Smart Hiring System through Personality Prediction using AI-ML

Anjali Ravindra Pawar, Lekisha Sunil Bagul,
Sakshi Ravindra Dharmadhikari, Pratiksha Ajay Khushal
Guru Gobind Singh Polytechnic, Nashik, India

Abstract*: This system is designed to streamline the shortlisting process of submitted candidate CVs from a large pool of applicants, ensuring a consistent and equitable CV ranking policy that can be legally justified. The system will evaluate candidates based on their experience and key skills relevant to a specific job position.*
The process includes:
1.Ranking CVs based on resume details, including but not limited to, the candidate's hobbies, strengths, and weaknesses.
2.Administering a set of 15 to 16 questions aimed at personality assessment, experience evaluation, and identification of key skills pertinent to the job profile. The system will aid the HR department in effectively shortlisting candidates by implementing a CV ranking policy that not only considers qualifications and experience but also other critical aspects relevant to the job position. This approach ensures that the HR department can select the most suitable candidates for each job profile, thereby contributing to the recruitment of an expert workforce for the organization.
Candidates will be required to register by providing comprehensive details and completing an online form. This form will include sections on resume details, hobbies, strengths, weaknesses, and responses to the aforementioned questions. Upon completion of the process, the system will shortlist the top candidates and automatically send notifications to them. Additionally, the system will generate a report on the performance of employees, which will be accessible to managers for evaluating top employees based on work efficiency, and for facilitating the selection of the company's Employee of the Year..

Keywords: Personality prediction, Neuro-Linguisitic Programming

I. INTRODUCTION

The evolution of electronic technology and the internet has significantly contributed to the advancement of global Smart Talent Prediction and Optimization (TPO) tools. This progress is further supported and enhanced by the development of the Job Characteristics Model (JCM), which is grounded in contemporary job design concepts. The advancements in modern information systems, digital technologies, and universal access to Human Resource Management (HRM) have rendered these systems more applicable and efficient.

In alignment with these trends, the proposed system aims to integrate the Job Characteristics Model into the HR system, seeking to establish a new, efficient model for Human Resource Management in the Internet Age. There is an increasing interest among organizations in assessing the personality traits of candidates to better understand their responses to various circumstances. Consequently, this system incorporates criteria such as required personality traits, roles, and responsibilities. It automatically evaluates whether candidates meet these criteria by conducting a personality prediction test to determine their traits.

The system will register candidates with comprehensive details, including resume information, hobbies, strengths, weaknesses, and responses to 15 to 16 personality prediction questions. HR will analyze the candidates based on the Big Five personality traits: Openness (O), Conscientiousness (C), Extraversion (E), Agreeableness (A), and Neuroticism (N). For example, a candidate with high Agreeableness is typically warm, friendly, and tactful, while a candidate with high Neuroticism may exhibit moodiness and feelings of anxiety or depression. These traits will be used by the system to shortlist candidates.

Upon completing the evaluation, the system will shortlist the top 10 or more candidates and automatically send notifications via email. The system also presents the results to recruiters, who will evaluate and finalize the top candidates.

Additionally, the system includes techniques designed to enhance the efficiency and effectiveness of the recruitment process. It ranks top employees based on work feedback and suggestions, focusing not only on qualifications and experience but also on other important job-specific criteria. This approach helps the HR department select the most suitable candidates, thereby providing a skilled workforce for the organization.

Artificial Intelligence (AI) technology underpins this entire process. AI enables the execution of tasks requiring a degree of intelligence, offering significant opportunities to enhance HR functions. By finding the right information more quickly, cost-effectively, and securely, AI builds momentum in the recruitment process and beyond.

II. LITERATURE REVIEW

In 2014, Faliagka et al. introduced an Integrated E- Recruitment System designed for automated personality analysis and applicant ranking. This system implemented automated candidate ranking by leveraging objective criteria. Candidate information was extracted directly from their LinkedIn profiles, and their personality traits were identified through linguistic analysis of their social presence. Using the Analytical Hierarchy Process (AHP), individual selection criteria were assessed, with recruiters (admins) determining the weight of each criterion. Howe"er, the system faced limitations when screening senior positions that required specific expertise and qualifications, leading to inconsistent results .

Separately, Liden et al. conducted a study titled The General Factor of Personality, which examined the interrelations among the Big Five personality traits (Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism). Their meta-analysis provided evidence supporting the existence of a General Factor of Personality (GFP) at the highest hierarchical level, suggesting that GFP is substantively linked to supervisor-rated job performance. Nonetheless, the study also emphasized that the presence of a GFP does not diminish the relevance of other lower-level personality traits in the hierarchy.

The human asset division faces a noteworthy workload In selecting the foremost reasonable candidate for a particular work part to guarantee an master workforce for the organization. A few challenges contribute to this burden, counting:

Trouble in drawing in gifted and gifted candidates.

Misalignment or need of understanding between scouts and enlisting supervisors.

Incapable communication with candidates amid the enrollment prepare.

Challenges in holding Millennials within the workforce for expanded periods.

Wasteful utilization of accessible information.

Battles to adjust hiring speed with keeping up quality. Wasteful aspects within the generally enlistment prepare.

III. EXISTING SYSTEM

System Architecture : The suggested recruitment model's two primary components are the administrator page and the candidate page. There are numerous other parts inside these pages. User must log in using legitimate credentials in order to access them. While applicants would use the Candidate Page, the recruitment agency would use the Admin Page.
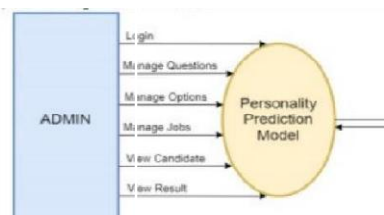
Section-1 Admin Page

Fig.1. Data flow diagram of Admin Page

Login: To configure the various system settings and gain access to the Admin Page's sub-sections, the admin must first log in.

Manage Questions: The administrator may include aptitude questions on any subject of his or her choosing, each with a multiple-choice response. The administrator may use a personality-related question based on the OCEAN model in this subsection to predict the candidate's personality.

Manage Jobs & Options: The administrator can control the selections based on the specifications of the employment position and the available job postings.

View Candidates: The administrator has access to all of the candidate's data.

View Results: The evaluation results for the shortlisted candidates are visible to the admin.
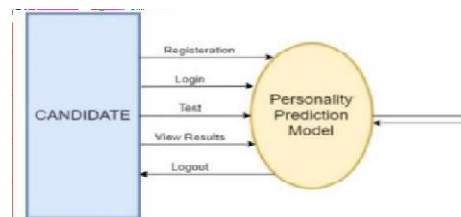
Section-2 Candidate Page

Fig.2. Data flow diagram of Candidate Page

Registration: To access the following sections, the candidate must first complete the registration form and create their login credentials. A CV form must be completed and submitted by the applicant as part of the registration process.

Login: By providing the necessary information, the candidate can access the sub-sections.

Test: A personality and aptitude test can be taken online following a successful login. If the applicant meets the requirements established by the candidate Admin, they will be able to view the job specifics and select the relevant position.

View Results: The test taker can see the results after finishing it.

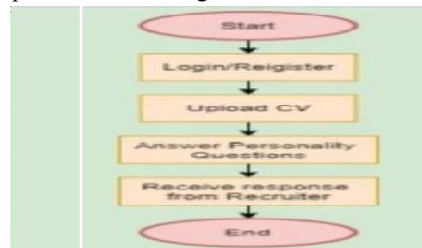Logout: The candidate may exit the portal after viewing the results.

Fig.3. Candidate System Workflow

IV. PROBLEM STATEMENT

There's a tremendous workload on the human resource department to choose the proper candidate for a specific work profile which in turn would give specialists workforce for the organization from a huge pool of candidates like;

- Disappointment to pull in gifted candidates.
- Need of understanding between the selection representatives and enlisting manager
- Need of communication with candidates.
- Holding Millennial within the workforce for a longer period of time.
- Failure in utilizing information viably.
- Trouble in adjusting the speed of enlist with quality of enlist.
- Need of productivity amid the enlistment handle.

V. RESEARCH METHODOLOGY

Requirement Analysis:

Identify Stakeholders:

First, let's pinpoint the roles involved. We HR managers, hiring managers, candidates, & the system administrator.

Define Functional Requirements:

Next, must figure out what features are needed for the web application. Some key features include the online test interface, personality prediction engine, plus the HR management panel.

Data Collection:

Dataset Selection:

Gather or create a dataset filled with personality-related questions & answers. This should include existing personality inventories like the Big Five Personality model.

Data Preprocessing:

It's important to clean & prep the data. This makes it fit for machine learning purposes. We'll normalize responses, deal with any missing values, & encode categorical data where needed.

Machine Learning Model Development:

Feature Extraction:

From the responses to the personality test, we need to extract features. This might use text analysis techniques or embedding methods.

Model Selection:

We'll use the OCEAN model for our tasks. Training & Validation: Train our models using a training dataset. Then validate their performance with metrics like accuracy, precision, recall, & F1-score.

Web Application Development:

Frontend Development:

Design & implement a user-friendly interface where candidates will take the personality test.

Backend Development:

Develop all server-side logic to manage test submissions. This includes integrating our machine learning model & taking care of user data.

Integration:

We must ensure smooth interaction between the web interface and machine learning model.

Testing & Deployment:

System Testing:

Test our application for functionality and usability issues. Also check for performance concerns.

User Acceptance Testing (UAT):

Conduct testing with real users—HR managers & candidates—to ensure the system meets their needs.

Deployment:

Finally, deploy the web application to a production environment and keep an eye on its performance throughout.

Evaluation:

Performance Metrics:

Evaluate how well the personality prediction model performs and how effective the overall user experience is for our web application.

Feedback Collection:

Gather feedback from users so we can find areas that need improvement.

VI. IMPLEMENTATION

System Design and User Interface Development:

Create a user-friendly web-based interface for candidates to register and upload their resumes.

Include fields for candidates to provide additional details such as hobbies, strengths, weaknesses, and other personality traits through a form with 15-16 targeted questions.

AI-Driven Candidate Evaluation:

Develop backend AI models using Natural Language Processing (NLP) and machine learning techniques to analyze resumes and form responses.

Implement algorithms to rank candidates based on key skills, experience, and qualifications aligned with specific job roles.

Integrate a scoring system that ensures fair and consistent CV ranking while adhering to legal and ethical recruitment practices.

Personality Analysis Integration:

Incorporate a module for personality analysis to evaluate candidates' soft skills and align them with job-specific requirements.

Use personality prediction models to assess traits and preferences from the provided responses.

Candidate Shortlisting and Notification:

Automate the shortlisting process to identify top candidates based on AI-generated rankings.

Enable the system to send automated email notifications to shortlisted candidates for further interview rounds, reducing HR workload.

Job Vacancy and Role Management:

Allow HR associates to define job vacancies with detailed descriptions, required personality traits, roles, and responsibilities.

Employee Performance Tracking:

Integrate work efficiency metrics to track the performance of existing employees.

Provide managers with insights into individual and team achievements, enabling the identification of top-performing employees.

Admin and User Roles Management:

Design the system to assign roles to different users:

Admin:

Oversees HR associates, HR managers, and other managers. Manages feedback, complaints, suggestions, and views top employees.

HR Associate:

Adds job vacancies, views top-performing employees.

HR Manager:

Accesses top 10 shortlisted candidates, sends automated emails, and views top-performing employees.

Manager:

Approves employee work, manages selected candidates, and views performance rankings.

Employee:

Completes assigned tasks, submits complaints or feedback, and views performance rankings.

Continuous Testing and Refinement:

Test the system extensively using real-world data to ensure high accuracy and reliability.

Refine the scoring and ranking algorithms based on feedback and performance metrics to align with organizational goals.

Workforce Optimization:

Leverage the tool to streamline recruitment processes and improve workforce productivity.

Use insights generated by the system to make informed decisions about candidate selection and employee recognition, such as selecting the "Employee of the Year."
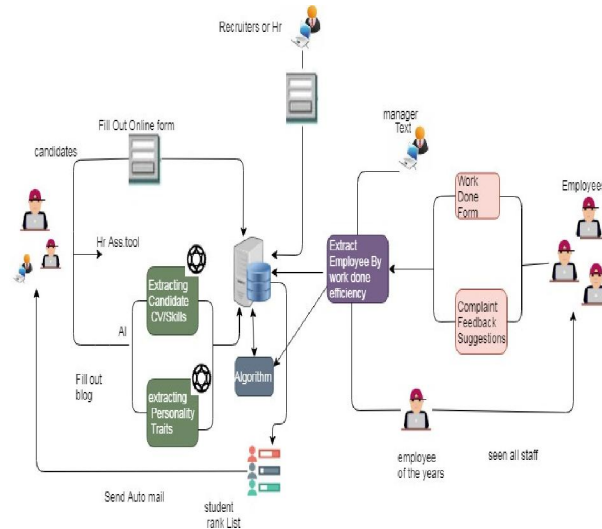

Fig.4. System Workflow

VII. RESULT

An automated candidate assessment tool simplifies the recruitment process by analyzing candidates objectively. It utilizes data from professional networks, performs linguistic analysis to evaluate personality traits, and uses methods like the Analytical Hierarchy Process (AHP) for ranking. This system improves precision, minimizes manual effort, and enables a more data-driven approach to candidate selection. However, its performance may be less reliable for senior positions requiring specific expertise, highlighting the importance of ongoing improvements and human involvement.
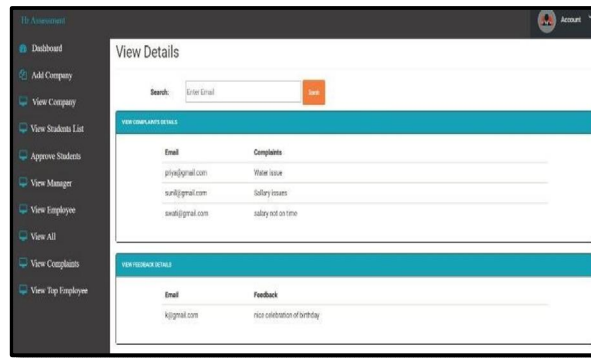
1. Module-1: Candidate

2. Admin-2: Admin

398
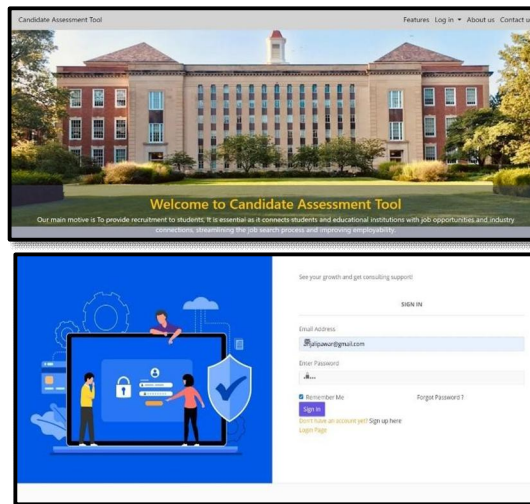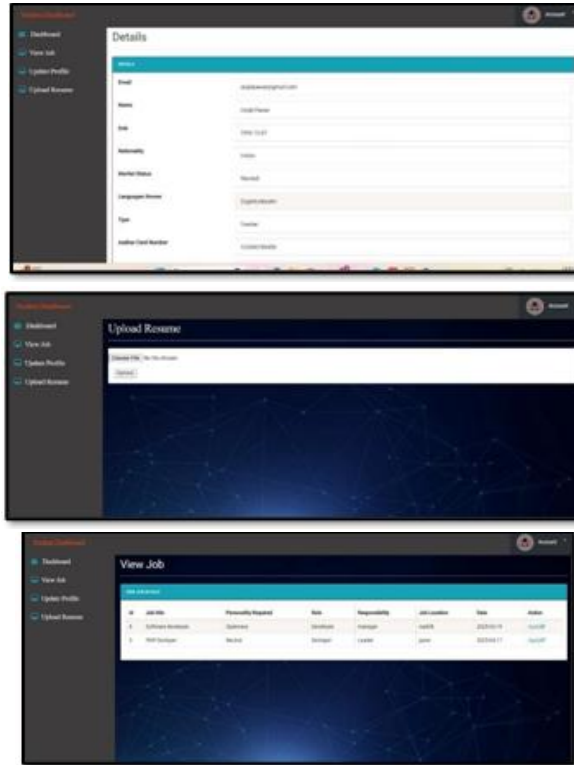
3. Module-3:HR

VII. FUTURE SCOPE

Model Enhancement:

Advanced Algorithms: Explore the use of more advanced machine learning algorithms and deep learning techniques for better accuracy and reliability.

Continuous Learning: Implement mechanisms for the model to continuously learn and improve from new data and user feedback.

Integration with Other HR Systems:

ATS Integration: Develop seamless integration with existing applicant tracking systems (ATS) for a more cohesive hiring process.

Broader Data Sources: Incorporate additional data sources such as social media profiles or work history for a more comprehensive assessment.

Ethical and Bias Considerations:

Bias Mitigation: Address potential biases in the model and ensure fair and ethical use of personality prediction technology.

Transparency and Explainability: Enhance the transparency and explainability of the machine learning models to build trust with users.

User Experience Improvements:

Personalization: Customize the personality tests and feedback based on the specific needs and preferences of different organizations.

Gamification: Introduce gamification elements to make the personality assessment process more engaging and enjoyable for candidates.

Expansion to Other Domains:

Broader Applications: Explore the use of the system in other areas such as career development, team dynamics, and employee satisfaction.

REFERENCES

[1]. Ishan Kulkarni, Riddhi Shah, Shivam Bhagat, Shivani Rathore, International Research Journal of Engineering and Technology (IRJET) ,Volume 8, Issue 4.

[2]. Isha Gupta ,Manasvi Jain , Dr.Prashant Johri, Journal :- 2023 International Conference on Disruptive Technologies (ICDT) published by IEEE

[3]. Devesh Agarwal, Mr. M. Karthikeyan, Journal :- International Research Journal of Modernization in Engineering Technology and Science

[4]. Ms. C. Ashwini, Sk Shahid Ali, Arnab Rooj, (Computer Science and Engineering Department SRM Institute Of Science And Technology, Ramapuram, Chennai, India.), Journal :- Journal of Emerging Technologies and Innovative Research (JETIR), Volume 6, Issue 6

[5]. www.github.com

[6]. www.geeksforgeeks.com