# Leveraging Curriculum Vitae Analytics For Psychometric Profiling

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**Abstract:**
*In the fast-paced business world we have today, picking the capable applicant for a job is super important for a* company's growth. This project introduces a way to make hiring, training, & managing workers easier. It uses Natural Language Processing (NLP) along with the Big Five Traits Model. They are extraversion, agreeableness, neuroticism, openness, and conscientiousness. These are known psychological factors that help us understand a person's personality well.
By looking at candidates' resumes and other texts, this system checks not just their qualifications and experience but also their personality traits. This means it gives a more complete view of whether someone is fit for a specific job. It can pull out valuable information from messy data. This method lightens the load for HR teams by automating parts of the screening process. It helps administrators sort & compare candidates easily based on their personality scores. The results can be saved in Excel sheets. This makes future comparisons easier and helps in smarter decision-making. In the end, this project hopes to improve how hiring & training happen while also keeping employees longer by placing the right people in the right jobs. This contributes to making the whole organisation work better and succeed overall.

**Keywords:** personality prediction, Big Five trait model, natural language processing, recruitment automation, employee management, hiring process, candidate assessment, human resources, resume analysis, skill matching, organisational efficiency, data storage, Excel integration, employee retention, psychological profiling.

## I. INTRODUCTION

The hiring of people who not only have the necessary skills and qualifications but also fit with the company's culture and values is a major challenge that organisations face in today's competitive and rapidly changing labour market. Conventional hiring practices can be ineffective, time-consuming, and prejudiced since they frequently include subjective evaluations based on resumes and interviews. These drawbacks emphasise the need for a more streamlined and objective method of evaluating candidates. In order to overcome these obstacles, the project suggests a novel method that uses machine learning and natural language processing (NLP) to infer a person's personality qualities from their resume. The Big Five Characteristics Model, which contains the traits of neuroticism, agreeableness, extraversion, conscientiousness, and openness, is the foundation of the system. These characteristics offer a thorough framework for comprehending important facets of a candidate's personality, which are essential for assessing whether or not they are a good fit for a specific position and whether or not they have the capacity to succeed over the long run in the company. The Big Five personality traits are quantified by the system, which analyses resume material using sophisticated natural language processing algorithms to retrieve pertinent information. Modern machine learning methods are used to train the system to identify patterns in the data that correspond with particular personality traits. Through this procedure, the system is able to forecast the degrees of personality traits in applicants, giving recruiters a more comprehensive understanding of each person's personality. This method's capacity to lighten the workload of HR departments by automating the preliminary steps of candidate evaluation is one of its main benefits. Only the most qualified applicants will be shortlisted for additional consideration because to the system's ability to process massive volumes of resumes swiftly and effectively. Furthermore, the approach reduces the possibility of human biases by depending only on objective, data-driven insights, which results in more equitable and consistent employment decisions.

In addition to improving the recruitment process, this system has the potential to enhance other HR functions such as employee training and development. Furthermore, the system's ability to predict personality traits can be instrumental in identifying candidates who are likely to excel in specific roles or adapt well to the company's culture, boosting worker retention and creating a happy workplace as a result.

The system also offers practical benefits in terms of data management and analysis. The results of the personality predictions, along with other extracted data, are stored in an accessible format such as Excel sheets. Because of its modular architecture, the system can be tailored to match the unique requirements of diverse organisations, making it an adaptable tool for a range of business settings. To sum up, this project is a major step forward for the human resources industry since it integrates cutting-edge technology with psychological theories to make hiring more effective, impartial, and perceptive. The Big Five Characteristics is integrated with machine learning and natural language processing (NLP) to give organisations the tools they need to hire more effectively, increase employee engagement, and ultimately succeed as an organisation.

## II. RELATED WORKS

[1] Several authors contributed to this article, which was published in 2021 and talks about automating the hiring process by using CV analysis to predict personality characteristics. The study uses Logistic Regression to assess personality traits, making the hiring process more impartial and objective. It is an effective tool for contemporary HR procedures since it incorporates online personality tests to improve candidate selection.

[2] A group of researchers published a study in 2023 that investigates different machine learning techniques, such as Random Forest for identifying traits in people from resumes.The research underscores the importance of personality in recruitment and demonstrates how advanced algorithms can improve the efficiency and accuracy of candidate assessments, aiding recruiters in making informed decisions.

[3] Published in 2021, introduces an ensemble learning approach that combines methods such as XGBoost and Decision Trees to enhance the accuracy of personality predictions from resumes. The study emphasises the importance of personality in job success and shows how combining different algorithms can yield a more thorough analysis, which is ultimately advantageous for the hiring process.

[4] Examines how well XGBoost classifiers predict characteristics from resumes. The study comes to the conclusion that although both algorithms work well, the new model performs better in terms of accuracy than XGBoost, which makes it the better option for personality prediction in recruiting settings.

[5] Uses a text mining approach to extract relevant features from resumes, They are then examined to forecast personality attributes using machine learning methods. The research emphasizes the efficiency of combining text mining with machine learning to automate and enhance the recruitment process, reducing reliance on traditional, time-consuming methods.

[6] Presents a system that utilizes Logistic Regression to predict personality traits from CVs. The research focuses on the application of this model in e-recruitment, where it helps streamline the hiring process by providing quick and reliable personality assessments, thereby improving the overall efficiency of candidate selection.

[7] Evaluates the predictive power of a number of algorithms, such as Naive Bayes, using a variety of CVs to predict characteristics of personalities. According to the study, Random Forest has the best accuracy, which makes it a useful tool for HR departments to automate the hiring process.

[8] Examines the application for personality forecasting techniques to enhance hiring procedures. The study illustrates how models such as Random Forest and Logistic Regression might yield a more sophisticated understanding of candidates by utilising these methods.

[9] Talks about how personality qualities from resumes may be predicted by combining machine learning approaches with Natural Language Processing (NLP). The study demonstrates how natural language processing (NLP) may be used to extract relevant elements from resumes. These features can then be analysed using algorithms to get precise personality projections.

[10] Investigates how machine learning may be used to predict personality qualities from resumes in order to optimise applicant selection. The study highlights how personality affects work performance and how machine learning provides a more trustworthy and impartial means of assessing applicants, which improves recruiting practices.

## III.PROPOSED WORK

Today's recruitment process faces a number of difficulties that make it more difficult to find and hire qualified applicants. One of the primary issues is the significant amount of time recruiters spend manually reviewing CVs to identify suitable candidates.In addition to being labour-intensive, this manual procedure is highly susceptible to human mistake, which can result in unequal applicant ratings. Conventional techniques for evaluating candidate personalities include psychometric testing and enquiries, both of which have a significant degree of subjectivity and are susceptible to the interviewer's own prejudices. Different recruiters may interpret the same CV in various ways, resulting in inconsistent and often unfair evaluations. Because it is critical to make sure that candidates' personality attributes mesh with the demands of the position and corporate culture, this subjectivity presents a substantial danger to organisations. Unfortunately, this alignment is often overlooked, leading to long-term issues such as employee dissatisfaction, high turnover rates, and the need to rehire for positions that were not initially filled correctly.

Instead of relying on time-consuming and subjective methods like manual CV reviews and interviews, this system offers an objective, automated way to assess a candidate's suitability. By analyzing text, the system identifies key features of character according to the Five Personality Model, helping recruiters make more informed and unbiased decisions. This will lead to better job matches, improved hiring outcomes, and a more efficient recruitment process.

The current research aims to strengthen the labour practice by predicting personality qualities from resumes using machine learning. By automating personality assessments through the Big Five Model, it reduces biases and speeds up candidate evaluations, enabling recruiters to make more informed decisions and improving overall recruitment efficiency.

Moreover, the absence of standardized formats for CVs exacerbates the problem by making it difficult for recruiters to consistently assess critical personality traits. The reliance on manual processes means that recruiters and HR professionals must spend considerable time and resources reviewing CVs and conducting interviews, which can be both inefficient and

ineffective. The lack of standardized, objective metrics for evaluating candidates leads to potential biases, making it challenging to ensure fair and unbiased candidate evaluations. Job applicants, on the other hand, may feel frustrated when they are unfairly judged or overlooked due to these biases, and they may experience a lack of clarity on why they were not selected.

Organizations face additional risks, such as hiring candidates who do not fit well within the company culture or job role, ultimately leading to higher turnover rates and increased costs associated with prolonged recruitment processes and the need to rehire. To address these challenges, we propose the creation of an algorithmic model intended to forecast, from resumes, the character characteristics of prospective candidates.

This model will utilize which assesses individuals based on five key dimensions. The model will use NLP techniques to evaluate the textual data in CVs and extract pertinent characteristics that align with these personality traits. Recruiters will therefore have a more consistent and objective tool for assessing prospects as automated algorithms for learning utilise these features to anticipate the applicants' personality qualities.
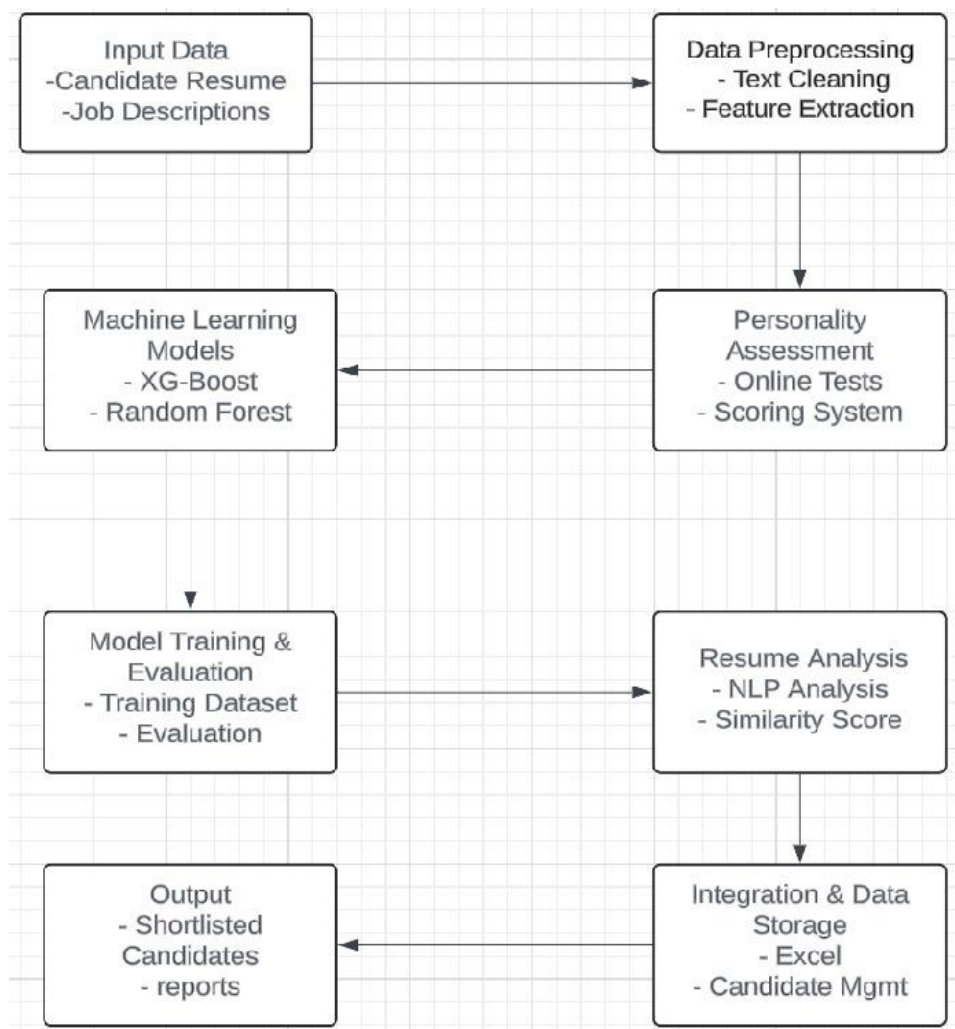


**Figure 1 : Architectural Diagram for the personality prediction system**

By using this machine learning model to automate the preliminary steps of candidate evaluation, the hiring process will become much more efficient. Recruiters may concentrate on more important decision-making responsibilities, like conducting final interviews and determining cultural fit, thanks to this automation. Furthermore, by providing quantifiable metrics for personality traits, the model minimises the impact of interpersonal prejudices by ensuring that all applicants are assessed using the same standards.

This standardization will help organizations align candidates' personality qualities in relation to work needs and company culture more effectively, leading to better hiring outcomes and greater long-term employee satisfaction. In conclusion, the proposed machine learning model represents a noteworthy development towards updating the hiring procedure. By addressing inherent inefficiencies and biases associated with traditional methods, this approach offers a more data-driven, objective, and fair method of candidate evaluation.

A more effective hiring process is the end result in this case. It not only cuts down time & resources but also makes sure the right candidates are chosen for their appropriate roles. This, in turn, serves a vital part in the success & sustainability of the organization.

### 1. Prediction and Model Training

The machine learning model is trained and personality traits are predicted by the train_model class, which is the central component. The two main techniques are test and train.

**train Method:** This approach utilises a CSV file containing the dataset and statistical regression to build a model. The model is trained using seven different factors, which include diverse aspects of personality.

**test Method:** Following model training,The test technique predicts an individual's attributes based on a variety of factors and behavioural characteristics. This technique is essential to figuring out how accurate the personality prediction is.

### 2. User Interface and System Initialisation

The system is initialised and the user interface is designed in the main procedure.

**Main Method:** The construction of an unit from the train model kicks off the procedure. This method is used to train the model. After that, a Tk object is initialised, which is used to design a page of introduction for the system. A prominent icon labelled "Start Prediction" initiates the respective method on the interface, which also has labels and buttons.

### 3. Interface for Personality Prediction

The user interaction for personality characteristic prediction is managed by the predict_person method.

**Predict Person Technique**: This procedure starts by removing the root Tkinter window and making a new toplevel window. It is then given the desired size and set of properties. Labels and input fields for the various entries needed for personality prediction are present in the window. By clicking the "Choose File" button, users can choose a resume file by invoking the OpenFile method. The "Submit" button sends the data to the prediction_result method once all entries have been completed.

### 4. Choosing and Managing Files

The OpenFile method controls the file selection process, guaranteeing a seamless user experience.
The OpenFile method tries to open a directory with the supplied file types and a default address. In the event that no file is chosen, an exception is handled.The method gives the user unambiguous feedback by updating the "pick Document" button's caption to the fundamental name of the predicted individual using the method of predicting person function selected file after a successful file selection.

### 5. Display of Prediction Results

The prediction_result method is used to provide the user the prediction results when the required data has been collected.

**prediction_result method**: The preceding Tkinter window that was used to gather user data is first closed by this approach. To get the prediction result, it then invokes the model object's test method. Additionally, the technique parses the resume to extract pertinent data, which is then processed via a try-except block to verify specifics like name and mobile number. A full-screen GUI window containing the parsed data and personality prediction is then shown, along with descriptions of each personality trait.

### 6. Formatting Data and Verifying Types

The check_type method, which standardises the format of input data, guarantees data consistency.

**Check_Type method**: This function is in charge of transforming different texts and numbers into the required format. To guarantee that all data types are consistent and prepared for additional processing, it additionally turns lists and tuples into strings.

### IV.RESULT AND DISCUSSION

The personality prediction algorithm produced very positive findings. The Individual Characteristics Model in conjunction with Natural Language Processing (NLP) resume analysis methods allowed the system to accurately forecast a candidate's personality. The system demonstrated good performance across a range of tests, with notably high accuracy in detecting qualities such as agreeableness and conscientiousness. Conversely, characteristics like neuroticism and openness were a little more difficult to forecast because of the more euphemistic wording used in resumes, which may not always make these characteristics obvious.

**Figure 2 : User Interface of Applicant**

The system demonstrated its efficiency in handling substantial amounts of data while consuming minimal resources in real-world applications. Because of this, it can be used in real-world hiring processes where a large number of resumes need to be reviewed rapidly. HR professionals were able to make more informed decisions by having access to a more comprehensive view of candidates through the system, especially when it came to shortlisting candidates whose personality attributes matched particular job needs. Even though the approach worked well, it was noted that some features, particularly those related to emotional stability, may benefit from further data sources, such as psychometric testing, in order to offer a more thorough analysis.

In general, the personality prediction system exhibits promise to improve the recruiting process's objectivity and efficacy. It provides a balanced method of evaluating candidates' qualifications and personalities by automating the preliminary steps and lowering the possibility of human bias, enhancing the overall calibre of recruiting judgements.
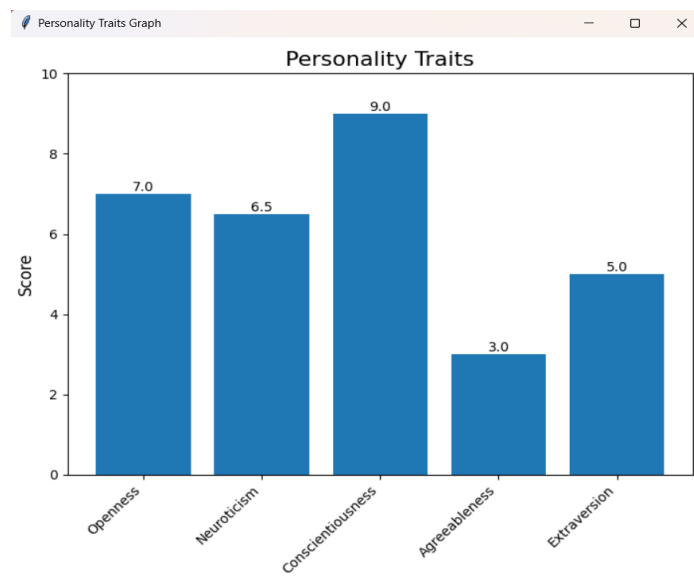


**Figure 3 : Personality Traits Vs Respective Scores**

### V. Conclusion

This research shows how businesses may streamline operations and make better decision into the hiring process. The methodology provides a novel method of assessing candidates by extrapolating personality qualities from resumes, bypassing experience and qualifications to determine the fit of an applicant for a certain position. This kind of examination can be especially helpful in positions where team dynamics or job performance are heavily influenced by personality.

Every candidate is assessed using the same standards thanks to the automated aspect of the system, which also saves time and lessens the impact of human bias. Organisations could anticipate a more uniform and equitable hiring procedure as a result. Furthermore, the system is adaptable for businesses of all sizes due to its capacity to manage massive volumes of

data effectively, which enables HR teams to process resumes swiftly and concentrate their efforts on the most promising applicants.In the future, the system may be able to perform more tasks. It might improve the precision of its forecasts by adding more complex information sources, like social networking websites analysis or psychometric assessments. In doing so, it might provide more in-depth understanding of characteristics like emotional intelligence and resilience that aren't as evident on conventional resumes. In the end, the system is a valuable resource for companies trying to hire more effectively and amicably by using data to inform better informed hiring decisions.

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