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Survey of Smart Hiring System Through Personality Prediction Using AI-ML

Anjali R. Pawar[1], Lekisha S. Bagul[2], Pratiksha A. Khushal[3], Sakshi R. Dharmadhikari[4]
Students, Diploma of Computer Engineering[1,2,3,4]
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 considers qualifications, experience, and 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, Talent Prediction, Neuro-Linguistic 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.

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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

PAPER 1

Title: - SMART-HIRE PERSONALITY PREDICTION USING ML

Date**: -** July, 2023

Author: - Isha Gupta, Manasvi Jain, Dr. Prashant Johri

(School of Computer Science & Engineering, Galgotias University, Gr. Noida) Journal: - 2023 International Conference on Disruptive

Technologies (ICDT) published by IEEE Problem Definition: -

Automating the selection of candidates is the key goal. The idea is to create a system that will make it easier to recognize the personality traits displayed by the applicant and learn more about them without actually meeting them. The company will have a better understanding of the candidate and be in a better position to choose the best applicant for the open position.

PAPER 2

Title: - PERSONALITY PREDICTION USING MACHINE LEARNING

Date: - April,2022

Author: - Devesh Agarwal, Mr. M. Karthikeyan

(Dept. of Computer Science and Engineering, SRM Institute of Science and Technology, Jaipur, India) Journal: - International Research Journal of Modernization in Engineering Technology and Science Problem Definition: -

Developing a system that aims to enhance the effectiveness of marketing campaigns and competitive exams by developing a system that predicts personality traits using the Big Five personality model. By analyzing high-dimensional data, the system classifies individuals' personalities to tailor communications and provide actionable insights for personal development.

PAPER 3

Title: - PERSONALITY PREDICTION SYSTEM USING MACHINE LEARNING

Date: - June,2019

Author: - 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.

Problem Definition: Developing a system that predicts user personality based on Facebook activity, using the Big Five Personality model, which includes Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. This model was chosen for its effectiveness and widespread use.

PAPER 4

Title: - MACHINE LEANING BASED AUTOMATIC PERSONALITY DETECTION SYSTEM.

Date: - April,2021

Author: - Ishan Kulkarni, Riddhi Shah, Shivam Bhagat, Shivani Rathore

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(School of Computer Science and Engineering, MIT World Peace University, Pune, India.)
Journal : International Research Journal of Engineering and Technology (IRJET) ,Volume 8, Issue 4. Problem Definition: Development of an AI-based automatic personality detection system for job interviews that aims to overcome limitations of traditional methods like self-reported surveys and human evaluations, which often suffer from dishonesty and inconsistency. Using machine learning models (e.g., CNN, TensorFlow), the system analyzes nonverbal cues, such as facial expressions and posture, from asynchronous video interviews. This approach enhances the accuracy and efficiency of personality assessments in the hiring process.

III. 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.

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IV. 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

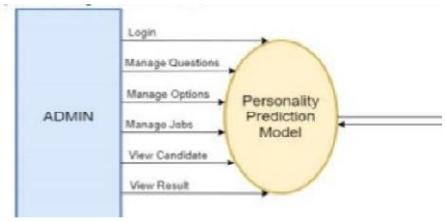

Fig.1. Data flow diagram of Admin Page

- 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.

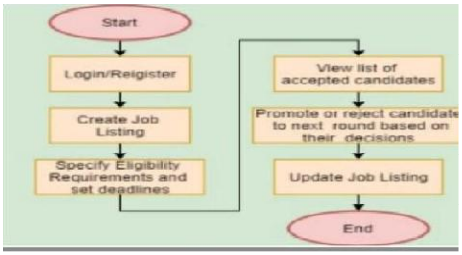

Fig.2. Admin System Workflow

Section-2 Candidate Page

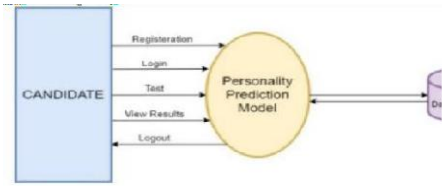

Fig.3. Data flow diagram of Candidate Page

- 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.

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- View Results: The test taker can see the results after finishing it.
- Logout: The candidate may exit the portal after viewing the results.

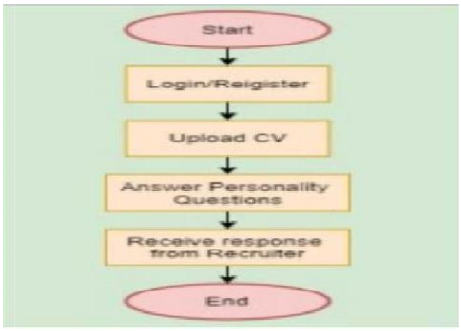

Fig.4. Candidate System Workflow

V. PROPOSED SYSTEM

The system proposed enables a more effective way to short list the most suitable candidates from a vast number of applicants which provides a fair and consistent CV ranking policy. A legal justification is made for this . System ranks the experience and key skills essentially required for a particular job position or designation. Thereafter system will rank the candidates form based on the experience and other key skills which are required for that particular job profile. This system will help the HR department to easily shortlist the candidate based on the filled information in given form format or personality prediction test ranking policy.A set of techniques have been presented that makes the whole recruitment process more effective and efficient as well. We have implemented a system that ranks the top employee based on work feedback policy as well as suggestions which will improve the productivity rate of the organization.

- Admin: Manages HR associates, HR, and managers. Views complaints, feedback, suggestions, and top employees.
- HR Associate: Adds job vacancies with required personality traits, roles, and responsibilities. Views top 10 employees. HR: Views top 10 shortlisted candidates, sends auto emails to them, and views top employees.
- Candidate: Views job titles, applies for jobs, and answers 15-16 questions, including hobbies, strengths, and weaknesses.
- Manager: Manages selected candidates, approves employee work, and views top employees based on performance. Employee: Completes assigned tasks, adds complaints/feedback, and views the top 10 employees.

Advantages:

- Reduces HR workload.
- Helps in selecting the right candidate for the job.
- Ensures an expert workforce.

Limitations:

- Requires large memory space.
- Needs an active internet connection.
- May produce inaccurate results with incorrect data.

Future Scope:

- Automates skill ranking and candidate shortlisting.
- Sends auto-mails to shortlisted candidates.
- Provides consistent CV ranking.

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Goals and Objectives

- To develop a system to provide an effective way of shortlisting the candidates.
- To determine the key skill characteristic from an applicant by defining each expert's preferences and ranking decisions.
- To automate the process of requirement specifications and applicant's ranking.
- Conduct aptitude and personality tests.
- To produce ranking decisions that would render relatively higher consistency and accuracy than those of human experts.
- System useful in many organizations in order to shortlist expert candidate.
- Determine work done efficiency of the employee at a position.

Hardware Requirements:

- Windows 7 or higher/Linux, 4 GB RAM, 500 GB HDD, 2 GHz CPU.

Software Requirements:

- Windows/Linux/CentOS, Java, Eclipse IDE.

VI. FUTURE SCOPE

A. 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.

B. 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.

C. 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.

D. 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.

E. Expansion to Other Domains:

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

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VII. CONCLUSION

The proposed system integrates machine learning to enhance the accuracy and efficiency of personality prediction in the hiring process. This provides an improved experience for both candidates and HR professionals through automation and objective assessments. The system is expected to streamline the hiring process, reduce manual effort, and support data- driven decision-making, while offering a modern and engaging approach to personality assessments. Overall, it contributes to the advancement of HR technology by combining machine learning with personality prediction and online assessments.

VIII. ACKNOWLEDGEMENT

The system proposed renders an organization oriented recruitment tool. This system aids the HR department in accessing a vast number of applicants by shortlisting the most suitable fit for the position accumulated. It identifies the key characteristics of the candidate using the form information retrieved from the forms. Hence, this proposal will prove to be an effective and prominent way of carrying out recruitment process with more accuracy using the terminologies of AI and ML. It adds to the advancements in computer science and technology by the improvement in manual works. The system will overall improve the productivity of the organization due to sorting out the right suitable employee. This will also avoid Family Nepotism and Political manipulation corrupting the corporate environment.

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[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