Online Recruiting System built on the OCEAN Model

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Abstract - *The primary goal of this paper is to automate candidate pre-screening in online recruiting processes by using a fresh method to predict a person's personality. In this initiative, we suggest a set of processes and techniques to make the recruitment process faster, more effective, and more successful. Our primary aim is to limit the rounds of interviews and background checks on candidates to all that can be identified by the organization based on their personal characteristics and the organization's requirements. The candidate's personality is now more important to the organization. As a result, the system performs a personality prediction test on the candidate to assess his or her personality characteristics. Finally, it sends the candidate results to the HR admin for further processing.*

Key Words: OCEAN Model, e-recruitment system, predicting personality, personality traits.

1. INTRODUCTION

In recent years, the rapid growth of digital knowledge and communication technology, as well as their incorporation into people's daily lives, has vastly increased the amount of information available at all levels of their social environment. Employment seekers are increasingly using websites like LinkedIn as well as job search platforms like Glassdoor, Naukri, and several others. Personality is the most important factor that reflects the individual, which tends to change. Applicants often apply their CVs to online recruitment sites as a loosely formatted document that must be reviewed by an expert recruiter. The importance of manual interviews and resumes in human resources has grown steadily in recent years. It is important to devise a plan for reducing or expediting the HR department's workload.

In this study, we suggest an approach to determining personality and automatically ranking applicants in the context of an e-recruitment scheme. Our aim is to limit applicant interviews and personal investigations. The results of the CV evaluation are used to test candidates based on the needs of the organization.

The OCEAN Model is used in this study to assess social media data in order to predict important personality traits, i.e. attributes or qualities that are unique to an individual. The OCEAN Model (also known as the Big Five Personality Model) was used to predict the candidate's personality, which includes Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism.

Figure 1. OCEAN Model factors representing an individual's personality

1.1 Objectives of the project

1. The primary goal is to simplify the candidate shortlisting process.
2. The aim is to provide a mechanism that can assist in identifying the applicant's personality characteristics and gaining knowledge about the applicant without meeting them.
3. The employer will have a great perspective of the employee and will be able to make a more informed decision to hire the best candidate for the job.

2. LITERATURE REVIEW

Dimitri van der Linden has published the paper "The General Factor of Personality": A criterion-related validity review and a meta-analysis of Big Five inter correlations. To assess the presence of a GFP, this study looked at the interrelationships between the Big Five personality traits (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism). The meta-analysis provides evidence for GFP at the highest operational level, and this paper concluded that the GFP has a significant component because it is linked to supervisor-rated job performance. [2].

Gayatri Vaidya: This system would first be developed by creating a dataset consisting of images, quality factors, intelligence measurement and personality measurement to create a personality prediction end-to-end network where self-reported personality traits can be accurately predicted from an image by Discrete Methodology. The key purposes of the proposed system were to differentiate the individual's internal properties from overt actions and to use a graph or percentage to display the outcomes [3].

In 2015, A Neural Network Approach to Personality Prediction based on the Big-Five Model was proposed by Mayuri Pundlik Kalghatgi [4]. For analytics, a parallelism is examined between the personality traits of an individual's linguistic information. Personality traits are identified by means of linguistic information which is enabled by the Big Five model. This shows the personality traits that can be applied to a number of fields, such as business intelligence, marketing and psychology.

In the year 2012, Athanasios Tsakalidis and Evanthia Faliagka proposed an Integrated E-Recruitment System for Automated Personality Mining and Applicant Ranking [1]. This system has introduced an automatic candidate ranking. It was based on objective principles that the information of the candidate will be derived from the LinkedIn profile of the candidate. The rank of the applicant was derived from individual selection criteria using the Analytical Hierarchy Process (AHP), while the recruiter controlled their weight.

3. PROPOSED SYSTEM

3.1 Problem Statement

The organization has a lot of work to do in order to choose the right applicant for a specific position; this e-recruitment system can assist managers in the recruiting process in gaining a deeper understanding of the submitted applicants based on knowledge derived from the CV and their personality test.

3.2 Solution

The proposed system would allow for a more effective evaluation of applicants. The system would require the applicant to enter his or her CV details and answer a few simple personality-based questions. The model would make it simple for the HR department to compile a shortlist of applicants based on the skills required for the job position.

3.3 Working of the system

The system will be developed as a web application. The administrator must first log in with the correct credentials before they can access and change the personality test questions. In the database, an accurate score is stored for

each option for the personality question. Following that, the applicant must register himself/herself with all of the necessary information, as well as enter their own CV information into the system. The applicant would then be required to take a personality test. During this evaluation, the applicant would be exposed to a variety of situations, during which their personality will be evaluated based on parameters such as openness, conscientiousness, extraversion, agreeableness, and neuroticism. Each question has a fixed range of answers ranging from strongly agree to strongly disagree.

4. METHODOLOGY

4.1 Data Collection

The data set was collected through a variety of websites and interactions with prospective employees. The questions and answers were recorded using Google Forms and stored in a CSV file for fast data training and retrieval.

The figure below depicts personality questions for one of the OCEAN Model personality characteristics, "Openness". Each query has a predetermined range of answers varying from strongly accept to strongly disagree.
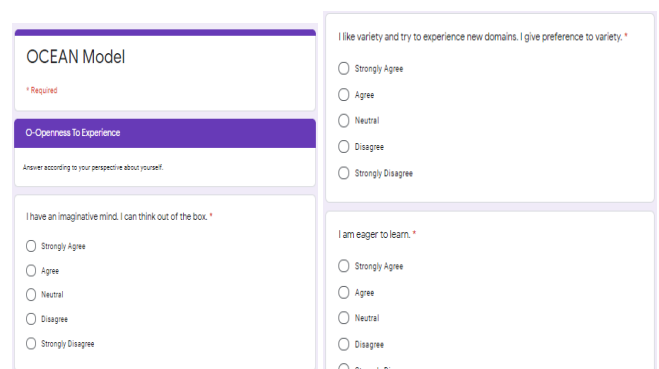
Figure 2. Sample Questions

4.2 Data Analysis

We divide the test dataset into x-test and y-test and scale it using StandardScaler from Scikit Learn Library.

```
In [5]:  #Splitting into X_test and Y_test
         testdf =df1[[0,1,2,3,4,5,6]]
         X_test=testdf.values
         temp1=df1[7]
         Y_test=temp1.values

In [6]:  #data scaling
         from sklearn.preprocessing import StandardScaler
         scaler = StandardScaler()
         scaler.fit(X_train)
         X_train = scaler.transform(X_train)
         X_test = scaler.transform(X_test)
```

Figure 3. Preprocessing of Dataset

4.3 Tools Used for Model

Jupyter notebook was the platform that we used to check the accuracy of our ML models. Pandas, numpy, and sklearn are some of the Python libraries that we have used. We also made use of XAMPP serve to host our website locally and used phpMyAdmin to store our data.

5. SYSTEM ARCHITECTURE

The proposed recruitment model is divided into two main sections: The Admin Page and the Candidate Page. These pages are divided into several sub-sections. To gain access to them, the user must first log in with a valid credential. The Admin Page would be used by be used by the HR Manager, while the Candidate Page would be used by the applicants applying.

5.1 Section 1-Admin Page
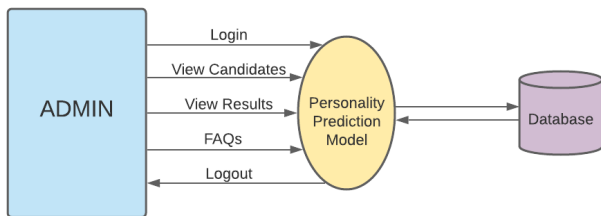
Figure 4. Data Flow Diagram of Admin Page

Login: To set the various system parameters and access the sub-sections of the Admin Page, the admin must login with his/her credentials.

View Candidates: The admin can view all the candidates' information like name, email, mobile number and his/her personality.

View Results: The admin can enter specific candidate ids to see their Curriculum Vitae, Predicted Personalities and OCEAN scores.

FAQs: The admin get his questions answered in the FAQ section.

Logout: After viewing the results, the admin can logout from the portal.
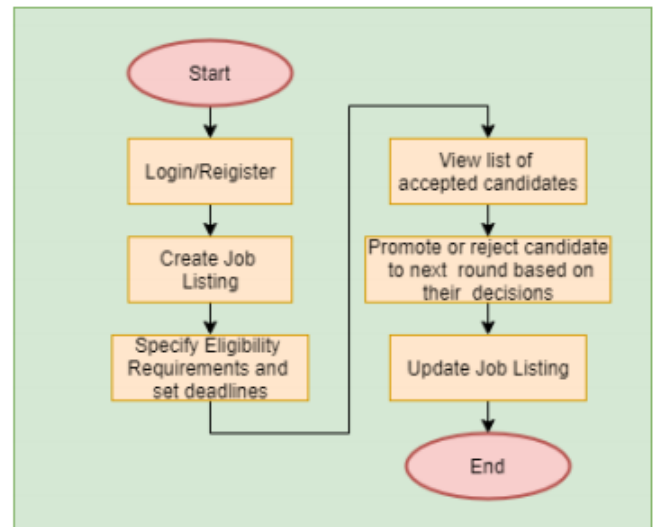

Figure 5. Admin System Workflow
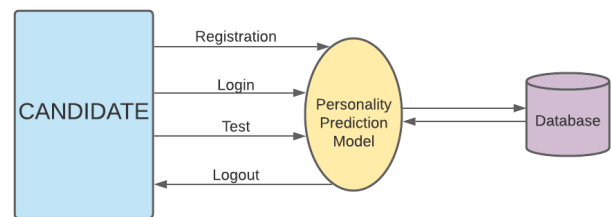
5.2 Section 2 - Candidate's Page

Figure 6. Data Flow Diagram of Candidate Page

Registration: To gain entry to the test page, the candidate must first complete the registration form and create his/her login credentials. During the application process, applicants must submit their CV by filling out during the registration process.

Login: The candidate can access the sub-sections by entering the requisite credentials and the otp from his registered mobile number.

Test: After successfully logging into the system, an online test of 50 personality-based questions will be conducted.

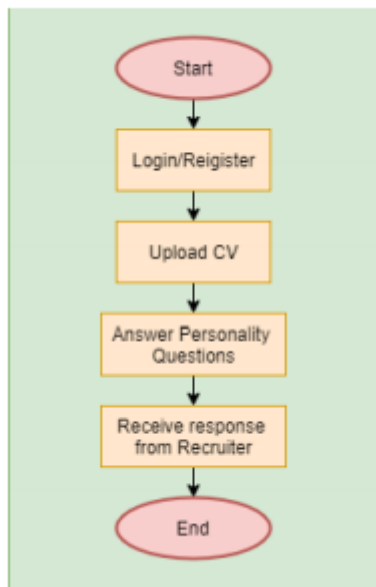**Logout**: After submitting the test, the candidate can logout from the portal.

Figure 7. Candidate System Workflow

6. DESIGN ALGORITHM

Machine learning (ML) algorithms are used to generate the results of the whole procedure prior to the interview process. It requires a certain amount of input training data, which primarily consists of previous candidate selection decisions made by subject experts. The eligibility scores from the study determine the candidate's suitability for the job.

When the candidate's defined characteristics are passed as input, the data that constructs the evaluation is given to a machine learning algorithm. Finally, the algorithm generates the final ranking list of the candidates with their predicted personality. The prediction assessment tests make use of machine learning to rank algorithms such as LR, DTG, DTE, RF, KNN, NB, SVM and GBC.
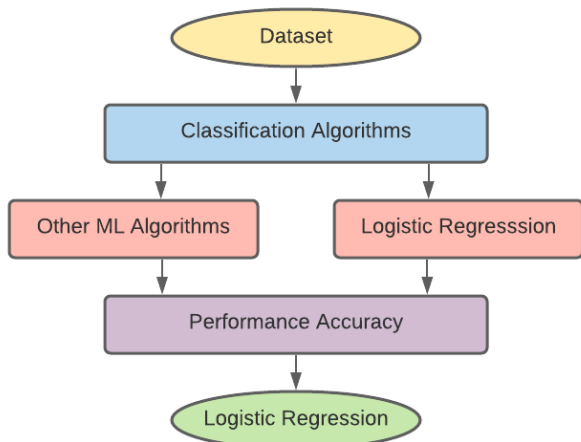

Figure 8. Machine Learning Algorithms

7. RESULTS

Table 1 was developed as a result of studies on the proposed model. The accuracy of the Logistic Regression algorithm is better than that of all other machine learning algorithm

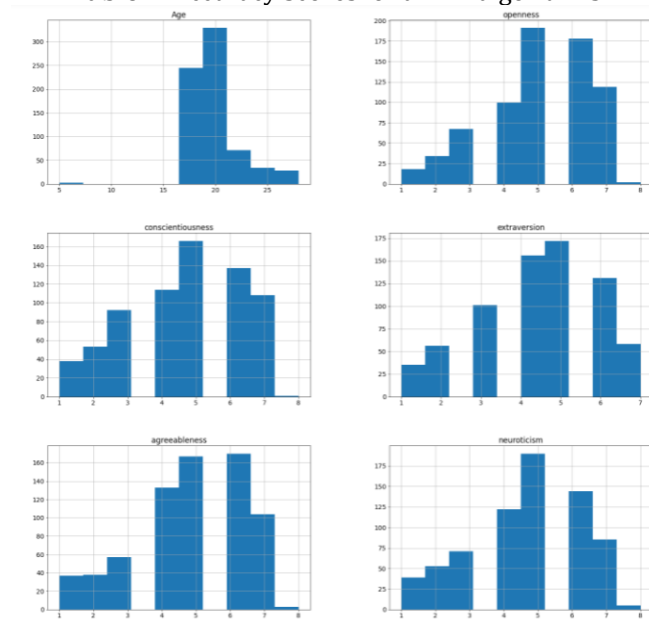| ML Algorithm	Accuracy
LR	84.76
DTG	29.84
DTE	24.76
RF	30.15
KNN	25.39
NB	49.52
SVM	69.52
GBC	29.84

Table 1. Accuracy Scores for all ML algorithms

Figure 9. Analysis of training dataset

Figure 10.1 Depicts the predicted personalities of the candidates from the test dataset.

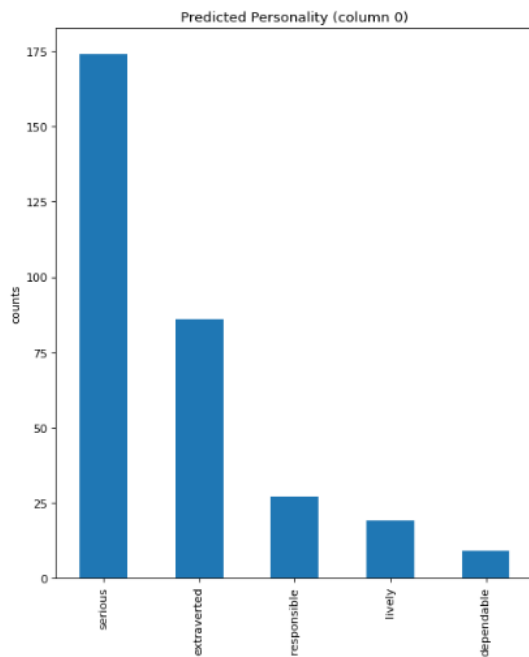**Figure 10.1.** Output CSV file

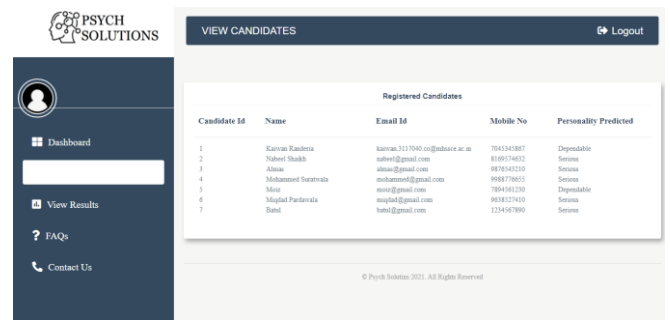**Figure 10.2.** Predicted Output Plot

Figure 10.3. Candidate Results on Admin Dashboard

8. CONCLUSIONS

This approach would help the human resources department find the right candidate for a particular work opening, resulting in an expert employee for the organization. This scheme would facilitate the selection of CVs based on their ranking. Their ranking is calculated by factors such as their test scores, expertise, degrees, and so on. The workload of the human resources department will be minimized as a result of this program.

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[5] Vishnu M. Menon and Rahulnath H A: "A Novel Approach to Evaluate and Rank Candidates in a Recruitment Process by Estimating Emotional Intelligence through Social Media Data"