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# Revolutionizing Campus Placements in Engineering and Technology: A Data- Driven Approach with Artificial Neural Networks

**Saurabh Liman, Harshada Thombare, Payal Shelar, Aishwarya Argade, Prof. R. A. Nikam**

Department of Information Technology, Anantrao Pawar College of Engineering and Research, Pune, India

**ABSTRACT:** Student placements play a pivotal role in shaping thereputation of educational institutions, particularly in Engineering and Technology domains. However, predicting these placements accurately and early on presents a significant challenge. Traditional methods of placement forecasting often lack accuracy and timeliness, leading to uncertainty among students and institutions alike. This uncertainty can hinder students' career planning and impact institutional credibility. This research leverages the power of Artificial Neural Networks (ANN) to forecast student placements with precisionand efficiency. Following the CRISP (Cross-Industry Standard Process) methodology, a comprehensive evaluation of various ANN models is conducted to identify the most proficient one. The study identifies an ANN model as the top performer, capable of offering early-stage placement predictions. Additionally, an "Advanced Placement Status Notification (APSN)" web module is introduced, empowering students withprior access to their placement status and offering opportunitiesfor skill enhancement.

**KEYWORDS:** Student Placement, Engineering Education, Artificial Neural Networks, CRISP Methodology, Early-Stage Prediction, Advanced Placement Status Notification, SkillEnhancement, Career Planning, Institutional Reputation

## I. INTRODUCTION

Student placements in Engineering and Technology are crucial in shaping the professional journey of students and contributingto the reputation and standing of educational institutions. These fields thrive on innovation, adaptation, and the application of theoretical knowledge to real-world scenarios. The anticipation and precision of placements directly impact the success and efficacy of academic programs in these fields.

In today's competitive job market, employers place great emphasis on the caliber of graduates entering the workforce, often evaluating institutions based on the success of their placement programs. Educational institutions are under constant pressure to ensure their graduates are not only academically proficient but also well-prepared for the demandsof the industry. Student placements serve as a barometer of theeffectiveness of educational curricula and approaches within Engineering and Technology disciplines. Institutions that successfully place their students in reputable companies and organizations not only bolster their reputation but also validatethe quality of education they provide. Conversely, institutions that struggle with placements may face scrutiny regarding the relevance and adequacy of their programs, potentially leading to a decline in enrollment and funding.

In conclusion, student placements in Engineering and Technology play a multifaceted role in the dynamic landscape of higher education, shaping individual career trajectories, institutional reputation, and the efficacy of educational programs. This study aims to address the uncertainty surrounding student placements in Engineering and Technology education by leveraging Artificial Neural Network (ANN) techniques for placement prediction. Traditional methods of placement prediction often rely on historical data and manual analysis, which may lack the accuracy and timeliness required to meet the evolving demands of the job market. ANN techniques have demonstrated the ability to analyze complex patterns within large datasets and make accurate predictions, offering a promising solution to the challenge of uncertainty in placements.

The study seeks to improve the overall student experience within Engineering and Technology education by providing students with early insights into their placement prospects, empowering them to make informed decisions about their academic and professional pathways, ultimately enhancing their satisfaction and success. Additionally, the study's focus on ANN techniques has broader implications for institutional reputation and competitiveness. Institutions that

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accurately predict and place their students in reputable companies and organizations enhance their reputation as providers of high- quality education and talent, attracting top-tier students and faculty, as well as fostering stronger partnerships with industrystakeholders. The relevance and applicability of the results extend far beyond academia, encompassing broader socio- economic challenges, particularly the issue of youth unemployment in India. The study's focus on leveraging Artificial Neural Network (ANN) techniques for student placement prediction aligns closely with the urgent need to bridge the gap between educational attainment and employability, thereby offering tangible solutions to this pressing societal issue.

Youth unemployment remains a significant challenge in India, with a large proportion of educated young people struggling tosecure meaningful employment opportunities that align with their skills and aspirations. This mismatch between educational outcomes and labor market demands not only hampers individual career prospects but also stifles economic growth and social progress. Initiatives that promote curriculum enhancements and skills development within the realm of Engineering and Technology education address a key aspect ofthe youth unemployment challenge. By advocating for curriculum enhancements and skills development within the realm of Engineering and Technology education, the research addresses a key aspect of the youth unemployment challenge.

By identifying the most proficient ANN models for predicting student placements and introducing innovative approaches such as the "Advanced Placement Status Notification (APSN)" web module, the research offers concrete strategies for empowering students and enhancing their readiness for the workforce.

In conclusion, the relevance and applicability of the results lie in their potential to contribute to broader socio-economic objectives, including the reduction of youth unemployment andthe promotion of inclusive growth. By advocating for curriculum enhancements and skills development within the context of Engineering and Technology education, the research offers a pathway toward empowering young people, fostering innovation, and driving sustainable development in India and beyond.

## II. LITERATURE SURVEY

The utilization of Artificial Neural Networks (ANNs) has garnered significant attention in campus placement prediction. Starting from 2019, researchers delved into the application of ANNs alongside traditional machine learning algorithms, evaluating their performance in predicting placement outcomes based on diverse features such as academic records, technical skills, and extracurricular activities. Following studies in 2020 sought to compare the efficacy of ANNs with other predictive models like logistic regression and k-nearest neighbours, witha particular emphasis on metrics like accuracy and precision. By 2021, researchers began exploring ways to enhance ANNs through feature selection techniques such as correlation analysis and principal component analysis, aiming to improve model performance and interpretability. Building upon this foundation, 2022 witnessed further advancements in ANNs, particularly in the deep learning, with the integration of convolutional and recurrent neural networks to handle complex, high-dimensional data for more accurate predictions. The subsequent year, 2023, saw a continuation of this trend with studies focusing on temporal analysis using time series forecasting within ANN frameworks to predict future placement trends. Additionally, efforts were made to enhance model robustness and transparency through ensemble learning methods and explainable AI techniques, respectively, all contributing to the evolving landscape of campus placement prediction. These underscored growing significance of ANNs in providing accurate, reliable, and interpretable predictions to support students, universities, and recruiters in making informed decisions during the placement process.

**Research Gap**

Despite significant advancements in predicting student placements within Engineering and Technology education, a notable research gap persists in effectively integrating Artificial Neural Network (ANN) techniques with innovative approachesfor enhancing placement forecasting accuracy. While existing literature provides insights into various methodologies and challenges, there remains a need for studies that systematically evaluate the efficacy of ANN models in real-world placement scenarios. Additionally, there is a lack of research focusing on the development and implementation of practical solutions, such as the "Advanced Placement Status Notification (APSN)" web module, to empower students and address the uncertainty surrounding placements. Thus, there exists an opportunity to bridge this gap by conducting research that not only evaluates ANN models' performance but also introduces and evaluates practical tools aimed at improving the placement process for students in Engineering and Technology education.

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## III. PROPOSED SYSTEM

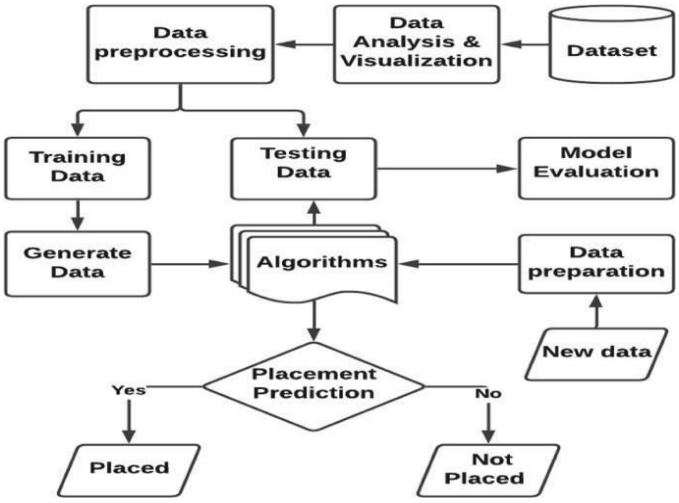


Figure 3.1: System Architecture

- **Dataset Acquisition:** Begin by gathering a comprehensive dataset containing historical information about students, includingacademic performance, skills, and placement outcomes.
- **Data Analysis:** Perform exploratory data analysis (EDA) togain insights into the dataset, such as data distributions, correlations,and anomalies.
- **Data Pre-processing:** Handle missing values, outliers, and any inconsistencies in the dataset. Encode categorical features intonumerical values if necessary.
- **Data Splitting:** Divide the dataset into two parts: training data and test data to evaluate the model's performance.
- **Data Preparation:** Further prepare the data by scaling or normalizing features to ensure that the model performs effectively.
- **Model Selection:** Choose an appropriate machine learning algorithm for placement prediction. Common algorithms includelogistic regression, decision trees, random forests, and support vector machines.
- **Model Training:** Train the selected model using the trainingdataset. The model learns the underlying patterns in the data that lead to placement outcomes.
- **Model Evaluation:** Evaluate the trained model's performance using the test dataset. Common evaluation metrics include accuracy,precision, recall, F1-score, and ROC AUC.
- **Generate New Data:** Utilize the trained model to predict placement outcomes for new data, such as incoming students. Thisprovides placement predictions based on historical patterns.
- **Placement Prediction: -** Use the model to predict whethera student is likely to be placed or not placed based on their academic andpersonal attributes.
- **Placement Outcome: -** Provide placement predictions as outputs, along with a confidence score indicating the model's confidencein its prediction.
- **Model Refinement: -** Continuously refine the model by incorporating new data and updating it with the latest placementoutcomes. By following this methodology, you can develop an effective model for campus placement prediction, assisting educational institutions and students in making informed decisions about their future career prospects.

**Algorithm – Artificial Neural Network (ANN)**

In the context of the provided content, the architecture of an artificial neural network (ANN) plays a crucial role in addressing the challenge of forecasting student placementswithin the domain of Engineering and Technology education. Let's elaborate on the various types of layers available in an ANN and how they contribute to the overall process:

**1. Input Layer:**

- The input layer of the ANN receives data related to student profiles, academic performance, and other relevant attributes.

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- In this research, the input layer would accept information such as academic grades, project involvement, certified coursescompleted, and internship experiences of students.
- Each neuron in the input layer represents a specific feature or attribute of the student data.

**2. Hidden Layers:**

- Hidden layers are the intermediary layers in the ANN architecture, responsible for processing and analyzing the input data toextract meaningful patterns.
- In the context of student placement forecasting, the hidden layers would perform computations to identify correlations between different features, suchas the relationship between academic performance and placement outcomes.
- By evaluating various ANN models, as mentioned inthe research, the hidden layers help identify the mostproficient model thatoffers accurate placement predictions.

**3. Output Layer:**

- The output layer of the ANN generates predictions or classifications based on the processed information from the hiddenlayers.
- In this research, the output layer would produce predictions regarding student placements, indicating whether a student islikely to be placed in a particularjob or company.
- The introduction of the "Advanced Placement StatusNotification (APSN)" web module further enhancesthe functionality ofthe output layer by providing students with early access to their placement status.

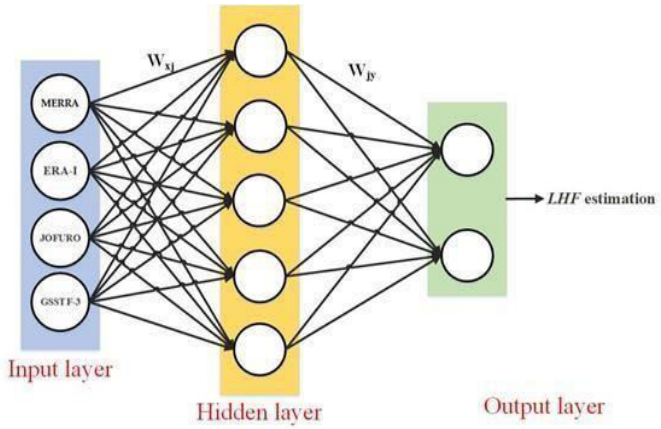


Figure 3.2: Structure of Artificial Neural Network (ANN)Algorithm.

**Additional Layers (Optional):**

- Depending on the complexity of the task and the specific requirements of the research, additional layers such as convolutional layers, recurrent layers, or dropout layers may be included in the ANN architecture.
- These additional layers help improve the performance and accuracy of the ANN models, contributing to more reliableplacement predictions.
- Overall, the architecture of the ANN in this research encompasses input, hidden, and output layers, along with potential additional layers, to effectively forecast student placements in Engineering and Technology education. By leveraging ANN techniques and meticulously evaluating various models, the research aims to address the challenge of uncertainty in student placements, ultimately contributing to theenhancement of employability among college graduates and thereduction of youth unemployment rates in India.

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## IV. USE CASE DIAGRAM

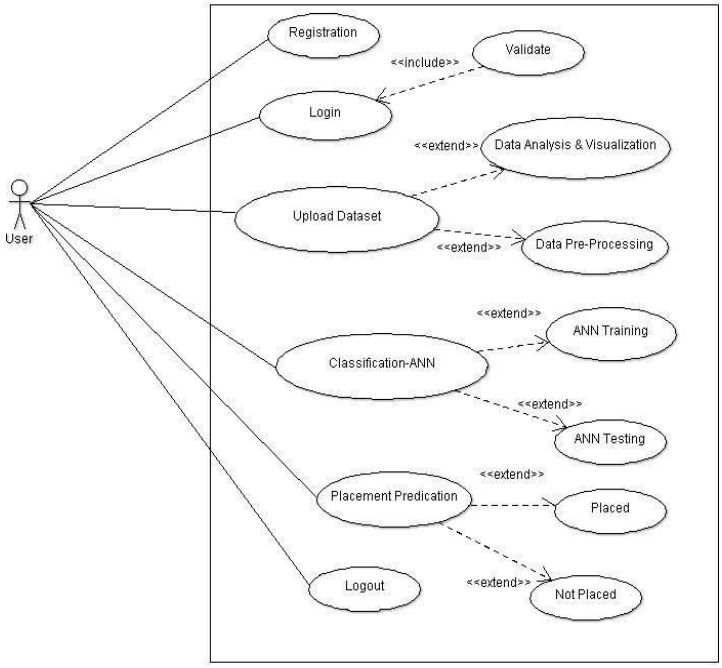


Figure 4.1: Use Case Diagram

## V. RESULT

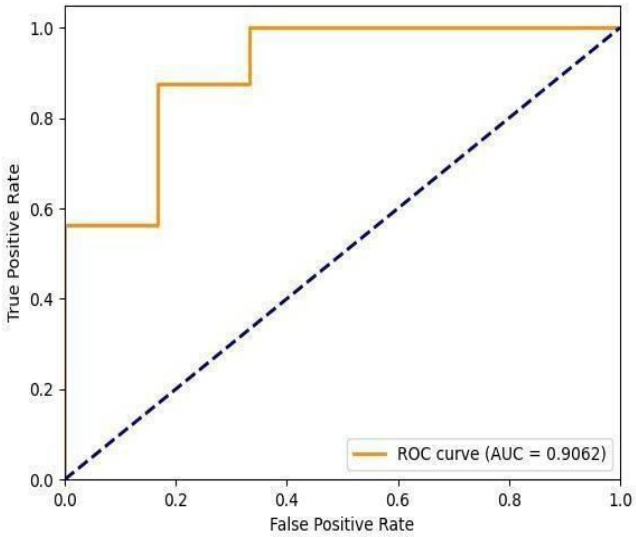


Figure 5.1: Output

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**USE CASE DIAGRAM**

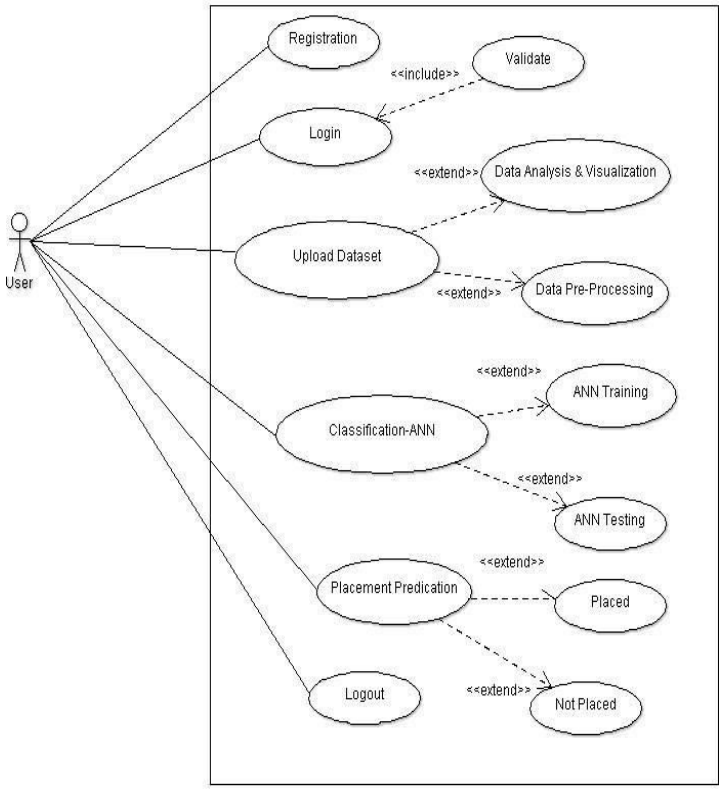


Figure 5.2: Use Case Diagram

**RESULT**

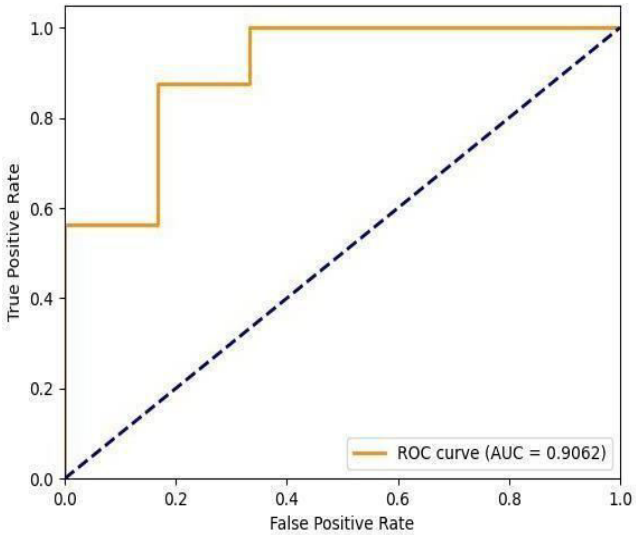


Figure 5.3: Output

## VI. CONCLUSION

The Advanced Placement Prediction and Enhancement Platform (APPEP) is a revolutionary solution that aims to revolutionize student placements in India's engineering and technology sectors. It uses advanced machine learning

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algorithms and predictive modelling techniques to provide accurate placement predictions, enabling students to make informed decisions about their career paths. This boosts studentconfidence by providing early insights into their placement status, enhancing their overall well-being and motivation. APPEP also offers personalized skill development recommendations, analysing each student's profile and identifying areas for improvement. This proactive approach equips graduates with the necessary tools to thrive in the competitive job market. Educational institutions can benefit from APPEP by offering insights into curriculum adjustments that can enhance graduate employability. By analysing placement trends and industry requirements, institutions can identify areas for improvement in their programs and implementtargeted interventions to better align their offerings with market demands. APPEP bridges the gap between academic aspirations and real-world achievements, ensuring graduates possess the skills and knowledge required to succeedin the workforce. This transformative shift in transition signifiesa smoother and more efficient journey for students as they embark on their professional careers. In essence, APPEP represents more than just a placement prediction tool; it is a catalyst for change, driving innovation, and empowerment in India's engineering and technology sectors.

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