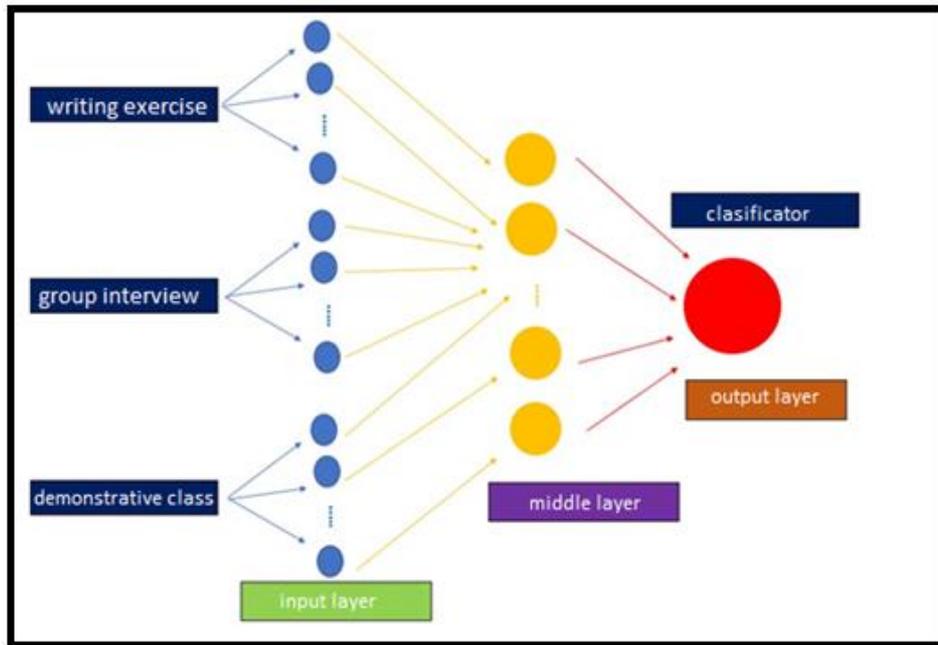
Figure 2: Computational Model Architecture

3. Results

The results are related to the presentation of an application where the applicability and the necessary steps to be able to apply the proposed method are demonstrated, the demonstration was carried out using the Matlab computational tool. Through the use of the Artificial Intelligence library for the use of the neural network and the graphical user interface, as can be seen in Figure 3.

Figure 3: Implemented Application

In Figure 3, the fields to be completed are presented corresponding to each of the 23 criteria applied in the 3 groups of characteristics, the values to be entered correspond to values between 0% and 100%, a record button is observed , this button saves each group of criteria, it is necessary to save them so that the application generates the vector of characteristics that will be entered as input in the

neural network, the criteria are loaded and completed for each group, it must be saved if at the end of the process we have a vector of characteristics with 23 data that corresponds to the 23 criteria.

We also have the processes for the configuration of the neural network, where we can load the training data, this data is very important, because it is the data with which the network will train, these data correspond to the teachers who in previous processes managed to have results suitable and have been accepted by the institution, these data correspond to the same criteria, with which we have the 23 criteria.

For the processes of manipulating the neural network, we have the buttons to create res, train network with which our network is ready to be used, with the classify button, we can make the selection and the network presents us with the results that correspond to the probability of being accepted and if they are close to the ideal teacher model of the institution, we must indicate that the ideal teacher is the one who obtains the value of 100%, the possible values to obtain are the following:

- "0": corresponds to a teacher who totally does not meet the ideal teacher model
- "1": Corresponds to the result of an ideal teacher "0.25": indicates that the candidate has 25% of being the ideal candidate
- "0.50": indicates that the candidate has a 50% chance of being chosen as the ideal candidate
- "0.75": indicates that the candidate has 75% of being the ideal candidate, in this case if the directors of the educational institution, they can choose to hire the candidate
- "0.95": indicates that the candidate presents 95% of being the ideal candidate, which has a good chance of being hired by the institution.

4. Conclusion

Finally we can conclude that in the teacher selection processes there are many criteria, we can have cases where a candidate can be rejected in one institution, but can be accepted in another, these results show the variability of the criteria, with which they are evaluated, it is very It is important to indicate that the proposal presented is a model of how a selection process can be carried out with varied and changing criteria over time, the organization of the data will depend on each institution.

We must bear in mind that in order to implement a new data model, the data of the new candidates must be organized, with the candidates taken as a model, so the neural network will be input with the data of the candidates taken as a model. If we increase the number of criteria in the evaluation, the criteria for the model candidates must also be increased.

The way the neural network is used is standard for the different data organizations, the processes of creating a network, training a network and classifying, are the same and must be executed in that order so for the same group of candidates, it should only be After cleaning the input and output data, this process is done with the new button, so it is not necessary to retrain the network, it is trained only once for the same group of candidates.

We also indicate that the presented model could be applied in different institutions, groups of teacher profiles, managing to be scaled according to the institutions' own policies, for the demonstration the Matlab tool was used, due to the practicality in the design of prototypes , and can be implemented with various tools and programming languages.

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