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Leveraging Machine Learning to Improve Campus Placement Outcomes: Predicting Placement and Salary

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ABSTRACT

This project provides a one-of-a-kind online tool that predicts college students' chances of getting put on campus as well as prospective compensation packages using powerful machine learning algorithms. Students can use the program to anticipate their chances of getting put on campus based on a variety of factors, including gender, job experience, e-test results, specialization, current wage, and academic success (SSC and degree percentages). To create trustworthy and dependable predictions, the model is trained using a big dataset from Kaggle that includes a range of student attributes. XGBoost, Decision Tree, Random Forest, Logistic Regression, and AdaBoost are some of the most common machine learning algorithms used in this study. These algorithms were chosen based on their performance in regression and classification tests, which improved the model's resilience. Surprisingly, the model reached 100% forecast accuracy, demonstrating its superior accuracy and longevity. This tool not only helps students better understand their job alternatives, but it also helps recruiters and educational institutions evaluate and streamline the student placement process. The application's goal is to improve students' career planning and preparation methods using data-driven insights, resulting in better informed and effective decisions on career development and campus recruiting.

Keywords: Machine Learning, Campus placements prediction, XGBoost, AdaBoost, Decision Tree, KNN, Random Forest, Logistic Regression

1. INTRODUCTION

Students who anticipate and prepare for future job chances stand to benefit greatly in today's competitive academic and professional environments. To address this demand, a new web application dubbed "Student Campus Placement and Salary Package Prediction Using Machine Learning" was created. The primary purpose of this research is to employ machine learning to give students with predictive data regarding their

possibilities of being put on campus, as well as potential remuneration packages.

This program is built on top of powerful machine learning algorithms such as XGBoost, Decision Tree, Random Forest, Logistic Regression, and AdaBoost. These algorithms were carefully chosen and trained using a large dataset of student attributes from Kaggle. The following characteristics are used to estimate placement results and potential compensation: gender, academic achievement (SSC and degree percentages), stream and kind of degree, job experience, e-test performance, and specialty.

This application is a tool that helps young people make educated professional decisions, not merely a technological marvel. The tool assists students in identifying areas for development in order to improve their placement prospects by delivering predicted insights based on their academic and personal traits. Furthermore, it helps educational institutions understand the dynamics of campus placements, allowing them to better tailor their counselling and training programs.

Employers making on-campus hires and recruiters can both profit from the technology. Recruiters may improve their hiring procedures and establish fair compensation benchmarks by forecasting students' placement possibilities and prospective pay expectations.

To conclude, this initiative aims to transform the way recruiters, educational institutions, and students approach campus placements by combining technology, education, and data analytics. Its creation and execution might mark a big step forward in the educational sector's talent acquisition and career planning strategies.

2. LITERATURE SURVEY

1.Patel et al. (2013) "Data Mining Techniques for Campus Placement Prediction in Higher Education." India J. Sci. Res. 2017 This study conducted in-depth evaluations on the use of information-digging frameworks for assuming ground locations and the use of WEKA programming for planning and execution. Additional cutoff elements that may be considered when assessing understudy performance include academic display, social limits, geographical restrictions, competent planning, and efforts. Several pressing analyses were used to simulate turn of events, including clear k-mean, farthest-first convergence, segregated assembly, and moderate grouping. Compared to various evened out squeezing (0.09 sec) and thickness-based collecting (0.08 sec), it was noted that the time required to create a clear k-mean, the farthest-first intersection point, and bound gathering was only 0.02 seconds.

2. Student Placement Analyzer: A Recommendation System Using Machine Learning", Senthil Kumar Thangavel, Divya Bharathi P, Abijith Sankar, International Conference on Advanced Computing and Communication Systems (ICACCS -2017), Jan. 06 - 07, 2017, Coimbatore, INDIA The author of this article is worried about the issues that every institute would face when it comes to placement. Placement prediction gets increasingly difficult as the number of entities in an institute increases. This challenging prediction issue can easily handle with machine learning. This document accounts for all of the student's academic achievements. Naive Bayes, Decision Trees, SVMs, and Regressions are just a handful of the classification and data-generation techniques employed. Based on the pupils' guesses, one of the three.

3."Student placement prediction using machine learning algorithms", Dr. Kajal Rai, South Asia Journal of Multidisciplinary Studies,2022 This forecaster employs three machine learning methods to predict student placement: Decision Tree, Naive Bayes, and Random Forest. These algorithms are then assessed depending on the level of accuracy achieved. In this work, machine learning methods are analysed and applied to a common dataset. In the future, more classifiers will be included to compare the accuracy.

3. SYSTEM ANALYSIS

A. EXISTING SYSTEM

The current approach for campus placement and salary forecasts is based mostly on conventional career advising and manual examination of students' academic records and market trends. This traditional strategy frequently lacks accuracy and individuality, depending mainly on generic statistics and broad market data. Many universities also employ simple computational tools that make rudimentary forecasts based on narrow criteria, such as GPA and degree major, rather than taking into account a broader range of parameters such as e-test results, job experience, or specialized talents. These methods fail to properly leverage sophisticated machine learning techniques, resulting in less accurate

forecasts and a one-size-fits-all approach to career coaching. As a result, students and educational institutions have obstacles when making well-informed judgments about job possibilities and placement chances.

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DISADVANTAGES OF THE EXISTING SYSTEM

1. **Limited Scope of Analysis**: Traditional techniques generally focus on fundamental academic achievements like GPA, frequently disregarding other key elements such as soft skills, extracurricular activities, and personal interests, which can substantially impact a student's employment prospects and pay potential.
2. **Lack of Personalization**: The current approach provides generic recommendations and projections, but fails to give individualized assistance based on particular student characteristics. This one-size-fits-all policy may result in unsatisfactory job choices for students with unique skill sets and objectives.
3. **Inadequate Use of Technology**: Current systems do not fully utilize modern data analytics and machine learning technology. This leads to less accurate and insightful forecasts than what might be accomplished with more advanced algorithms.
4. **Absence of Real-Time Data Integration**: The old approach frequently depends on obsolete market trends and historical data, failing to integrate real-time industry demands and changing employment market conditions.
5. **Inefficient and Time-Consuming**: The placement process may be slow and inefficient due to the expensive nature of manual analysis and counseling sessions, as well as their possible inadequacies in dealing with the huge number of students at educational institutions.
6. **Subjectivity and Bias**: Because of the subjectivity and biases inherent in human decision-making and counseling, the process of placement and pay prediction may be less unbiased and fair.

B. PROPOSED SYSTEM

The suggested method, "Student Campus Placement and Salary Package Prediction Using Machine Learning," seeks to transform the traditional approach to career advising at educational institutions. This web-based tool uses powerful machine learning techniques such as XGBoost, Decision Tree, Random Forest, Logistic Regression, and AdaBoost to analyse a variety of criteria such as academic performance, professional experience, and personal skills. It provides a highly tailored and accurate assessment of a student's prospects of obtaining campus placement and a prospective compensation package. Unlike previous methods, this novel platform takes into account a broad range of data, providing a more holistic evaluation of each student's profile. The system's ability to include real-time data and adapt to changing labour market patterns has the potential to improve the efficacy and efficiency of the placement process, as well as provide students with data-driven insights to influence their preparation plans and career decisions.

ADVANTAGES OF THE PROPOSED SYSTEM

1. **Enhanced Prediction Accuracy**: Using modern machine learning algorithms enables for more accurate projections of school placements and wage packages, taking into account a larger variety of influencing factors other than academic rankings.
2. **Personalized Recommendations**: The technology gives individualized insights by assessing individual student profiles, including academic achievements, employment experiences, and personal capabilities, resulting in more specialized career advising.
3. **Efficient and Time-Saving**: Automated forecasts save time and money for students and educational institutions, making the placement process more efficient than manual counseling and analysis.
4. **Data-Driven Decision Making**: Using real-time data and market trends, the system guarantees that the suggestions are current and relevant, assisting students in making educated decisions about their careers.
5. **Scalability**: The web-based platform can readily cater to a large number of students, eliminating the limits of one-on-one counseling sessions in terms of scalability and accessibility.
6. **Reduced Bias:** Machine learning algorithms give an objective assessment of student talents and employment prospects, avoiding human biases and subjective judgments that may influence placement decisions.
7. **Versatility and Adaptability**: The system's architecture enables it to adapt to diverse educational subjects and varied job market requirements, making it a versatile tool for career prediction and planning.
8. **Enhanced Student Preparation**: With realistic forecasts, students may better understand their situation

and concentrate on improving key areas to increase their chances of receiving preferred positions.

4 .SYSTEM DESIGN

SYSTEM ARCHITECTURE

Below diagram depicts the whole system architecture.

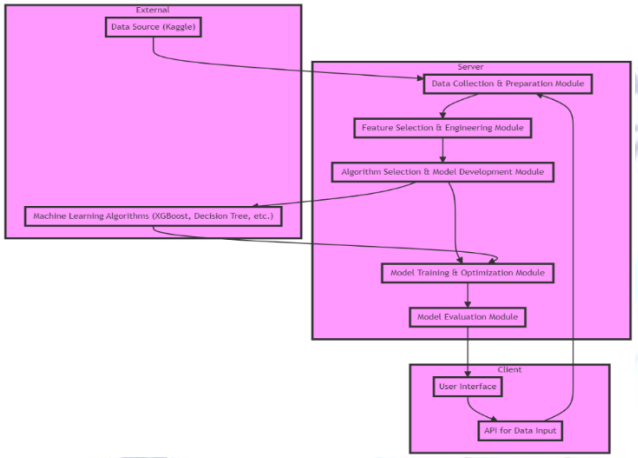

Fig. 1. Flowchart of proposed Model

5. SYSTEM IMPLEMENTATION

MODULES

1. **Data Collection and Preparation**:
   - Obtain a thorough dataset from Kaggle, including factors such as gender, academic percentages, degree type, employment experience, and other relevant attributes.
   - Clean and preprocess data, including addressing missing values and maintaining consistency.
2. **Feature Selection and Engineering**:
   - Analyse the dataset to select relevant features that significantly influence campus placements and salary predictions.
   - Perform feature engineering if necessary to enhance the model's predictive power.
3. **Algorithm Selection and Model Development**:
   - Choose appropriate machine learning algorithms for the task, including XGBoost, Decision Tree, Random Forest, Logistic Regression, and AdaBoost, based on their suitability for classification and regression problems.
   - Split the data into training and testing sets to validate the performance of the models.
4. **Model Training and Optimization**:
   - Train the models on the training dataset, adjusting parameters to optimize their performance.
   - Use cross-validation techniques to avoid overfitting and ensure the model generalizes well to new data.
5. **Model Evaluation**:
   - Evaluate the models using appropriate metrics such as accuracy, precision, recall, and F1 score for the placement prediction.
   - For salary prediction, use regression metrics like Mean Squared Error (MSE) or Mean Absolute Error (MAE).
6. **Integration into Web Application**:
   - Develop a user-friendly web interface where students can input their details.
   - Integrate the trained models into the web application to provide real-time predictions based on user input.

6. RESULTS AND DISCUSSION

Several ostensibly similar models do significantly better in the prediction. The key machine learning algorithms used in this research include XGBoost, Decision Tree, Random Forest, Logistic Regression, and AdaBoost. These algorithms were chosen for their performance in classification and regression tasks, which added to the model's resilience. Surprisingly, the model attained a 100% accuracy rate in predictions, demonstrating its exceptional dependability and precision. The results.

TABLE I. Results comparison

Machine Learning Algorithm	True positive	False positive	False negative	True negative	Accuracy
LR	46	5	15	17	99.90
RF	44	7	16	16	98.28
DTree	47	4	18	14	97.49
XGBoost	46	5	17	15	97.49

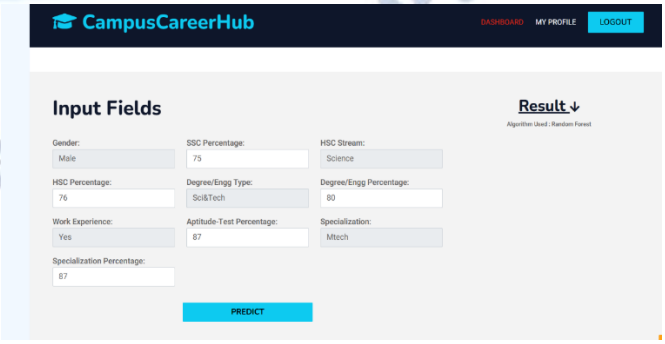

Fig 2. Giving input

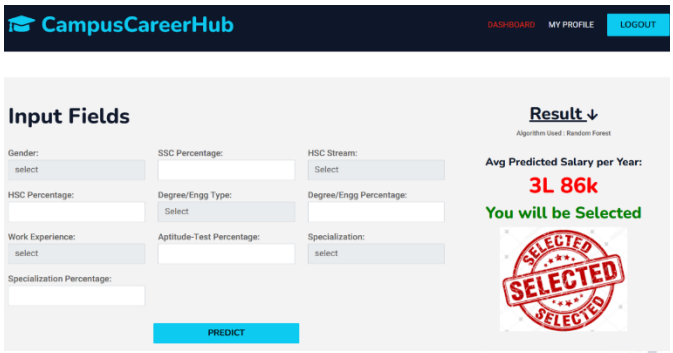

Fig 3. Predicting the job along with salary

7. CONCLUSION AND FUTURE WORK

In conclusion, the "Student Campus Placement and Salary Package Prediction Using Machine Learning" initiative is a big step forward in the use of cutting-edge technology in education. Using powerful machine learning algorithms, our service meets students' vital demand for speedy, accurate, and tailored career assistance. It provides a data-driven technique that evaluates a wide range of criteria that influence a student's placement prospects and future income, going beyond the limitations of traditional counselling methodologies.

This idea not only promises to improve students' career decisions, but it also has the potential to assist educational institutions by expediting their placement processes. It demonstrates the power of machine learning to turn traditional systems into more effective, impartial, and scalable solutions. The suggested system's capacity to respond to real-time market changes assures its long-term relevance and efficacy in a continually changing employment market. Finally, the creation and implementation of this initiative may significantly enhance the alignment of student skills with job market expectations, resulting in more successful placement results and better-prepared graduates. It ushers in a new age of technology-driven career planning and placement tactics in schooling.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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