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Students Placement Assistance System

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ABSTRACT: This paper presents the design and development of a Students Placement Assistance System that leverages machine learning and web technologies to improve placement outcomes in academic institutions. Traditional placement methods are often inefficient and lack personalized support for students. The proposed system addresses these challenges by predicting placement eligibility using logistic regression, analysing resumes through NLP techniques, and providing actionable feedback to enhance employability. Built as a web application using React.js, Node.js, and MongoDB, the system offers separate modules for students, administrators, and recruiters. Students can register, input academic and skill-related information, and receive placement predictions along with resume improvement suggestions. Administrators can manage student records and company requirements while accessing analytics dashboards to track placement performance. Experimental evaluation using real academic data achieved a prediction accuracy of 87.3%, demonstrating the system's reliability. Feedback collected from a user base of over 100 students revealed a significant improvement in confidence and interview readiness. This system not only automates placement workflows but also empowers students with insights to better align their skills with industry requirements.

KEYWORDS: Machine Learning, Resume Analysis, Web Application, Predictive Modelling, Career Assistance

I. INTRODUCTION

In recent years, the competition for employment opportunities among graduating students has intensified. Academic institutions face the dual challenge of preparing students for industry while streamlining the placement process. Manual procedures lack efficiency and fail to offer personalized guidance based on individual student profiles. This research introduces a smart placement assistance system that aims to automate and personalize the campus recruitment process by using predictive analytics and intelligent resume evaluation. It provides a holistic solution that benefits both students and training and placement (TnP) cells.

II. SYSTEM OVERVIEW

The system is composed of three major modules: the student interface, the administrative panel, and the recruiter dashboard. The student module allows users to build detailed profiles including academic records, projects, certifications, and extracurricular activities. An integrated resume analyser evaluates uploaded documents and provides suggestions using keyword matching and NLP scoring. The prediction engine estimates a student's likelihood of being placed based on features such as CGPA, number of internships, skill set, and soft skill ratings. Meanwhile, the admin module enables staff to manage company postings, track student participation, and visualize placement trends. Recruiters can define job requirements and access lists of eligible candidates.

III. LITERATURE SURVEY

Several research efforts have focused on improving the campus placement process using data analytics, web technologies, and automation. In [1], Singh et al. proposed a machine learning-based system to predict student placement eligibility using logistic regression and decision trees [1], The study demonstrated that historical academic data can be used effectively to forecast placement outcomes, though the system lacked integration with real-time web interfaces. Developed a resume evaluation tool using natural language processing (NLP), which scored resumes based on keyword relevance and formatting. However, the tool was standalone and not linked to placement prediction

systems [2]. Agarwal implemented a campus placement management portal using PHP and MySQL, which simplified data entry and reporting but lacked intelligent decision-making features.[3]

Other studies have incorporated more advanced predictive models such as support vector machines and random forests, though these models often suffer from reduced interpretability. Additionally, commercial platforms like Superset and Interns Hala offer placement tracking and job applications but do not provide personalized analytics or resume feedback. Unlike these systems, the proposed solution integrates a lightweight Python Flask backend with a predictive model and resume analyser, offering a unified, student-centric platform for placement assistance. This integration of web technologies, machine learning, and NLP techniques within a single application distinguishes the proposed work from previous studies and provides a more actionable tool for both students and institutions.

IV. METHODOLOGY

The machine learning model at the core of the system is a logistic regression classifier trained on historical placement data from the past three academic years. Features such as GPA, technical certifications, programming languages known, and participation in events were encoded and normalized. The data was split into training and test sets using an 80-20 ratio. Evaluation metrics included accuracy, precision, recall, and F1-score. The model achieved an overall accuracy of 87.3% and an F1-score of 85.1%. Comparisons with decision tree and random forest models showed slightly lower performance, affirming the reliability of the chosen model.

V. SYSTEM ARCHITECTURE

The architecture of the Students Placement Assistance System is designed as a three-tier web application, ensuring modularity, scalability, and ease of deployment. The system consists of the frontend layer, backend layer, and data layer, each with distinct responsibilities.

The frontend layer is developed using HTML and CSS, providing a responsive and user-friendly interface for students and administrators. It enables students to register, log in, fill out academic and skill-based forms, and upload resumes. The administrator interface allows placement officers to manage company records, view student profiles, and generate eligibility lists.

The backend layer is built using the Flask framework in Python. It handles all business logic, user authentication, session management, form processing, and communication between the user interface and the machine learning modules. This layer also integrates the resume analysis engine and the predictive model, ensuring real-time feedback and placement probability calculations.

The data layer consists of an SQLite database used to store student records, academic data, skill profiles, company job descriptions, and prediction outputs. The machine learning model, trained using scikit-learn, is serialized and loaded at runtime to predict the likelihood of placement for each student.This layered architecture allows for clear separation of concerns, enabling independent development, testing, and maintenance. Additionally, the system supports future scalability, such as integrating advanced models, external APIs, or migrating to a more robust database system like PostgreSQL or MongoDB.

VI. IMPLEMENTATION

The system was developed as a full-stack web application. The frontend was built using React.js to ensure responsiveness and an interactive user experience. The backend API was implemented using Node.js and Express.js, with MongoDB used for flexible, schema-less data storage. The machine learning model was trained using Python's scikit-learn library, and the resume analyser was built with PDF Miner and spicy for text extraction and keyword analysis. The system uses JWT-based authentication to ensure secure, role-based access control.

VII. RESULTS AND DISCUSSION

Testing was conducted with a sample group of final-year students and placement officers. The prediction model provided accurate results in 9 out of 10 cases when tested against actual placement outcomes. The resume analyser significantly improved resume quality scores, increasing the average score from 60 to 80 after two rounds of feedback.

Survey feedback from users indicated that 92% found the system helpful in preparing for job interviews and shortlisting relevant opportunities. Placement officers appreciated the efficiency and ease of generating eligibility lists and analysing department-wise trends.

VIII. CONCLUSION

The Students Placement Assistance System provides a modern, intelligent platform to enhance the employability of students and simplify placement coordination. By integrating data analytics, machine learning, and intuitive interfaces, the system offers actionable insights to students and tools for administrators to monitor and improve outcomes. The system can be extended further by incorporating deep learning models, LinkedIn integration, and a mobile application for broader access and real-time notifications.

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