AI Use - Case Problem with Solution

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CSC510: Foundations of Artificial Intelligence

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July 9, 2023

Use-Case and AI Solution

The use-case for this particular assignment was the following: the goal of the algorithm was to take a dataset that contained a list of candidates with their respective demographic data and leadership traits and predict the most suitable group of candidates that could be trained as a leader for the Department of Defense (DoD). The DoD can expand its leader development system by implementing an artificial intelligence model able to classify a group of contenders early in their professions by analyzing cognitive abilities, skills, performance, and the capacity to cope with the challenges that entail the decision-making process at the strategic level. Leadership features are the abilities that experts use to manage a project, team, or organization. An expert can use qualities like communication and entrustment to manage a team or employees to work synchronized and in unison toward accomplishing a mission.

The focus of the task was to design and develop an artificial intelligence algorithm that could be trained with such data to generate a prediction. Then later, such prediction shall generate a list of candidates with the most suited leadership traits that the DoD could use to identify the candidates that could be trained as leaders. Such an endeavor was quite challenging and loaded with trials and errors; however, despite the difficulties using trial and error when developing and implementing different techniques served as a framework to identify the techniques that worked the best for the final iteration of the algorithm. Several different methods were employed throughout the development life cycle of the algorithm in order to achieve the intended goal of operations, such as input data, processing the data, and rendering a satisfactory output based on the intended purpose of prediction. One of the most fundamental techniques that allowed the completion of this assignment was the employment of the agile methodology that implemented the different techniques in previews iterations of the code.

The tools, libraries, and APIs

Based on the intended operational nature of the algorithm and the particular use-case that the same is meant to solve, an overall of thirteen different Python libraries were employed in the development of this algorithm, including the development of a library that serves as the back-end engine of the main operation of the algorithm. Some imported tools and libraries are csv, os, random, pandas, TensorFlow, matplotlib with pyplot, time, and pyknows. The back-end library named "NN_Engine" was also created and imported. In addition, Keras was the most widely used API and was implemented in the algorithm, a high-level API to develop and train deep learning models.

Search Methods

Although the original design of the algorithm included the implementation of a search method such as the A* search method during the trials of the early stages of the algorithm was decided that the implementation of such a method would not be necessary due to the type of task that the algorithm was designed and intended to accomplish. Such implementation introduced more errors than solutions; it also made the code more convoluted and unnecessarily complex, and the primary goal of this development was orbiting around the concept of simplicity and ease of use. A simple code is easier to implement, test, and debug than a compound one, saving time and effort and reducing the likelihood of errors. A simpler code is more robust than a convoluted one, making it less sensitive and more reliable. Another reason is that the computational impact is less, making it faster with fewer computational resources. However, despite that, the goal was overall simplicity; the algorithm still has some level of complexity but in a controlled manner. Therefore, the main reason for not employing the search method was to maintain simplicity and diminish the error probability while implementing other methods for the data pipeline.

The Deep Learning Model

The deep learning model implemented in the project consisted of utilizing the TensorFlow open-source library with the Keras API. The developed neural network consists of 1 entry layer, three concealed layers, and one output layer, with 64 neurons for the entry layer, the conceal layers, and one for the output layer. During the testing phase, the deep learning neural network was found to work better for this particular task than the Naïve Bayes. A neural network (NN) can correlate amongst input variables and is more suited to manage interdependencies between arguments. In contrast, A Naive Bayes classifier assumes that such features are independent of one another, which can impact the accuracy of the classifier prediction. Therefore, the fewer errors, the better the operation!

Expert System

An expert system has been implemented in the algorithm. The expert system allows for a straightforward and easy-to-use interaction making it very intuitive. Furthermore, incorporating the expert system allows the algorithm to represent knowledge in a streamlined manner in which each option is in numerical order ranging from one to eight. Additionally, the information and instructions of what the system does and how it works are represented when selecting option number one; this system is divided into two subsystems: the inference and the knowledge engine, which allows the algorithm to represent information and instructions on operating. Adding a knowledge base system provides a versatile, fun, straightforward, and smooth experience.

Symbolic Planning: During the test and trial phase of the development process also found that symbolic planning was not necessary for this implementation. Symbolic planning is a powerful tool for solving complex problems that involve reasoning; however, it was not implemented within the algorithm due to the implementation of other means.

Conclusion

The AI algorithm's development life cycle has been full of challenges, trial, and error, but the learning experiences this project has provided is priceless. In addition, despite all these challenges, the project turned out the way described in the preview updates documents, which it was described as may or may not the final iteration shall work as intended, but with perseverance and patience, it turns out that the final release worked at design. However, by no means is this algorithm perfect; there are many corrections and addition that could make the algorithm better. Finally, the overall experience gained in this course shall serve to put it to the test in the final master-capstone course.

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