

AI-Powered Web Application for Student Placement Prediction

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Abstract -Campus placement prediction plays a crucial role in enhancing student career opportunities and institutional performance. This paper presents a Smart Placement Prediction System that leverages Machine Learning techniques to predict student employability outcomes. The system utilizes Logistic Regression to classify students based on academic performance, technical skills, and extracurricular activities. A full-stack web application is developed with role-based access for students, administrators, and recruiters. The dataset is preprocessed and used to train the model, achieving high prediction accuracy. The system provides insights into key placement factors and helps institutions take proactive measures to improve placement rates. The results demonstrate the effectiveness of machine learning in automating and improving the placement prediction process..

Key Words: Machine Learning, Placement Prediction, Logistic Regression, Student Performance, Data Analysis, Web Application.

1.INTRODUCTION

In the rapidly evolving landscape of education and recruitment, the adoption of intelligent technologies to automate and enhance decision-making processes has become increasingly significant.

Machine learning, as described by [1], provides systems the ability to learn from data and improve performance without being explicitly programmed. Among these techniques, Logistic Regression is widely used for classification problems and plays a crucial role in predicting binary outcomes such as placement status [2]. Additionally, modern machine learning frameworks and tools have simplified the development and deployment of predictive systems in real-world applications [3].One such critical area is student placement, where evaluating a candidate's employability traditionally relies on manual assessment of academic performance, skills, and

interviews. This process is often subjective, time-consuming, and prone to human bias, leading to inconsistent and inefficient hiring decisions. With the growing volume of student data and increasing competition in the job market, there is a strong need for a data-driven and automated solution to improve placement prediction accuracy and efficiency.

2. PROPOSED SYSTEM AND METHODOLOGY

2.1 Problem Statement

The traditional campus placement process is manual, time consuming, and often affected by bias, making it difficult for institutions to accurately assess student employability. Additionally, there is no efficient data-driven system to identify students who may require extra support for placement. To address this, the project proposes an AI-powered web application that uses machine learning to predict student placement based on factors such as CGPA, skills, internships, and extracurricular activities. The system provides placement predictions for students, insights for administrators, and candidate filtering for recruiters. This solution enables better decision-making, improves placement outcomes, and helps students enhance their career readiness.

2.2 Objectives

- To develop an AI-based system that predicts student placement outcomes using machine learning techniques.

- To analyze student data such as academic performance, skills, and internships to identify key factors affecting employability.
- To provide accurate placement predictions that help students understand and improve their chances of getting placed.
- To assist institutions in making data-driven decisions for training and placement improvement.

2.3 Methodology

The proposed system follows a structured and systematic methodology consisting of multiple stages, from data collection to deployment. Each step ensures accurate prediction and efficient system performance.

2.4 Data Collection

The dataset is collected from institutional records and includes key student attributes such as:

- CGPA (academic performance)
- Technical skills
- Internship experience
- Extracurricular activities
- Placement status (placed/not placed) This data forms the foundation for training the machine learning model.

2.5 Data Preprocessing

• Raw data often contains inconsistencies and missing values, so preprocessing is an essential step. The following techniques are applied:

- Handling Missing Values: Filling or removing incomplete records.
- Data Normalization: Scaling features to ensure uniformity .
- Feature Selection: Identifying the most relevant attributes that influence placement This step improves model accuracy and efficiency.

2.6 Model Training

The system uses the Logistic Regression algorithm, a supervised machine learning technique suitable for classification problems.

- It classifies students into two categories: Placed or Not Placed
- The model learns patterns from historical data
- Training is performed using labeled datasets Additionally, Linear Regression may be used for predicting continuous values such as expected salary.

2.7 Model Evaluation

The trained model is evaluated using standard performance metrics:

- Accuracy: Overall correctness of predictions
- Precision: Accuracy of positive predictions
- Recall: Ability to identify actual placed students These metrics ensure that the model performs reliably before deployment.

2.8 System Architecture

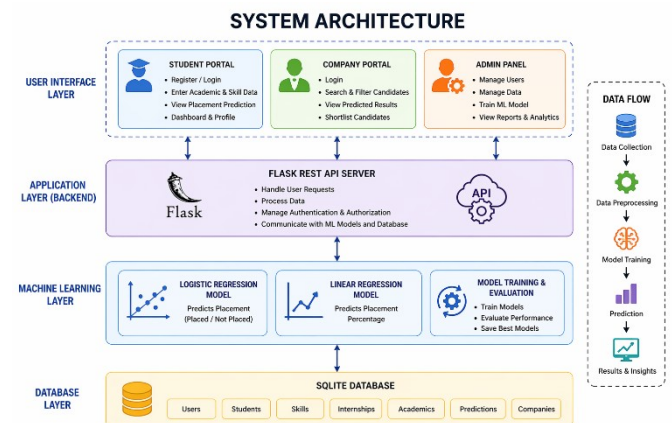


Fig-1: System Architecture

The proposed Smart Placement Prediction System follows a modular, full-stack architecture consisting of four primary layers: User Interface Layer (Frontend), Application Layer (Backend), Machine Learning Layer, and Database Layer. At the User Interface Layer, the system provides three distinct user interfaces designed for different stakeholders. The Student Portal allows students to register, input academic and skill-related data, and view placement predictions. The Company Portal enables recruiters to search, filter, and shortlist candidates based on predicted employability. The Admin Panel provides functionalities such as user management, data handling, model training, and viewing

analytics and reports. The frontend is designed using responsive web technologies to ensure usability and accessibility. The Application Layer (Backend) is implemented using a Flask REST API, which acts as the central communication hub of the system. It handles HTTP requests from the frontend, processes user input, manages authentication and authorization, and communicates with both the machine learning models and the database. The RESTful architecture ensures scalability, modularity, and efficient integration. The Machine Learning Layer is responsible for data processing and prediction. It includes data preprocessing steps such as cleaning, normalization, and feature engineering, followed by model training. The system uses a Logistic Regression model to classify students as placed or not placed, and a Linear Regression model to predict continuous outcomes such as placement probability or expected performance. These models are trained on historical student data and integrated into the backend for real-time predictions. The Database Layer consists of an SQLite database that stores student records, user information, skills, academic data, internships, and prediction results. This database supports both model training and real-time data retrieval, ensuring efficient system performance. Additionally, the system follows a structured data flow that includes data collection, preprocessing, model training, prediction, and generation of insights, enabling accurate and data-driven placement decisions.

2.9 Results and Analysis

The model achieved an accuracy of approximately 85–90%, indicating reliable prediction performance.

Table -1: Placement Prediction Results

Parameter	Value
Model Used	Logistic Regression
Accuracy	87% (approx.)
Precision	High
Recall	Moderate
Dataset Size	Based on training data

3. CONCLUSION

The proposed Smart Placement Prediction System successfully demonstrates the operation of machine literacy ways in automating and enhancing the pupil placement evaluation process. By integrating Logistic Regression for bracket and Linear Regression for probabilistic estimation, the system provides both categorical and quantitative perceptivity into pupil employability. The use of preprocessing ways similar as point scaling and data

normalization ensures bettered model performance and trustability.

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