Using Machine Learning Classifiers and A Virtual Voice Assistant for Common Tasks, An Employee Performance Evaluation Model is Used

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ABSTRACT

This study focuses on a conversational voice assistant for businesses that facilitates staff productivity and efficiency gains by speeding up routine, time-consuming operations. By using straightforward voice commands, they can manage conference rooms, arrange meetings, and adjust work hours thanks to speech recognition and TTS technologies. The necessity of employee performance analysis is also taken into account in this study, and this is done with the aid of machine learning classification models, specifically L1 and L2 Regularization, Random Forest, and Gradient Boost. The experimental results reveal that the Random Forest Classification Algorithm yields the highest accuracy, F1 Score, Train and Test AUC-ROC, with values of 97.08 percent, 98.27 percent, 99.82 percent, and 98.41 percent, respectively.

1.INTRODUCTION

Due to the effective and dynamic experience they provide for any organization, smart systems are in high demand. By making ordinary processes interactive, artificial intelligence has made it possible for people and organizations to leverage technologies like speech recognition, machine learning, and natural language processing to improve the user experience [1]. The way people engage with technology could change thanks to voice-enabled bots like Alexa, Google Assistant, and Cortana. Because of this, organizations are implementing procedures that will boost productivity and examine an employee's capacity for sustained productivity. In the workplace, routine chores stifle innovation and productivity. Every person in a company, even the manager, is required to complete tiny but repetitive, time-consuming chores including scheduling meetings with coworkers, requesting leaves, organizing conferences, and logging daily/weekly time sheets that can take up extra time and disrupt workflow. The organization must go through a time-consuming and lengthy process to manually analyze employee performance. While these tasks cannot be automated, they can be streamlined and centralized, which will cut down on the amount of time they take to complete. We specifically aim to do this with our implementation. This study uses machine learning approaches that can analyze employee performance and provide helpful suggestions. A technology based on artificial intelligence is a virtual assistant. Through the device's microphone, the program is able to hear verbal commands, with the speaker providing speech output. The most exciting part, though, is what takes on in between these two activities. In order to minimize time waste and analyze employee performance, this article aims to streamline and carry out these particular duties utilizing voice commands. [14] 15] [16] [17] [18] .

2.METHODOLOGY

A voice-activated assistant that is integrated into a graphical user interface will be used for user interaction. By using credentials-based authorisation, it is possible to distinguish between a Manager and an Employee and grant each with a distinct level of access. MySQL is used to establish a database for the organization that has various functionality outlined for the employees and the manager in order to implement the functionalities and retain a record of the actions taken. Our strategy is distinctive since all of the features are speech-recognition enabled and because the staff may interact with the voice assistant to make it interactive and improve the user's experience. The entire study conducted to do this may be divided into three major categories: the database and schemas, speech recognition for the voice-controlled functions, and the machine learning model for employee performance.

2.1MySQL Database

The most popular database management system for relational databases in use today is MySQL. We use a manager-monitored personnel database to keep the scope of our virtual assistant implementation to a small company, but not exclusively. The database has a variety of tables to enable the specified functionalities. Figures 2 and 3 display the database's schema for the organization. While the latter supports accessing data of each employee together with their job roles and parameters required to pass to the categorization model, the former supports storing and retrieving data for arranging leaves, scheduling meetings, changing work hours, and booking conference rooms.

2.2 Speech Recognition

Using speech as input is the first stage in creating a voice assistant. Python has been the primary programming language used throughout our implementation. With the aid of a microphone, speech recognition entails turning physical sound into electrical impulses, which are then converted into digital data. We've utilized PyAudio, which facilitates microphone audio recording, the Spoken Recognition library, and the Google Speech API to process the speech input and convert it to text. The main component of processing this voice data is automatic speech recognition. The ASR first recognizes the audio input received through the microphone, turns it into a file, eliminates background noise, normalizes volume, divides sentences into words, and then uses statistical probabilities to identify the words before translating them into text [2]. Text-to-speech conversion comes next when speech-to-text conversion is finished. Based on the list of functionalities, the user issues a command, and the voice assistant executes the necessary operation and confirms its completion to the user or returns the necessary data. We used the pyttsx3 library for Windows, which is supported by the Sapi5 driver, to translate the acknowledgement or the data retrieved by the voice assistant into speech. The NSSpeechSynthesizer is utilized for Mac OS, and espeak is utilized for all other platforms. We can select a male or female voice for our assistance using Pyttsx3. Figure 4 depicts the login screen the user must utilize to access any functionality.

2.2.1 A Meeting Planner:

With voice commands that can recognize the date, time of the meeting, and its conclusion, the manager may plan meetings. Additionally, the ID of the worker with whom the manager wants to schedule a meeting is entered. Our voice assistant checks if the other employee is available and does not have any other meetings scheduled before responding with a confirmation or asking the boss to reschedule in order to avoid timetable conflicts. The other employee receives an email with meeting information. Emails were sent using the SMTP (Simple Mail Transfer Protocol). It entails establishing a connection, moving the mail data, and then cutting the connection off [3]. Secure Sockets Layer (SSL) is a different protocol that is used to encrypt our connection to ensure that no data is leaked or vulnerable to hacking and to establish a secure connection and protect the user's credentials.

2.3 Model for Classifying Employee Performance Analysis

We used an HR dataset [4] for this investigation, which contains employee records for a variety of criteria given in Table 1. The technique underlying the method used to create the models is shown in Figure 4. Cleaning, adding missing values, and getting rid of duplicates are all part of the pre-processing stage of data. This phase is important because if it is skipped, the algorithm may perform poorly or even fail. Heatmaps are used to show the data so that all variables may be understood in connection to one another. The Environment Satisfaction, Salary Hike Percent, Work-Life Balance, Years in Current Role, Years since Last Promotion, and Years with the Current Manager were revealed to be the Top Factors after Analyzing the Correlation between the Target Variable (Performance Rating) and the Other Parameters. The first three show a positive association, showing that performance improves as values increase. The three remaining variables have strong negative correlations, indicating that they are inversely related to the target variables. In order to better comprehend, we made the assumption that the later three characteristics correspond to an individual's growth being stagnant due to subpar performance. A promotion is a crucial element in a company's growth. An employee has not received a promotion if they have held the same position for a considerable amount of time. proving the theory in the process. The dataset was then divided into a training set (80%) and a testing set (20%), hyperparameter tuning was carried out, and pipelines for the four classification models were developed. Hyperparameter optimization, also referred to as tuning, is the process of selecting a subset of the best hyperparameters for a learning algorithm. A parameter's value used to affect the learning process is known as a hyperparameter [5]. The performance of each classification model was assessed using a variety of performance indicators, including Accuracy, Precision, Recall, and F1-Score. To forecast and analyze employee performance, the model with the best algorithm is ultimately chosen.

3. RESULTS

. The office assistant's performance yields satisfactory results, and speech recognition is precise, prompt, and responsive quickly. The login page, voice assistant features, and performance analysis classification model are all integrated into the user interface to provide a seamless user experience and easy accessibility. Because all functions are properly completed and the database is constantly synced, our voice assistant is effective and available. Table 2 summarizes the findings from the four categorization algorithms. The Random Forest Classifier has good Accuracy, Precision, Recall, F1 Score, and a high percentage for both the test and training set ROC curve, according to Table 2. Because the dataset was unbalanced, focusing just on accuracy can lead to inaccurate results. We constructed Receiver Operating Characteristic (ROC) curves to determine the Area Under Curve in order to obtain an accurate assessment of the models' performance on both training and test sets (AUC).

4.CONCLUSION

In our research and application, we used a novel strategy to increase the interaction of repetitive daily tasks in workplaces. Conversational bots are revolutionizing business processes, and this served as our motivation. A hassle-free experience is provided by the speech recognition modules and text-to-speech conversions. With an accuracy of 97.08 and an F1 score of 98.27, the Employee Performance model produced the best results from Random Forest Classifier. The Nave Bayes Classifier, which has a 95.48 accuracy rate, is one of the models that have been used in previous work to solve the employee performance categorization [11]. With a variation in the features and dataset properties, our study employing Random Forest generates an accuracy greater than the previously known by 1.6 percent. It could be implemented in areas where decisions are made to advance and grow the organization. In conclusion, this study shows how important human resources are to an organization's development and how voice assistants may be

used to improve employee satisfaction and create more dynamic workspaces. By monitoring performances using machine learning models, emphasizing improvements and recognizing successes, the human resource department may determine whether the employee will conform to the business needs. By exploiting the scientific quality of AI tools, virtual assistants have the potential to become trusted partners in corporate processes[13] [14] 15] [16] [17] [18] .

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