Industrial Engineering Journal
ISSN: 0970-2555
Volume : 54, Issue 2, No.2, February : 2025

AI BASED RESUME ANALYZER AND CAREER GUIDANCE SYSTEM

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ABSTRACT:
This project focuses on developing an AI and ML-driven system designed to enhance both recruitment processes and career development. For HR professionals, the system automates the analysis of resumes, extracting key skills and identifying skill gaps between the candidate's experience and the requirements of the job role. By using machine learning models such as Random Forest, the system classifies resumes into relevant job categories and offers feedback on the proficiency of specific skills through aptitude testing, enabling HR to streamline recruitment and identify suitable candidates more effectively.
For students, the system offers a personalized approach to career development by predicting suitable job categories based on their uploaded resumes and recommending relevant courses to bridge any skill gaps. By combining advanced techniques in natural language processing (NLP) and machine learning, this project aims to enhance the career prospects of students while also optimizing the recruitment process for HR professionals. The system's capabilities offer significant improvements in both hiring efficiency and skill-based career growth.
Keywords: Career path, Machine Learning, Artificial Intelligence, Natural Language Processing, Resume Analyzer, Large Language Model, Skills

INTRODUCTION:

This rapidly transforming job market in the face of rapid technological changes and the dynamic demands of the industries, presents both employers and employees with the daunting task of matching up the gaps. Current methods of recruitment through resumes and resume screening by the recruiter or human resources staff is long drawn, vulnerable to biases, and largely inefficient. Therefore, this creates unaccounted-for talent and a wrong hire in many cases.
AI and ML-driven solutions can, therefore, help in automating resume analysis and identifying skill gaps, thereby allowing for personalized career guidance. The research aims at developing an intelligent system that makes recruitment easier and enhances decision-making while empowering the job seeker in aligning the skills with the industry demands. This approach of bridging the skills gap is likely to make the workforce efficient, reduce the cost of hiring, and enhance lifelong learning toward a more adaptive and competitive job market.

LITERATURE SURVEY:

There has been an increased focus on the application of Artificial Intelligence (AI) and Machine Learning (ML) in career guidance and job recommendation systems in recent times. Different approaches to improving employability through advanced algorithms for career prediction, resume analysis, and skill gap identification have been studied in different studies. Though promising results

are observed with these systems, issues regarding data quality, model accuracy, and scalability also come up.

Sneha H. S. et al. proposed an AI-driven career guidance system using Naïve Bayes classifiers and NLP-powered chatbots to provide career recommendations based on academic performance and skill assessments. The system interacts with students to assess their skills and interests, offering personalized career suggestions. Although it effectively enhances career decision-making, it fails to process unstructured resumes and ensures accuracy in its predictions. Because career choices depend on a lot of factors, including industry demand and personal aspirations, the system would need further optimization in providing a more holistic direction.

Prashanth V. J. et al. presented a resume analysis tool that employs CNNs and word2vec to predict the appropriate job role based on resume information and offer recommendations to upgrade related skills. The system extracts major features of a resume, analyses skill gaps, and recommends improvements, bringing candidates' profiles in line with industry needs. Despite being proficient in detecting missing skills and targeted recommendations, it fails with multilingual resumes and the complexities inherent to unstructured data formats, limiting its utility for diverse groups of users. In addition, the model will tend to favour well-structured resumes over less conventional formats in its recommendations, and fairness in recommendations is a concern.

Hude T. et al. performed an extensive review of AI-based career counselling, which reviewed systems that utilized Support Vector Machines (SVMs) for personalized career recommendations. These models improve job matching by analysing user skills and market trends; however, their effectiveness is largely dependent on the quality and completeness of the input data. This review also brings into focus real-time job market trends, aptitude assessments, and interactive career quizzes that help to enhance the ability of the system to give relevant career suggestions. However, some of the drawbacks include concerns regarding data privacy, algorithmic bias, and model transparency. Therefore, AI-driven career counselling should ensure that there are no biased recommendations and ensure the protection of user data for credibility and trust.

Overall, the studies highlight an increasing role for AI and ML in career counselling and job matching but also present significant areas of improvement. Success in these systems depends on the diversity of the data, model robustness, and adaptability to changing job market trends. Future research should target the improvement of the accuracy of AI models by incorporating real-time labour market insights and developing adaptive learning mechanisms for more precise, fair, and inclusive career recommendations. Further integration of psychometric evaluations, soft skills assessments, and industry-specific career pathways would further refine the guidance provided and ensure a holistic and personalized approach to career development.

PROPOSED SYSTEM:

The design of the proposed system shall focus on two major target groups: HR professionals and students. It shall focus on distinctly different demands yet interrelated needs of these two groups in the hiring and career development process.

For HR professionals, the system dramatically augments and streamlines the recruitment workflow using such advanced technologies as Machine Learning (ML), Natural Language Processing (NLP), and AI-driven recommendations. One of its key features is the automated extraction of essential skills from resumes, which reduces the manual effort required to screen candidates effectively. The system can intelligently predict the most suitable job categories for applicants by analysing the extracted skills, thus ensuring better alignment between candidates and job roles. It also identifies skill gaps by comparing the candidate's qualifications with job requirements, thus helping recruiters make more informed hiring decisions. These include aptitude assessments within the system. The system evaluates the proficiency of a candidate in specific subjects and will provide insightful feedback that will help

improve the selection process. This further limits the role of manual screening, minimizes biases associated with the process, and leads to an efficient, fair, and data-driven hiring approach.
The system offers quality career guidance for students and job seekers by going through their resume and predicting a probable job category based on what they are possessing at the present moment. That way, a person gets more clarity about their career path suited to them. The system automatically identifies the areas of skill deficiencies and gives proper recommendations in regard to courses or certifications or trainings that one can undertake for filling those skills. This enables students to upskill effectively for improving their prospects of employability. With AI-driven career guidance incorporated, student access is provided with personalized insight, thereby having a strategic and efficient approach toward job search.

AIMS AND OBJECTIVES:

AIM:

This project is intended to help HR professionals screen, assess, and hire the right candidates efficiently using leading-edge Artificial Intelligence (AI) and Machine Learning (ML) technologies. The system automates primary resume analysis, skill evaluation, and job role identification to decrease manual effort, improve decision-making, and make the recruitment process more accurate and unbiased. The project further aims to offer students career guidance and personalized suggestions to maximize their employability.

OBJECTIVES:

Simplify the Recruitment Process:

The system is designed to streamline and optimize the recruitment process by automating candidate screening and resume evaluation. Through resume analysis for skill gaps and job role fit, HR professionals can make faster, data-driven hiring decisions. This minimizes the time spent on manual resume screening and ensures that the best candidates are identified in an efficient manner, thus enhancing overall recruitment productivity.

Improve Resume Assessment:

Using Natural Language Processing (NLP), the system identifies relevant skills, qualifications, and experiences from resumes. It uses Machine Learning (ML) algorithms to categorize resumes into suitable job categories so that each candidate is matched with the most appropriate job role. This feature enhances the accuracy of resume evaluation and the hiring process by matching candidates with job opportunities that best suit their skill set.

Offer feedback and learning paths:

The system provides comprehensive, AI-based feedback to candidates on their strengths, weaknesses, and areas of improvement. It detects missing skills that are critical for target job roles and suggests individualized learning pathways by proposing suitable courses, certifications, or training programs. This method allows job seekers to close skill gaps efficiently, making them more competitive in the labour market.

Helping Career Development in Students:

For job applicants and students, the system acts as a career guidance system by scanning their resumes and identifying their current career category. It offers intelligent recommendations on skills they need to learn in order to enhance their employability and move up in their desired career paths. Through its AI-based suggestions for upskilling and reskilling, the system ensures that students are equipped to compete in a fast-changing job market.

SCOPE OF PROJECT:

It takes advanced AI and Machine Learning capabilities to elevate not only the processes of recruiting people but also developing career-related solutions. In its resume analysis enhancement, automated resume review with increased skill gaps recognition, categorization of jobs by type, resume scoring, resume filtering based on key competencies, it contributes significantly in providing insights about people.

For HR Professionals: It saves the traditional, time-consuming resume screening process and intelligently filters candidates on various parameters such as specific skills, experiences, qualifications, and job role relevance. It provides insights to the HR professional using AI-driven inputs for data-driven hiring decisions and saves manual effort, thereby accelerating the recruitment cycle.

For Job Seekers: It provides highly personalized career support by analysing resume s, identifying what may be missing or improving, and publishing relevant career recommendations. The portal offers career advice from the potential job roles, job market trends, and skill-building courses for bridging gaps in skills. This personalized approach helps candidates understand their strength and where they need improvement while providing access to practical resources that will be a better step toward increasing their employability.

Currently, the system supports resumes in English language, but in the future updates, it will be multilingual to reach a global audience. Moreover, it is planned to introduce more advanced AI-driven assessments that will evaluate not only technical skills but also aptitude and soft skills of candidates. This should help the project enhance job matching, increase efficiency in hiring, and empower job seekers with actionable, data-driven insights that help them thrive in a competitive job market. It is an all-around seamless AI-powered ecosystem supporting recruiters and candidates alike in the pursuit of professional goals.

METHODOLOGY

Skill Extraction with NLP and LLM:

Skill extraction is achieved through the Natural Language Toolkit (NLTK) for Natural
Language Processing (NLP). An extracted skill is converted into structured JSON form by a Large Language Model (LLM) to categorize and analyse efficiently. Automation of the process lessens manual effort and enhances accuracy in skill detection.

Extraction Process:

Preprocessing: Stop word removal, punctuation stripping, and tokenization to normalize and clean the text.

Skill Identification: By employing Named Entity Recognition (NER) and Part-of-Speech (POS) tagging to recognize and extract relevant skills.

LLM Refinement: Forwarding extracted skills through an LLM to normalize, disambiguate, and format as structured JSON for further analysis.

Machine Learning Model for Skill Assessment:

Skill proficiency is quantified with a Random Forest model, well-known for its accuracy and ability to capture non-linear relationships. The model is trained to forecast proficiency based on a candidate's resume attributes and other input features. Hyperparameter tuning is employed to enhance performance and enhance generalizability.

Training Process:

Data Collection: A labelled dataset of skill levels, previous performance measures, and job success rates is constructed.

Feature Engineering: Extracting relevant features such as years of experience, successful project count, relevant certificates, and educational qualifications.

Model Training: A Random Forest model is trained and tuned using Grid Search and
Bayesian Optimization to boost prediction accuracy.

Evaluation Metrics: Performance is evaluated using accuracy, precision, recall, F1-score, and cross-validation strategies to avoid overfitting.

Aptitude Question Generation using LLM:

An LLM creates dynamic aptitude-based multiple-choice questions (MCQs) based on the extracted skills to further evaluate candidate proficiency.

Generation Process:

Skill-Based Prompting: The LLM consumes extracted skills as input and produces aptitude questions pertinent to the skills.

Difficulty Calibration: The difficulty level of questions generated is dynamically calibrated according to the responses of earlier candidates.

Response Analysis: The system assesses responses against pre-defined metrics of correctness and improvement or deterioration patterns.

SKILL LEVEL MEASUREMENT BASED ON OUTPUT PERFORMANCE:

Candidate ability is assessed through an ML-based scoring mechanism that takes into account various performance metrics.

Evaluation Criteria:

Response Accuracy: Measures the percentage of correct responses to questions.

Response Time: Analyses the time taken to respond to each question, providing insights into ability and confidence.

Complexity Handling: Checks whether the candidate responded to more complex questions correctly.

The output is mapped to pre-defined ability levels (Beginner, Intermediate, Advanced) for an objective skill evaluation.

ATS SCORE CALCULATION:

The ATS score is calculated to determine how well a resume matches a job description, enhancing recruitment efficiency.

ATS Scoring Factors:

Skill Relevance: Measures the similarity between extracted skills and job requirements.

Keyword Optimization: Checks the presence of industry-specific keywords that improve resume visibility.

Resume Structure & Formatting: Checks for clarity, readability, and compliance with industry standards.

Match Percentage: Calculates the percentage of required qualifications matched by the candidate.

A weighted scoring algorithm allocates points to each factor, resulting in an overall ATS score that recruiters can utilize to shortlist candidates efficiently.

CONCLUSION:

In summary, this project is able to successfully leverage the power of Artificial Intelligence and Machine Learning to optimize both skill development and recruitment efficiency. By utilizing sophisticated AI-based methods, it automates significant parts of resume analysis, career guidance, and job role prediction, thus decreasing the manual effort involved in conventional hiring procedures. The use of the Random Forest algorithm is a key factor in predicting job categories accurately from derived resume data. By examining the skills declared on a candidate's resume and matching them with relevant industry job requirements, the system delivers accurate information on the most appropriate career paths. It also determines the current skill gaps, enabling both job seekers and HR professionals to make informed decisions about hiring and career progression.

For HR practitioners, this process improves the hiring process by supporting data-driven decision-making. Rather than using purely subjective resume screening, recruiters are provided with AI-based feedback that identifies a candidate's strengths and weaknesses. This reduces the influence of human bias, facilitates a more objective assessment, and accelerates the hiring process. Additionally, automated aptitude tests further improve candidate assessment by allowing recruiters to view a candidate's level of expertise in areas of key skills using a quantitative score.

From the student's point of view, the project presents a proactive career development strategy. Through resume analysis and job category prediction, the system gives students personalized career advice, enabling them to know where they are in the job market. More significantly, the system takes it a notch higher by providing AI-based course suggestions that match the forecasted job positions. This capability allows students to fill their skill gaps effectively, becoming more competitive and having better chances of landing the desired job opportunities.

In proving the capability of AI to streamline and optimize talent acquisition and professional development, the project showcases technology's catalytic effect in contemporary hiring and learning. Beyond simplifying candidate sourcing, this system also enhances ongoing learning to keep students and professionals up-to-date in an ever-changing workforce. In effect, this system makes the recruitment and hiring process more efficient, better-informed, and more balanced for both employers and workers, solidifying the position of AI as an effective driver of workforce development.

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