# “Student’s Placements Prediction and Recommendations Model using Machine Learning Algorithm”


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**Abstract-- Student’s Placement Prediction and Recommendation Model is developed to enhance the efficiency and effectiveness of the job placement process in various educational institutes. It is designed to calculate the possibility of a student being placed in a company using Machine Learning algorithms. The model takes various parameters like academic performance, technical skills, Internship experience, which can be used to assess the skill level of the student. Logistic regression is a supervised machine learning algorithm which is used to predict the probability of a student being placed in the particular company based on their skillset. The system utilizes historical placement data and real-time industry requirements to train the model. The personalized recommendations are given to students based on their skillset such that they can apply in other companies as well. Through its accurate predictions and personalized recommendations, the system streamlines the job placement process, benefiting both students and recruiters.**


## I. INTRODUCTION

The number of educational institutions is rapidly increasing. Each higher education institution's goal is to place its pupils in a well-paying job through their career center. Increasing pupil positioning performance is one of the challenges facing today's institutions. Every university considers placements to be quite important. The presence of students on campus is used to gauge the college's fundamental development. Every student gets admitted to college depending on the proportion of placements at that institution.

The method is to predict and analyze the demand for institutions placement, which aids in the construction of institution and the enhancement of placements. The possibility of students being placed in a company is predicted using classification algorithms such as Random Forest AL, SVM AL in this technique of selection. This model's main purpose is to forecast whether a student will be put in campus recruiting or not. As a result, statistics such as the total student population, backlogs, and credits are taken into account. The algorithms were developed using student data from the previous year.

### A. Prediction system

In this paper we use machine learning techniques to predict the placement status of students based on a dataset. The parameters in the dataset which are considered for the prediction are $10^{th}$ Percentage, $12^{th}$ Percentage, BE Percent, Internships, etc. The placement prediction is done by machine learning using Logical Regression, Random Forest, KNN, SVM.

## II. LITERATURE SURVEY

1. M. Siva surya, Dr. M.Sathish Kumar, Dr. D.Gandhimathi. "Student Placement Prediction Using Supervised Machine Learning". 2nd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE).Volume 108, July- 2022.

This paper illustrarte an method for predicting the possibility of students being placed in a company is using classification algorithms such as Random Forest AL, SVM AL as a technique of selection.

2. Saha, Goutam, "Applying logistic regression model to the examination results data", in Journal of Reliability and Statistical Studies 4, no.2(2021):1-13.

This paper illustrate the binary logistic regression model is used to analyze the school examination results (scores) of 1002 students. The analysis is performed on the basis of the independent variables viz. gender, medium of instruction, type of schools, category of schools, board of examinations and location of schools, where scores or marks are assumed to be dependent variables. The odds ratio analysis compares the scores obtained in two examinations viz. matriculation and higher secondary.

3. Senthil Kumar Thangavel, Divya Bharathi P and Abhijith Shankar. "Student Placement Analyzer: A recommendation System Using Machine Learning", International Conference on advanced computing and Communication systems (ICACCS-2017), Jan 06- 07,2017, Coimbatore, INDIA.

This paper presents a recommendation system that predicts whether the current student will be placed or not, if the student is placed the company is also predicted based on the data of previously placed students. Here we use two different machine learning classification algorithms, namely Naive Bayes Classifier and K Nearest Neighbors [KNN] algorithm. These algorithms independently predict the results and we then compare the efficiency of the algorithms, which is based on the dataset.

4. S.Taruna , Mrinal Pandey, "An Empirical Analysis of Classification Techniques for Predicting Academic Performance" in 2018 IEEE International Advance Computing Conference (IACC).

This paper compares five classification algorithms namely Decision Tree, Naïve Bayes, Naïve Bayes Tree, K-Nearest Neighbor and Bayesian Network algorithms for predicting students' grade particularly for engineering students. Bootstrap method is a resample function available in WEKA tool kit. The excellent results of this function can be seen through IBK, Decision Tree and Bayes Net algorithm.

5. Shreyas Harinath, Aksha Prasad, Suma H and Suraksha A. "Student Placement Prediction using Machine Learning", International Research Journal of Engineering and Technology (IRJIET) Volume : 06 Issue: 04 April 2019.

This paper illustrate a study to predict the placement chances of the students using Decision Tree Learning, SCI-Kit learning which used two attributes as dataset namely CGPA and arrears which resulted in more time consuming for prediction and being not efficient.

## III. EXISTING SYSTEM

Existing System for Placement Prediction:

Currently, the process of student placement relies heavily on manual efforts and subjective decision-making. Educational institutions and students often face challenges in accurately predicting and matching students with suitable job opportunities. Here are some aspects of the existing system for placement prediction:

1. Manual Evaluation: In the absence of an automated system, placement coordinators and career counselors manually evaluate student profiles, academic records, and skills to make placement predictions. This process is time-consuming and prone to human bias and errors.

2. Limited Data Analysis: The existing system often lacks comprehensive data analysis capabilities. It may not effectively leverage historical placement data, internship experiences, or industry trends to generate accurate placement predictions.
3. Lack of Personalization: The current system may not provide personalized recommendations tailored to individual student profiles and preferences. Students often receive generalized advice, which may not align with their specific career aspirations and skill sets.
4. Limited Scalability: Manual placement prediction processes may struggle to handle large volumes of student data. The lack of automation and efficient data processing can hinder the scalability and effectiveness of the placement system.
5. Incomplete Information: The existing system may not capture all relevant information about students, such as their updated skill sets, extracurricular activities, or evolving industry demands. This limited information can lead to suboptimal placement decisions.
6. Lack of Continuous Learning: The current system may lack the ability to learn and adapt based on placement outcomes. It may not incorporate feedback or update its models to reflect changing industry dynamics or evolving student preferences.

7. Evaluation Challenges: Without an automated system, it can be challenging to evaluate the effectiveness and accuracy of placement predictions. The absence of standardized metrics and analysis tools makes it difficult to assess the performance of the existing system.
The limitations of the existing system highlight the need for a more sophisticated and data-driven approach to student placement prediction. By leveraging advanced machine learning techniques, automation, and personalized recommendations, a new system can address these shortcomings and improve the overall efficiency and effectiveness of the placement process.

## IV. PROPOSED SYSTEM & PROBLEM STATEMENT

to expand a system to are expecting the position of students the use of system gaining knowledge of techniques and endorse task possibilities based on their capabilities proposed machine the proposed student placement prediction and recommendation device ambitions to beautify the accuracy and performance of pupil placement the use of the logistic regression system learning set of rules the system will accumulate and preprocess a comprehensive dataset along with parameters which include academic overall performance abilties experience and choices the logistic regression model can be built the use of the accrued dataset to expect appropriate process positions for college kids the version will remember the various input factors and calculate the probabilities of students being positioned in distinctive process positions this may provide precious insights for placement officials and recruiters in making knowledgeable selections in addition to placement prediction the machine will incorporate collaborative filtering techniques to generate personalized activity tips through reading the profiles of a success candidates and figuring out similarities with character students the gadget will advocate tailored job positions that align with their competencies and choices to assess the overall performance of the gadget sizable testing and validation will be performed the accuracy of the logistic regression model could be measured by way of comparing its predictions with real placement outcomes statistical analysis can be performed to evaluate the versions precision dont forget and f1-score moreover consumer comments and pride surveys may be accrued to evaluate the usability and effectiveness of the

gadget placement officers recruiters and college students could be involved in providing insights and recommendations for gadget enhancements universal the proposed system making use of the logistic regression algorithm targets to decorate the accuracy of placement predictions and offer personalised suggestions for students by way of leveraging system studying strategies the machine will streamline the position procedure reduce manual attempt and improve the overall pleasure of students and recruiters involved within the placement technique

## V. IMPLEMENTATION

### A. Methodology

The data frame for the machine learning algorithm is created using pandas library based on the above sample dataset. We use sklearn which is an efficient tool for predictive analysis. And we import train_test_split in sklearn for creating training and test sets from the dataset. Standardisation is done by standard scaler in sklearn.preprocessing. Based on the respective algorithm it predicts the placement of each student and accuracy can be viewed from the confusion matrix.

The development of a placement prediction system involves several key steps to ensure accurate and reliable predictions. Here is a brief overview of the methodology for building a placement prediction system:

1. Data Collection: Gather relevant data from various sources, including student profiles, academic records, skills, internship experiences, and placement outcomes. Additionally, collect industry trends and job market data to incorporate external factors into the prediction model.
2. Data Preprocessing: Clean the collected data by removing duplicates, handling missing values, and addressing inconsistencies. Normalize or standardize numerical features to ensure they are on a similar scale. Encode categorical variables using techniques like one-hot encoding or label encoding.
3. Feature Selection: Conduct exploratory data analysis to gain insights into the dataset and identify relevant features. Use techniques such as correlation analysis or feature importance to select the most influential features for the placement prediction task. Eliminate features that are highly correlated or redundant to avoid overfitting.
4. Model Selection: Choose an appropriate machine learning algorithm for the placement prediction task. Commonly used algorithms include logistic regression, decision trees, random forests, support vector machines, or ensemble methods. Select the model based on factors such as performance, interpretability, and scalability.
5. Model Training: Split the dataset into training and testing sets. Train the selected model on the training set using the chosen algorithm. Fine-tune the model by adjusting hyperparameters using techniques like grid search, random search, or Bayesian optimization. Evaluate the model's performance using appropriate evaluation metrics like accuracy, precision, recall, and F1-score.
6. Model Evaluation: Assess the performance of the trained model using the testing set, which represents unseen data. Calculate evaluation metrics to determine the model's accuracy and generalization capability. Analyze additional metrics like confusion matrix or ROC curve to gain insights into the model's strengths and weaknesses.
7. Model Deployment: Once the model demonstrates satisfactory performance, deploy it for real-world use. Develop a user-friendly interface or integrate the model into an existing application for easy accessibility. Continuously monitor the model's performance and update it as new data becomes available or placement patterns change.
8. Model Improvement: Analyze the model's limitations and errors to identify areas for improvement. Iterate on the model by incorporating additional relevant features, collecting more diverse and recent data, or exploring advanced techniques like feature engineering or ensemble learning. Continuously

evaluate and refine the model to enhance its predictive capabilities.

By following a systematic methodology, a placement prediction system can leverage data analysis and machine learning algorithms to provide accurate predictions for student placements. This methodology ensures that the system is robust, scalable, and capable of delivering valuable insights to educational institutions and students.

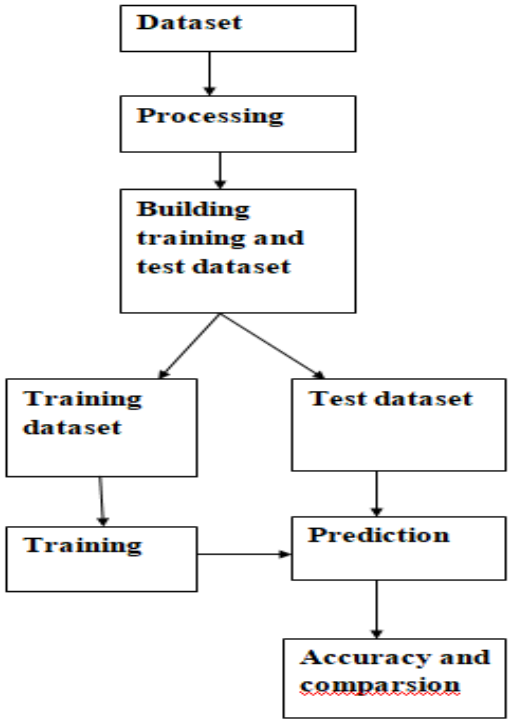


**Fig. Architecture Diagram**

Methodology for Student Placement Prediction Model:

1. Data Collection:
   - Gather historical data related to student placements, including information such as student profiles, academic performance, skills, internship experience, and placement outcomes.
   - Collect data from various sources such as student records, university databases, surveys, and placement reports.
2. Data Preprocessing:
   - Perform data cleaning by removing duplicates, handling missing values, and addressing inconsistencies.
   - Normalize or standardize the numerical features to ensure they are on a similar scale.
   - Encode categorical variables using techniques like one-hot encoding or label encoding.
   - Split the dataset into training and testing sets, ensuring that the placement outcomes are balanced in both sets.
3. Feature Selection:
   - Conduct exploratory data analysis to gain insights into the dataset and identify relevant features.
   - Use techniques such as correlation analysis or feature importance to select the most influential features for the placement prediction task.
   - Eliminate features that are highly correlated or redundant to avoid overfitting.
4. Model Selection:
   - Choose an appropriate machine learning algorithm for the placement prediction task, such as logistic regression, decision trees, random forests, or support vector machines.
   - Consider using ensemble methods or deep learning models like neural networks if the dataset is large and complex.
5. Model Training:
   - Split the training set further into training and validation sets to evaluate the model's performance during training.
   - Train the selected model on the training set using the chosen algorithm.
   - Tune hyperparameters using techniques like grid search, random search, or Bayesian optimization to optimize the model's performance.
   - Evaluate the model's performance on the validation set using appropriate evaluation metrics such as accuracy, precision, recall, and F1-score.
6. Model Evaluation:
   - Assess the model's performance on the testing set, which represents unseen data.
   - Calculate evaluation metrics to determine the model's accuracy and generalization capability.
   - Perform additional analysis, such as generating a confusion matrix or ROC curve, to gain a deeper understanding of the model's performance.
7. Model Deployment:
   - Once the model demonstrates satisfactory performance, deploy it for real-world use.

- Develop a user-friendly interface or integrate the model into an existing application for easy accessibility.

- Continuously monitor and update the model as new data becomes available or the placement patterns change.

8. Model Improvement:

- Analyze the model's limitations and errors to identify areas for improvement.

- Iterate on the model by incorporating additional relevant features, collecting more diverse and recent data, or exploring advanced techniques like feature engineering or ensemble learning.

The above methodology provides a general outline for building a student placement prediction model. Depending on the specific requirements, the methodology can be customized and expanded accordingly.

In the context of Student placement prediction and recommendation using ML algorithms, accuracy refers to how well the trained model performs on the test dataset or new unseen data, typically measured as a percentage of correctly predicted outputs. Comparison involves evaluating the performance of different machine learning algorithms or techniques to choose the best one for the task. This can be done by comparing their accuracy scores or other metrics such as precision, recall, or F1 score.

## VI. RESULTS

The very last result of appearing various machine gaining knowledge of algorithms are noted we considered knn logistic regression random wooded area and svm for the analysis we trained and predicted the position reputation of college students primarily based on the identical dataset and observed the true high-quality false high quality false poor proper terrible and accuracy of every algorithm.

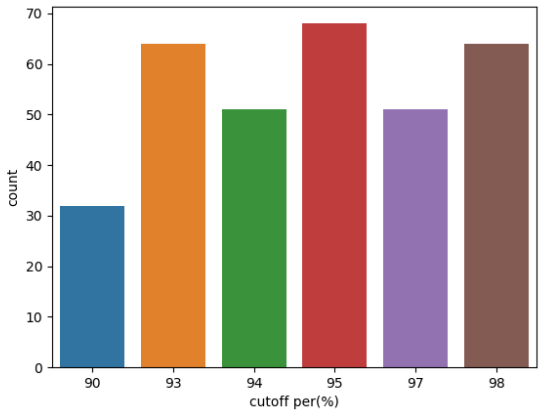


Fig. 1 This graph represents the cutoff per(%) of the dataset field.

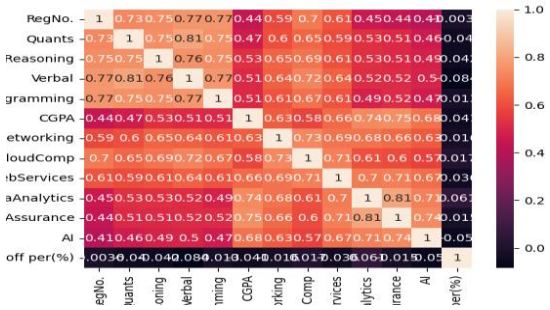


Fig. 2 This graph represents correlation plot of all the dataset fields.

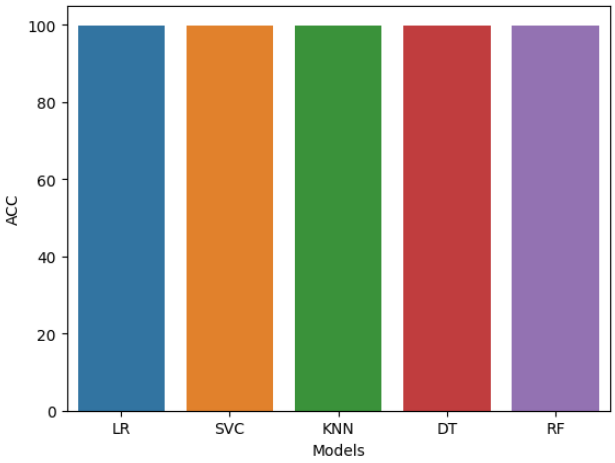


Fig. 3 This graph represents accuracy of the algorithms.

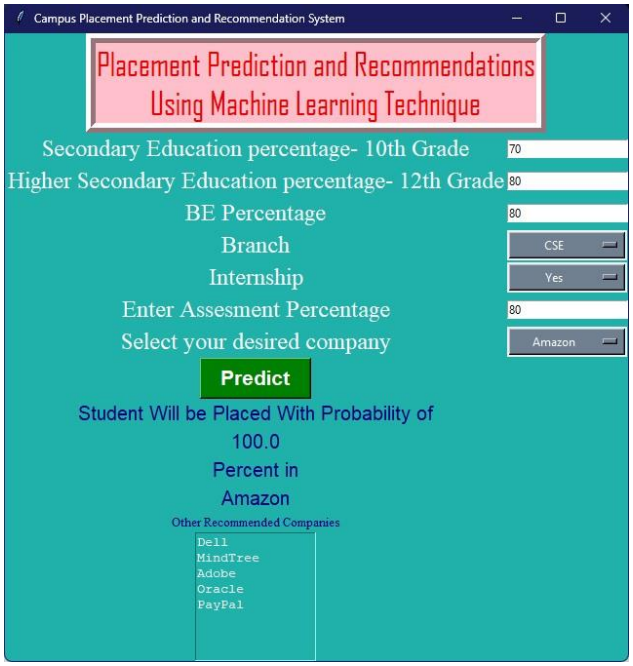


Fig. 4 This represents the probability of student getting placed.

## VII. CONCLUSION

The development of a Student Placement Prediction and Recommendation Model (SPPRM) offers significant benefits for both educational institutions and students. By leveraging machine learning techniques and data analysis, the SPPRM aims to enhance the placement process by accurately predicting the likelihood of student placements and providing personalized recommendations.

Through the SPPRS, educational institutions can optimize their placement strategies by gaining insights into the factors that contribute to successful placements. They can identify areas for improvement, tailor their career counseling services, and allocate resources more efficiently. Additionally, the system enables institutions to track and monitor the placement progress of their students, facilitating data-driven decision-making.

For students, the SPPRM provides valuable support in making informed career choices. By analyzing their profiles, academic records, skills, and industry trends, the system predicts the likelihood of placements in specific job roles or industries. Furthermore, it offers personalized recommendations, aligning students' profiles and interests with suitable career paths. This empowers students to make better-informed decisions, increasing their chances of securing desirable job opportunities and fostering career satisfaction.

The continuous evaluation and improvement of the SPPRM ensure its reliability and relevance. By comparing predicted placements with actual outcomes, the system can learn and adapt, refining its predictions and recommendations over time. Regular updates and monitoring of industry trends enable the SPPRS to remain up to date and provide accurate insights into the dynamic job market.

Overall, the Student Placement Prediction and Recommendation System (SPPRM) streamlines the placement process, benefiting both educational institutions and students. By leveraging data-driven approaches, the system facilitates more efficient and effective placements, enhances career decision-making, and maximizes the chances of students securing suitable and fulfilling job opportunities.

## VIII. REFERENCES

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