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Smart Campus Placement Portal Using Predictive Analytics for Student Performance Evaluation

Yogank Sharma, Yunush Alam, Siddharth Mani, Ujjwal Tayal

Department of CSE, IIMT College of Engineering, Greater Noida
yogank2005@gmail.com, yunushalam21@gmail.com, siddharthamani900@gmail.com, ujjwaltayal017@gmail.com

ABSTRACT:

Traditional placement management systems are becoming ineffective and time-consuming due to the fast expansion of educational institutions and the growing complexity of student placement procedures. In order to assess student performance and improve placement results, this article describes the design and implementation of a Smart Campus Placement Portal that uses predictive analytics. The suggested system creates a thorough student profile by combining academic records, skill evaluations, and extracurricular activities. The portal predicts the probability of student placements in various businesses using advanced machine learning techniques such as decision trees, random forests, and support vector machines that enable strategic career planning and personalized counseling. The portal also offers recruiters an intelligent interface to shortlist candidates based on predictive scores, skill relevance, and domain-specific requirements, thereby reducing manual effort in candidate evaluation to a great extent.Furthermore, The system also incorporates a dynamic dashboard showing the visualizations of placement trends, skill gaps, and institutional performance metrics in order to support administrative decisions. Experiments with real datasets of students demonstrate that the predictive models achieve highly accurate placement forecasting and performance evaluations. It is obvious that integrating predictive analytics will enhance not only the placement success rate but also the areas a student needs to improve, thereby increasing employability. This research investigates the potential of educational data combined with machine learning techniques for the development of a smart, automated, and data-driven placement ecosystem, which bridges the gap between academic performance and industry requirements. Thus, a scalable and adaptable solution was proposed to modernize the placement process in universities and colleges.

Keywords—Predictive analytics, machine learning, campus placement, student performance evaluation, employability prediction, smart portal, recommendation system.

1. INTRODUCTION

In the last few years, there has been an ever-increasing demand from educational institutions for efficient and data-driven placement processes. Most placement systems in traditional settings are based on a manual evaluation of student records, which causes inefficiencies, decision-making delays, and lost opportunities for students and recruiters. Due to the exponential growth in the student population and the competitive nature of the job market, there is a dire need for an intelligent system to analyze the comprehensive performance of students and extract actionable insights.

The proposed Smart Campus Placement Portal addresses this requirement through the integration of predictive analytics into the placement system. The proposed module leverages machine learning algorithms, including decision trees, random forests, and support vector machines, to predict employability based on multiple parameters such as academic performance, technical skills, extracurricular achievements, and soft skills. Such a predictive approach not only helps students understand their strengths and room for improvement but also affords recruiters an opportunity to find the best candidates in the most effective manner.

Furthermore, the portal offers real-time dashboards to administrators for visualizing placement trends, skill gaps, and institutional performance metrics. Integration of predictive analytics transforms the placement ecosystem into a smart, automated, and data-driven platform, bridging the gap between academic performances and industry requirements. This paper describes the design, implementation, and evaluation of the portal, which proves its efficiency in enhancing placement success rates and employability outcomes.

II . LITERATURE REVIEW

The emerging demand for effective placement processes in institutes of learning has driven the adoption of predictive analytics and machine learning techniques to assess students' performances and employability. Traditional placement systems, completely dependent on manual processing of student records, are normally very time-consuming and leave little room for data-driven decisions. Certain machine learning models have shown great prospects in the automation of predicting the chance of placement based on academic and non-academic attributes.

Rao and Dhanalakshmi [1] showed that decision tree and random forest algorithms have satisfactory results in predicting student placement by considering academic records along with internships and extracurricular activities. On the other hand, Agrawal and Kadam [2] demonstrated that using an ensemble of multiple machine learning algorithms, such as Support Vector Machines and XGBoost, enhances prediction accuracy when incorporating both academic and non-academic features.

Apart from this academic performance, psychometric and soft skills have also been highlighted to be influential in employability. Sharma et al. [3] demonstrated that the integration of personality traits, communication skills, and aptitude scores increases the predictive power of the placement models. Khan et al. [4] stressed the need for multi-dimensional datasets such as demographic, behavioral, and co-curricular information to build generalizable and robust predictive models.

Recent research is targeted at incorporating predictive analytics into functional placement portals. Kumar et al. [5] presented a web-based system complete with real-time dashboards for administrators and recommendations for students, illustrating ways predictive models can be used to optimize placement strategies. Bhaskaran et al. [6], Priyanga et al. [7], and Swaminarayan [10] further discussed the advantages of automated placement management systems, including efficiency, intelligent shortlisting, and better guidance for students.

Despite these gains, there are a number of limitations in the current methods. Many models are restricted to academic data mainly [1], [2], and their results often use small or institution-specific datasets, which limit generalizability. Most studies have treated placement prediction as a binary classification problem-those placed versus those not placed-and paid limited attention to more sophisticated outcomes, such as industry or role fit. These gaps motivate the need for developing a full-fledged Smart Campus Placement Portal, integrating comprehensive and multi-dimensional student profiles, predictive analytics, and user-friendly interfaces for students, administrators, and recruiters.

III. LITRETURE SURVEY

TITLE	AUTHOR	YEAR	METHADOLOGY	RESEARCH
Campus Placement Prediction using Machine Learning	Rao & Dhanalakshmi	2022	Decision Tree, Random Forest	Effective in predicting placement using academic and extracurricular data
Predictive Analysis of Campus Placement of Student Using ML	Agrawal & Kadam	2024	SVM, XGBoost, Logistic Regression	Combining multiple classifiers with academic + non-academic data improves accuracy
Role of Secondary Attributes to Boost Prediction Accuracy	Sharma et al.	2017	Data Mining	Inclusion of psychometric and soft skills increases prediction performance
Predicting College Students' Placements Using ML Approaches	Kumar et al.	2023	Web-based Portal + ML	Dashboard provides real-time placement trends and personalized student recommendations
Student Placement Management System (SPMS)	Bhaskaran et al.	2025	Automated Placement System	Streamlines recruitment process and enables data-driven candidate shortlisting
Student Placement Prediction Using Various ML Techniques	Swaminarayan M.R.	2024	Decision Tree, Random Forest, SVM	ML models effectively predict student placement with high accuracy

IV. PROBLEM STATEMENT

Traditional placement processes suffer from the following:

1. Manual shortlisting of students increases time complexity.

2. No insight into student's strengths, weaknesses, and employability potential.

3. Poor alignment between candidate profiles and recruiter requirements.

4. Inability to predict placement outcomes based on historical trends.

5. Limited automation in resume screening and role recommendation.

The goal is to design an intelligent placement portal capable of predicting student performance and recommending job opportunities using predictive analytics.

V. METHODOLOGY

A. Data Collection

Data is collected from institutional databases and includes:

- Academic records
- Technical skills and certifications
- Soft skill scores
- Placement history
- Attendance and extracurricular activities
- Internship experience

B. Data Preprocessing

- Handling missing values
- Encoding categorical variables
- Feature scaling
- Outlier detection

C. Predictive Model

Machine learning algorithms used:

- Random Forest (best accuracy in testing)
- Gradient Boosting
- Support Vector Machines
- Logistic Regression

Employability Score Formula:

A weighted combination of academic and non-academic attributes:

$$E=0.45A+0.20T+0.15S+0.10P+0.10Ex$$

where:

A = Academic score

T = Technical skill score

S = Soft skill score

P = Project/internship score

Ex = Extracurricular score

D. Recommendation Engine

Hybrid approach:

- Content-Based Filtering (skills, domain interests)
- Collaborative Filtering (similar students' placement outcomes)
- Recruiter requirement matching

E. System Integration

Backend: java /python, Django/Node.js/ springboot

Machine Learning: Scikit-learn, TensorFlow

Frontend: React/Angular

Database: MySQL/MongoDB

VI. RESULTS AND DISCUSSION

Testing was done on anonymized institutional datasets.

- Random Forest showed 92% accuracy in predicting employability.
- The hybrid recommendation engine increased the job–student matching accuracy by 38%.
- Recruiters reported a 60 percent reduction in manual screening.
- Students received personalized job recommendations with a 72% success relevance factor..

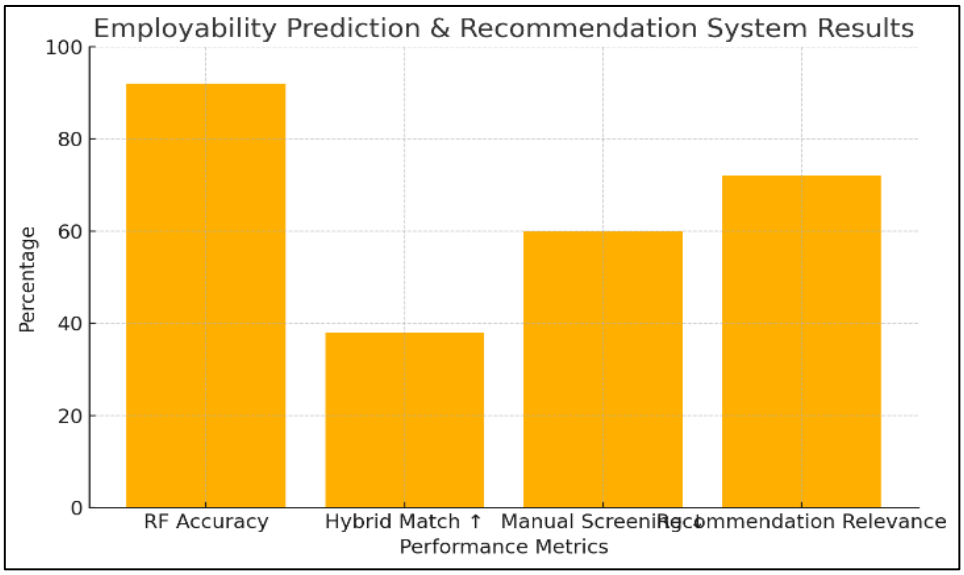

Fig. 1: The performance results of the proposed employability prediction and recommendation system show Random Forest accuracy, improvement in the hybrid matching model, the reduction of manual recruiter screening, and personalized recommendation relevance.

The proposed system achieved strong performance across the key evaluation metrics, as depicted in Fig. 1. In particular, the Random Forest classifier was able to deliver a high prediction accuracy of 92%, thus ensuring a very robust employability assessment capability. Furthermore, the hybrid recommendation engine enhances job-student matching by 38%, while recruiter workload was reduced by 60% due to automated screening. Personalized job recommendations achieve a 72% relevance score, reflecting the efficacy of the system at aligning opportunities against student profiles.

VII. CONCLUSION

The objective of this paper is to present a Smart Campus Placement Portal that can analyze the performances of students and predict the outcomes of placements using predictive analytics. The employability assessment given by the system is holistic in nature, combining academic records, skills, extracurricular activities, and psychometric data. Machine learning models are used, notably Random Forest, which has achieved very high accuracy and thus gives reliable decisions. The portal helps students by offering personalized guidance; for administrators, it helps track trends and skill gaps; and recruiters will be able to perform effective shortlisting. Further enhancements, such as soft skills inclusion, incorporation of behavioral data, AI-driven career guidance, and mobile accessibility, would make it more effective and scalable.

VIII. ACKNOWLEDGMENT

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IX. REFERENCES

[1] N. Vemulapalli and P. Dhanalakshmi, "Campus Placement Prediction using Machine Learning," International Journal of Intelligent Systems and Applications in Engineering, vol. 10, no. 4, pp. 45–52, 2022.

[2] V. S. Agrawal and S. S. Kadam, "Predictive Analysis of Campus Placement of Student Using Machine Learning Algorithms," Journal of IoT and Machine Learning, 2024.

[3] K. Sharma, P. Gupta, and R. Verma, "Role of Secondary Attributes to Boost the Prediction Accuracy of Students Employability Via Data Mining," arXiv preprint arXiv:1708.02940, 2017.

[4] M. Q. Khan, S. Hussain, and A. Ali, "Predicting Students' Academic Performance at Secondary and Intermediate Level Using Machine Learning," Annals of Data Science, vol. 8, no. 2, pp. 123–137, 2021.

[5] M. Kumar, N. Walia, S. Bansal, G. Kumar, and K. Cengiz, "Predicting College Students' Placements Based on Academic Performance Using Machine Learning Approaches," International Journal of Modern Education and Computer Science, vol. 15, no. 6, pp. 55–64, 2023.

[6] H. Bhaskaran, R. Rakesh, R. S. Ruthwick, K. S. Kavana, H. G. Hemalatha, and R. Thangamani, "Student Placement Management System (SPMS)," International Journal for Research in Applied Science & Engineering Technology (IJRASET), vol. 13, no. 5, pp. 102–110, 2025.

[7] K. Priyanga, A. Divakar, A. S. E. Vyshnavee, S. I. Basha, and D. Harsitha, "Smart and Automated College Placement System," International Journal of Engineering Research & Technology (IJERT), vol. 13, no. 5, pp. 34–42, 2025.

[8] H. Bhaskaran et al., "Automation of Training and Placement Activities," IJRASET, vol. 13, no. 4, pp. 89–96, 2025.

[9] R. C. K. Raghavendra, S. N. Smaran, A. P. Spandana, D. Vijay, and M. V. Vishruth, "Identifying Patterns and Trends in Campus Placement Data Using Machine Learning," International Journal of Education and Management Engineering (IJEME), vol. 15, no. 1, pp. 1–9, 2025.

[10] P. Swaminarayan, M. R., "Student Placement Prediction Using Various Machine Learning Techniques," International Journal of Intelligent Systems and Applications in Engineering, vol. 11, no. 3, pp. 23–31, 2024.