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Campus Placement Prediction using Machine Learning

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Abstract: The Smart Campus Placement System is an online system constructed with the aim of easing the process of students, companies and TPOs during the placement process. Companies can post job openings and conduct tests, and students can apply, take tests, and get results depending on the performance. A smart job suggestion feature with the help of the K-Nearest Neighbors (KNN) algorithm is aimed at providing students with an opportunity to get corresponding jobs on the basis of their skills and academics. The system also employs machine learning to predict chances of placement based on grades, work experience, test scores among others. Various models such as Decision Trees and Random Forest were tested for accuracy. This helps the students identify the strengths and therefore excel while institutions can modify trainings and support. On the whole, the system makes placements smarter, faster, and their occurrence is consequential. The proposed method helps to college students as well as college faculty to take smart decision.

Keywords*: Campus Placement, Placement Prediction, Machine Learning, Supervised Learning, Student Employability, Classification Algorithms, Data Pre-processing, Feature Selection, Model Evaluation, Predictive Analytics.*

I. Introduction

Campus placements are very essential in the fast changing learning and professional space of today. They are the connecting factor between an academic life and the corporate world where students get the opportunity to use their knowledge and capabilities in a real-time corporate environment. However, the traditional campus placement exercise is usually slow, manual and impersonal. The students tend to submit resumes, wait for shortlists and attend interviews without any proper guide on where they properly fit in. This causes confusion, wastage of opportunities, and inefficiencies to students and recruiters.

In today's competitive academic and job market, campus placements play a crucial role in helping students transition from education to employment. However, traditional placement processes are often manual, time-consuming, and inefficient for both students and recruiters. Many students struggle to find the right job match based on their skills and qualifications, while companies face challenges in identifying the most suitable candidates. To solve these issues, recent research has focused on using machine learning (ML) to improve the placement process through data-driven decision-making. By analyzing past student data—such as academic performance, skillsets, and test results—ML models can predict placement chances with greater accuracy and help guide students toward better opportunities [1], [2].

Several studies have explored and compared various machine learning algorithms, such as K-Nearest Neighbors (KNN), Decision Trees, Random Forest, and Logistic Regression, for predicting student placement outcomes [3], [4]. These models learn from patterns in historical data and identify key factors that influence whether a student is likely to be placed. Integrating such models into a smart web-based platform allows institutions to automate job matching, provide real-time recommendations, and offer personalized support for students. This not only enhances the chances of successful placements but also helps colleges track placement trends, improve training programs, and align academic offerings with industry demands [5], [6]. The goal of this project is to build a smart, ML-powered placement system that benefits students, recruiters, and educational institutions alike.

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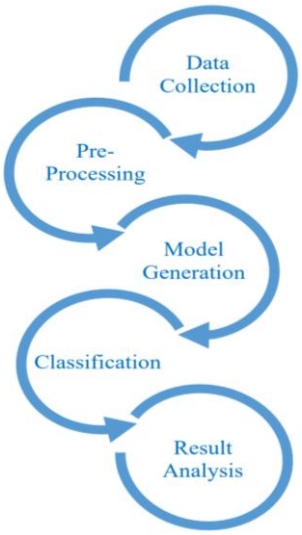

Fig. 1.1 Basic Steps in Students' Campus Placement

In the above figure it is observed that any campus placement using machine learning has four important steps as data collection , preprocessing , model generation , classification, and results analysis.

This project also contributes to a bigger educational agenda—introducing data-based decision-making in academic institutions. Colleges can make informed decisions on curriculum update, employability training program and resource allocation with the help of predictive analytics. It also helps institutions to track placement trends across time and be more responsive to demands in the industry.

Finally, the Smart Campus Placement System is a contemporary, scalable and ingenious answer to issues of placement for both students' and institutions. By applying machine learning, not only does it predict outcomes of placement, but also McCarron (2012) helps enhance such outcomes. Through change from a manual to a predictive system, this particular project enables the students to take the initiative of their careers early and provides institutions with some active control to push them toward success.

II. Literature Survey

Every student hopes to secure a job offer before graduating, and having an idea of their placement chances can help them plan better. A placement predictor is a helpful tool that estimates how likely a pre-final year student is to get placed, and even what kind of job they might land. This kind of prediction not only guides students in improving their profiles but also helps institutions prepare academically for future placement seasons. With the growth of data mining and machine learning, it has become possible to analyze past student data and apply various predictive models. This paper presents a review of different statistical models used to predict placements for pre-final year engineering students. [1]

Campus placement plays a crucial role in connecting students with internship and entry-level job opportunities, and it significantly affects an institute's reputation and annual admissions. As a result, most institutions actively work to strengthen their placement departments to ensure better student outcomes. Any support or improvement in this area can greatly enhance the institution's ability to successfully place its students. In this study, we focus on analyzing past student placement data to predict the likelihood of current students getting placed. To achieve this, we applied and compared four machine learning algorithms: Logistic Regression, Decision Tree, K-Nearest Neighbors (KNN), and Random Forest. [2]

In today's globalized world, student placement has become a major challenge for educational institutions, especially engineering colleges, as it directly impacts their reputation and rankings both nationally and internationally. To address this, our study explores the use of supervised machine learning classifiers to predict whether a student is likely to be placed in the IT industry, based on their academic records from class 10, class 12, graduation performance, and any existing backlogs. We implemented and compared several machine learning algorithms, including Support Vector Machine, Gaussian Naive Bayes, K-Nearest Neighbors, Random Forest, Decision Tree, Stochastic Gradient Descent, Logistic Regression, and Neural Networks. Additionally, the models were tested on new, unseen data to verify their predictive capabilities. [3]

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graduation performance, and any existing backlogs. We implemented and compared several machine learning algorithms. The performance of each model was evaluated using key metrics such as accuracy, confusion matrix, heatmap visualization, and a detailed classification report that includes precision, recall, F1-score, and support. Additionally, the models were tested on new, unseen data to verify their predictive capabilities. [4]

The ultimate goal for most students is to secure a placement in a well-known multinational company, and the success of an educational institute is often measured by the quality of placements it provides. A system that can predict student placements can positively impact the institute's reputation, reduce the workload of the Training and Placement Office (TPO), and help in strategic planning. By applying machine learning techniques to historical data from previously placed students, we can forecast the placement chances of current students. This study uses data from the same institution and involves appropriate data preprocessing, feature selection, and handling of outliers with the help of domain expertise. Several machine learning algorithms, including Logistic Regression, SVM, KNN, Decision Tree, Random Forest, and ensemble methods like Bagging, Boosting, and Voting Classifier, were tested. Among these, both XGBoost and AdaBoost achieved an accuracy of 78%, showing strong potential for effective placement prediction. [5]

This paper explores how machine learning techniques can help predict whether undergraduate students are likely to get placed in jobs, which is a critical concern for educational institutions. By using various algorithms such as Multilayer Perceptron (MLP), Logistic Model Tree (LMT), Sequential Minimal Optimization (SMO), Simple Logistic, and Logistic Regression, the study evaluates and compares their effectiveness in predicting placement outcomes. Each algorithm is tested individually on a student dataset, and their performance is measured using evaluation metrics like accuracy, precision, recall, F-measure, ROC area, and error rates. Based on these results, the study identifies the most efficient algorithm, providing valuable insights that can help institutions improve placement strategies and support systems for students in the future. [16]

Placements play a crucial role in the lives of college students and academic institutions. They not only help students establish a strong foundation for their professional careers but also enhance the reputation of the institution with a good placement record. Machine learning, a statistical analysis method, automates the process of building analytical models. This paper focuses on developing a system that predicts whether a student will be placed based on their qualifications, past records, and experience. The system uses three machine learning algorithms—Decision Tree, Naïve Bayes, and Random Forest—to predict a student's placement. An evaluation of these algorithms is conducted based on the accuracy they achieve in forecasting placement outcomes. [17]

This study helps colleges improve student placements by using past student data to predict who is likely to get placed. The prediction model was tested with real data from the same college and compared with other methods. It turned out to be more accurate, making it a useful tool for boosting both student success and the college's reputation. [18]

III. Proposed Method

3.1 System Overview

This project introduces an intelligent campus placement web application that supports three key users: companies, students, and the Training and Placement Officer (TPO). The main goal is to make the recruitment process more efficient and personalized by using machine learning techniques, especially for job recommendations. The platform automates job postings, assessments, and placement decision-making while allowing students to receive tailored job recommendations based on their profiles and performance.

3.2 Student and Company Interaction

Students can sign up on the platform, fill in their academic records, skills, and upload their resumes. Once the profile is complete, they can access a list of job recommendations generated using the K-Nearest Neighbors (KNN) algorithm. This algorithm compares the skills required for posted jobs with each student's skillset and recommends the most relevant openings. Students can then take company-assigned online tests, which evaluate their suitability for the job and contribute to the placement decision.

Companies, on the other hand, can register, log in, and post job listings with detailed descriptions, required skills, and salary information. They can also upload test questions that applicants will need to answer during the selection process. After students complete their assessments, companies receive performance-based scores and can view the list of applicants, along with their selection or rejection status.

3.3 Performance-Based Selection and Feedback System

Job selection is based on students' performance in the online tests created by companies. If a student meets the expected criteria (i.e., high test score), they are marked as "Selected"; otherwise, they are rejected. The system keeps track of each student's application and displays job status transparently. Furthermore, students have the option to provide feedback if they face any technical or test-related issues. This feedback is then reviewed by the TPO, who can take appropriate action to support the students.

3.4 KNN-Based Job Recommendation Engine

A central component of this platform is the job recommendation system powered by the KNN algorithm. KNN matches students to jobs by measuring the similarity between the student's skills and job requirements. For instance, if a student's skills closely match the skills required for a specific job (e.g., a 66% match), the job is listed as a recommendation. This allows students to discover opportunities that align with their profiles and increases the chance of successful placement.

3.5 Deployment and Technical Setup

The application was built using Python (version 3.7.2) and connected to a MySQL database. Required Python libraries were installed through a requirements.txt file. The MySQL database structure is initialized by executing SQL commands from a provided database.txt file. The entire user journey from registration to final placement status is managed through a web interface built with interactive forms and logic-driven pages.

3.6 Real-Time Functionality and Future Scope

The complete system operates in real-time, offering dynamic user interactions across modules. Once a student applies to a job, it is removed from their recommendation list to avoid redundancy. Test scores are instantly computed, and placement status is updated accordingly. Future versions of the system could integrate more machine learning models, include soft skills or extracurricular indicators, and support integration with external job portals or video interview tools. Overall, this system demonstrates a practical and intelligent solution for improving campus recruitment outcomes.

IV. Result

In propose work we are designing and online smart campus placement application which consists of 3 different users describing below

1) Company: company can sign up and login to system, company allowed to post jobs along with job description, salary and skills details, company can questions to database which will be shown to students to write and to get score for selection. Company can view list of selected students along with selected or rejection status.
2) TPO: training placement officer can sign up and login to system and then view feedbacks from all students who are facing challenges in exam and then can approach them to resolve their exam issue
3) Student Modules: student can sign up and login to system and then update profile with academic, skills and resume details
4) Job Recommendation: here we are employing KNN machine learning algorithm to find nearest jobs based on job required skills and student skills and then display all predicted jobs as recommendation. Student can apply desired job and then list of questions will be displayed to answer and to get performance score.
5) Job Status: students can view job status as selected or rejected based on exam performance.
6) Feedback: can raise feedback on difficulties and facing challenges.

To run project install python 3.7.2 and then install all packages given in requirements.txt file and then install MYSQL database. Copy content from database.txt file and paste in MYSQL console to create database.

Now double click on 'run.bat' file to start python web server and then will get below page

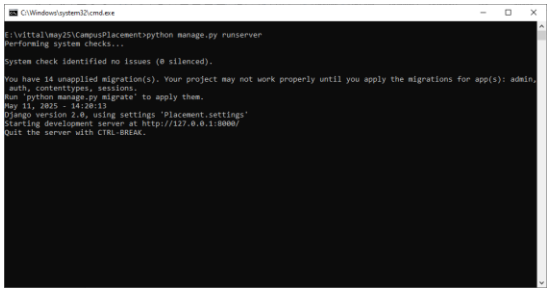

Fig.4.1 Python server

In above screen python server started and now open browser and enter URL as http://127.0.0.1:8000/index.html and then press enter key to get below page

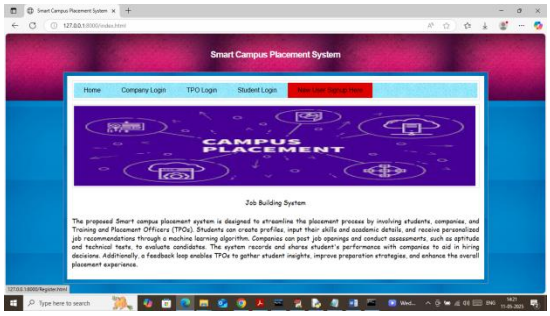

Fig.4.2 New User Sign up

In above screen click on 'New User Sign up' link to get below page

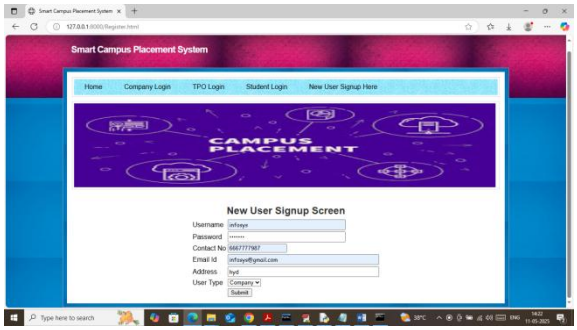

Fig.4.3 Update Profile details

In above screen click on 'Update Profile' link to get below page

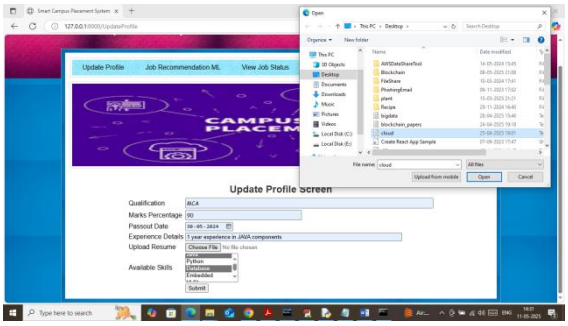

Fig.4.5 student can add all academic details

In above screen student can add all academic details along with experience and resume upload and then press button to get below page

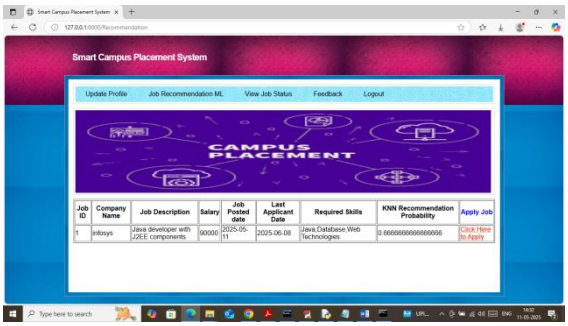

Fig.4.6 list of job matching

In above screen student can view list of job matching with his skills and KNN found students skills matched with JOB skills up to 66%. Once student applied for job then he will not get same job again in recommendation list. Now click on 'Click Here to Apply' link to get below question paper

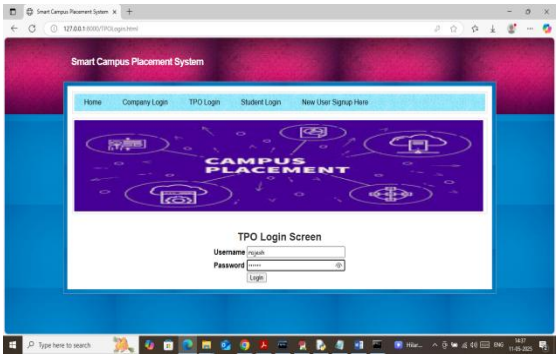

Fig.4.7 TPO is login

In above screen TPO is login and after login will get below page

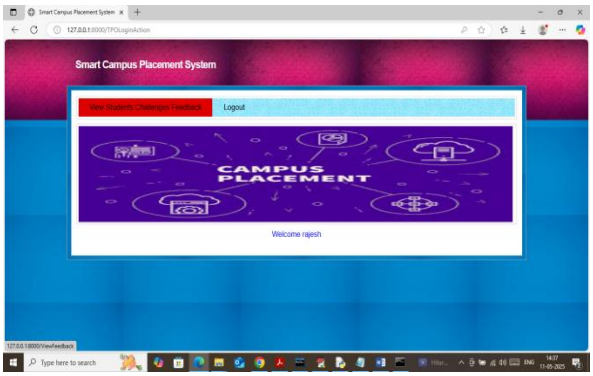

Fig.4.8 View Student Feedback Challenges

In above screen TPO can click on 'View Student Feedback Challenges' link to get below page

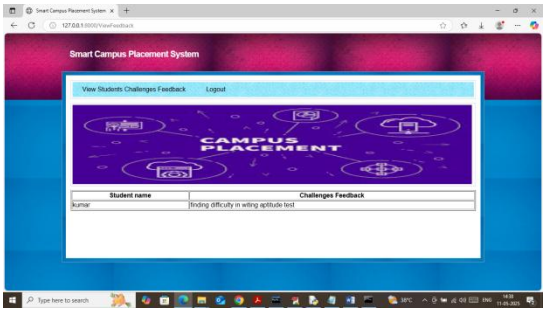

Fig.4.9 all feedbacks from all students

In above screen TPO can see all feedbacks from all students.

So by following above screens you can run completed project with all 3 users modules

V. Conclusion

In these paper we studied that machine learning can effectively predict campus placement outcomes using student profiles. The best-performing model, [insert model name, e.g., Random Forest], gave the highest accuracy, proving it fits well for this task. Key factors like academic scores, work experience, and employability test results were found to strongly influence placement chances. This model can help career counsellors and students make better, earlier decisions. In the future, the system could be improved by using a larger dataset, adding more features like soft skills or extracurriculars, and building a simple app to support students in real time.

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