

Identifying Patterns and Trends in Campus Placement Data Web App Report

Live Website at:

<https://placementtrack-frontend-nomig6337-dev.apps.sandbox-m3.1530.p1.openshiftapps.com/placement-insights>

Application name: PlacemenTrack

Github Repo:

<https://github.com/smartinternz02/SBSPS-Challenge-9964-Identifying-Patterns-and-Trends-in-Campus-Placement-Data-using-Machine-Learning>

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1. Introduction

1.1 Overview

In the modern educational landscape, campus placement plays a pivotal role in shaping the careers of students. The Campus Placement Analysis project aims to leverage the power of data analysis and machine learning to gain valuable insights from the vast amount of data generated during the campus placement process. This data includes student profiles, academic achievements, skills, internships, and eventual placement outcomes. By delving into this data, institutions can make informed decisions, enhance the placement process, and better prepare students for successful careers.

By integrating machine learning algorithms with web technologies, the Campus Placement Analysis project aims to revolutionise how institutions approach placement processes. This holistic approach empowers institutions to make informed decisions, enhances student employability, and establishes strong connections between academia and industry.

1.2 Purpose

The main purpose of the Campus Placement Analyzer is to provide colleges and universities with a comprehensive tool that leverages data analysis and machine learning to optimize the campus placement process. This tool aims to offer valuable insights, personalized recommendations, and predictions for students' placement outcomes. Analyzing student data and historical placement trends, helps institutions enhance their placement strategies, improve student employability, and foster stronger connections with potential employers.

Data Collection and Input:

Colleges provide an Excel sheet containing detailed information about students, including academic records, skills, internships, and any other relevant details.

Data Processing and Analysis:

The system takes the Excel sheet and processes the data to create a structured dataset.

Feature engineering is performed to extract key attributes like academic scores, skills proficiency, number of internships done, and more.

Stats and Insights Dashboard:

The system generates a comprehensive dashboard with detailed statistics about upcoming placements.

Colleges can view placement stats across all branches and the entire campus. Insights include placement success rates and average salary offers.

Personalized Recommendations:

Based on individual student profiles and skill sets, the system provides personalized recommendations.

Salary Prediction:

Utilizing machine learning algorithms, the system predicts potential salary ranges for each student based on their data and skills.

Visualization and Reporting:

The dashboard includes visualizations such as graphs, and charts to present data trends and patterns.

Colleges can use these insights to make informed decisions about refining placement strategies.

Student Engagement:

Students can access the system to view their personalized recommendations and predicted salary ranges.

2. Literature Survey

2.1 Existing problem

Data Quality and Consistency: Many institutions struggle with inconsistent and incomplete data collection, which can hinder accurate analysis. Variability in how student data is recorded and the lack of standardized formats can lead to challenges in data processing and interpretation.

Lack of Personalization: Traditional placement approaches often lack personalization. Students have diverse skill sets and aspirations, but generic placement strategies may not effectively cater to individual needs. This can result in suboptimal placement outcomes and unfulfilled potential.

Dynamic Industry Landscape: The job market's fast-paced nature poses challenges in accurately predicting future placement trends. Economic fluctuations, technological advancements, and shifting industry demands can make it difficult to create models that consistently predict salary ranges.

Skill Gap Identification: Identifying the precise skills that students need to develop for successful placements is challenging. Often, there need to be more clarity between industry requirements and the integration of relevant skills into academic curricula.

2.2 Proposed Solution

Inconsistent Data Handling:

Implemented a data preprocessing module that standardizes and cleans incoming data, converting it into a consistent format. This ensures that regardless of how data is provided by colleges, it is transformed into a structured dataset for analysis.

Personalization Gap:

Develop a recommendation engine that considers individual student profiles, skills, and preferences. By leveraging machine learning algorithms, the system can suggest specific skills, that align with each student's strengths and aspirations.

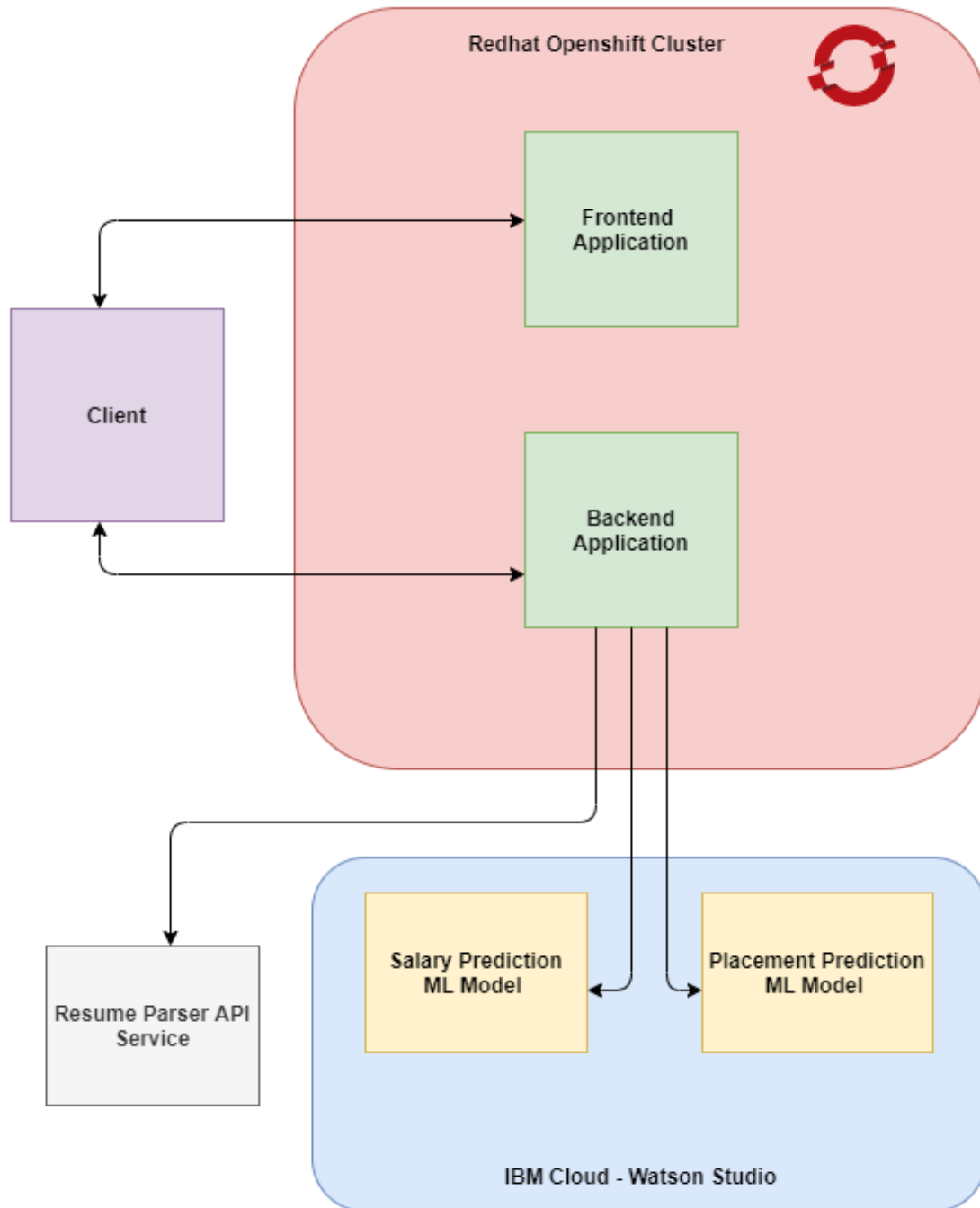
Skill Gap Bridging:

Skills Mapping and Development: Feature a "Skill Gap Analysis" chart that visualises the alignment between student skills and industry requirements.

It will offer clear and insightful data visualisations to colleges and universities, aiding them in making informed decisions about placements.

3. Theoretical Analysis

3.1 Block Diagram



3.2 Hardware / Software Designing Requirements

1. Hardware Requirements
 - Web Server - Redhat Openshift
 - Load Balancers (if applicable)
2. Software Requirements
 - Operating System - Linux
 - Server-Side Scripting Language - Python
 - Frontend Technologies (HTML, CSS, JavaScript)
 - Framework for Web Development (Flask and React)
 - Postman to test backend APIs
 - Microsoft Excel to store college student's data.

3. Data Science Tools
 - IBM Watson Studio to perform ML techniques on Jupyter Notebook
 - Numpy, Pandas, and Matplotlib for Data Analytics
 - Scikit-Learn to train Machine Learning models.
4. Deployment Tools
 - Redhat Openshift to host the application
 - IBM Watson Machine Learning to deploy ML models
 - Git for version control and collaboration
 - Docker Hub to upload docker images to the docker repository
5. API services
 - Affinda resume parser API to parse the resume and enhance user accessibility
 - Affinda Skill suggestions API to recommend skills based on existing skills

4. Experimental Investigations

Tier-wise Salary Distribution Investigation:

Investigated the relationship between student tiers (Tier 1, Tier 2, Tier 3) and placement outcomes to understand how higher tiers correlate with higher salary packages.

Role of CGPA and Technical Skills Investigation:

Explored the significance of CGPA and technical skills in influencing student salaries, emphasizing the importance of these factors in the placement process.

Resume Scoring ATS and Student-Oriented Applications Investigation:

Identified the absence of applications catering to student needs beyond resume scoring. Researched potential avenues to develop an application that provides personalized insights, including salary expectations and skill recommendations.

API Exploration Investigation:

Investigated available APIs to enrich the project's functionality, with a focus on integrating external data sources to enhance insights and predictions.

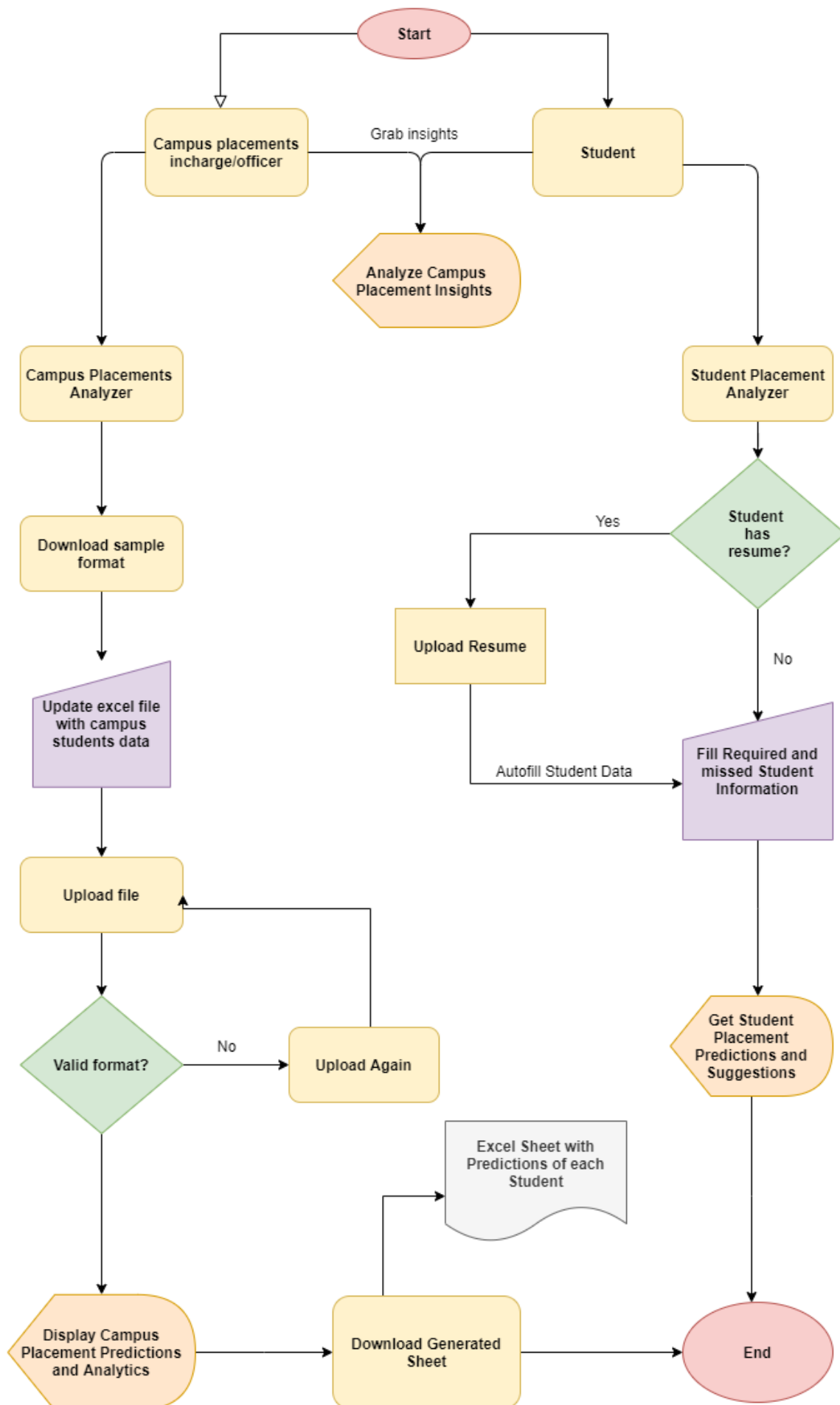
External Factors and Recession Trends Investigation:

Explored the impact of external factors, such as the country's GDP and economic trends, on placement outcomes. Analyzed how placement success varies during different economic scenarios, including recessions.

User-Friendly Data Visualization Investigation:

Explored options for creating user-friendly charts and visualizations that effectively communicate insights to users. Emphasized the importance of clear and intuitive data representation.

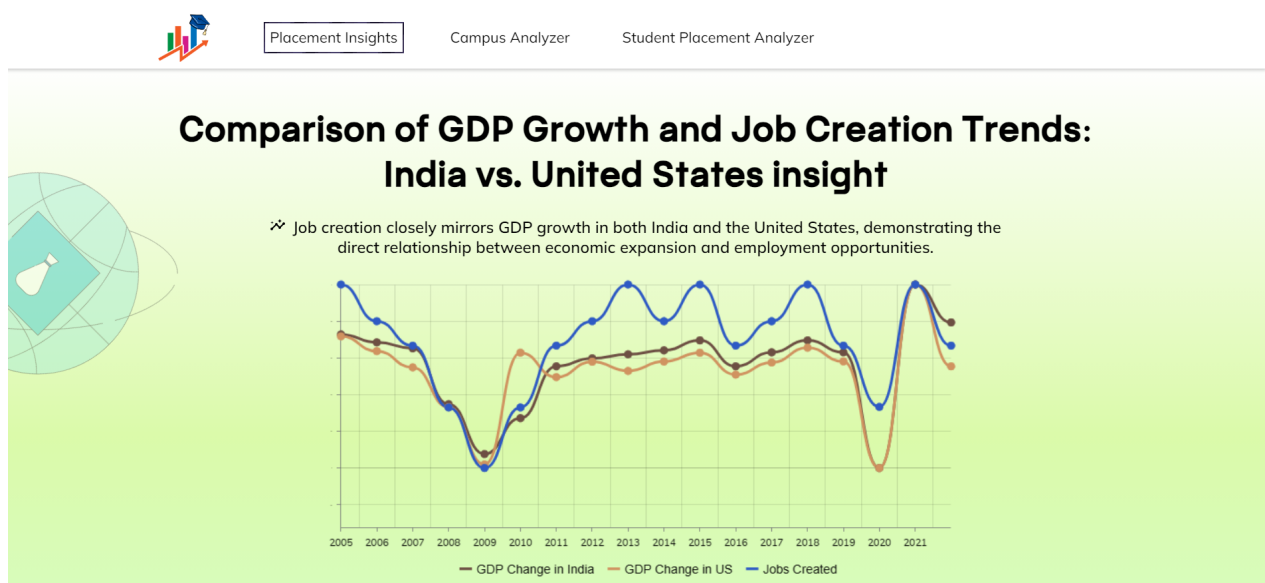
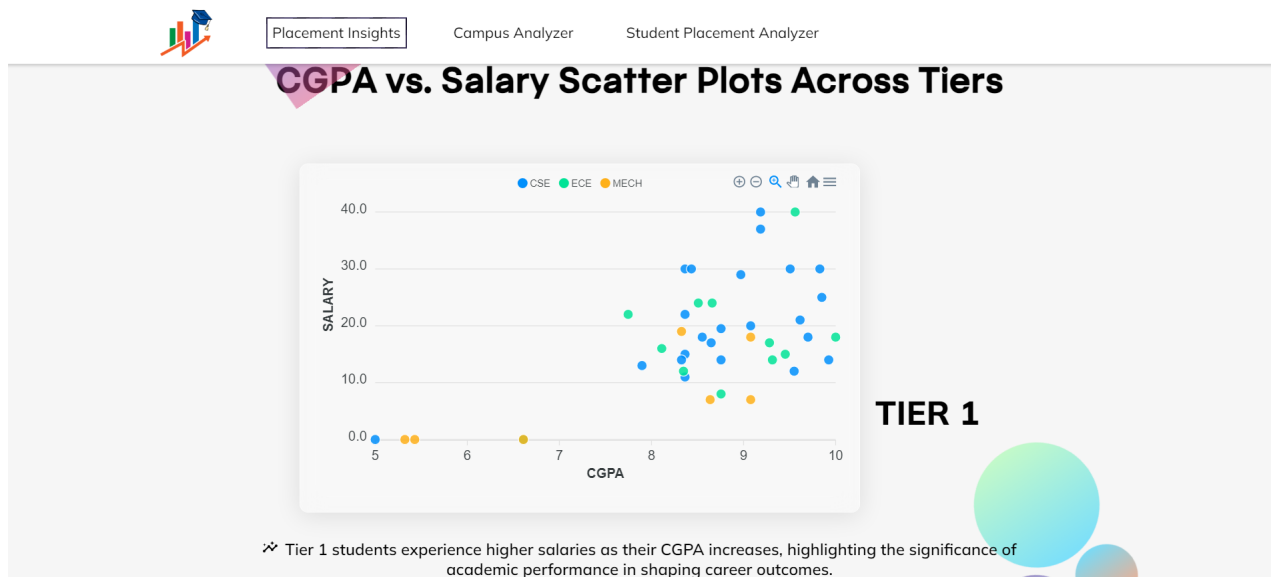
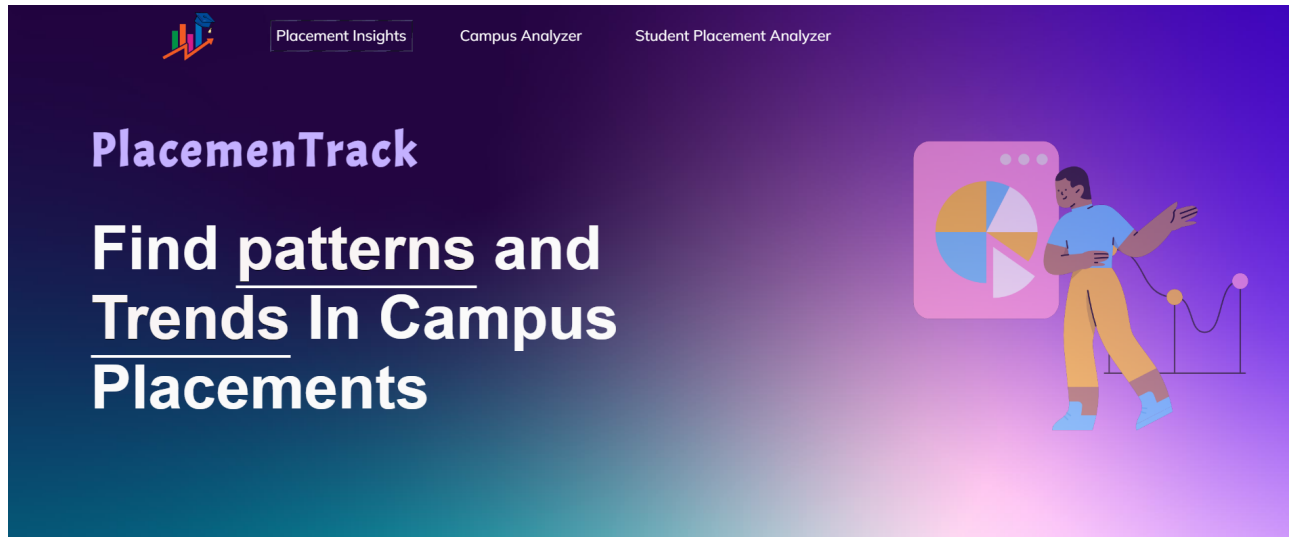
5. Flowchart



6. Result

Placement Insights

Some of screenshots





Predict & Analyze Campus Placements

Generate predictions and analysis report with interactive charts

- ✓ Prepare & fill a excel file with your college student details.
- ✓ Generate excel file with placement predictions and suggestions for each student.
- ✓ This file helps you to understand the format [Download format](#)

Upload .excel or .csv file in the mentioned format



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Campus Placements Predictions & Analytics

* Note: These analytics are generated from the placement predictions. Below shown statistics are expected placement results of your campus.

[Generate Excel](#)

Total Students
42

Students Placed
36

Students Not Placed
6

Placed Percentage
85.7%

To Get Average Salary

Minimum Internships
2

Minimum Projects
3

Skills Required to get Avg. Salary



Data Structures and Algorithms

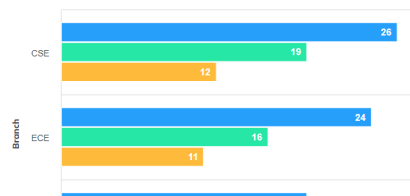


Machine Learning

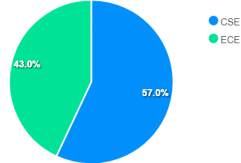


Web Development

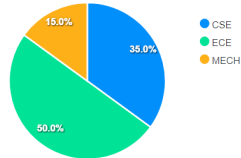
Highest, Average and Least Salary for Each Branch



Percentage of Students with Salary > 20 LPA by Branch

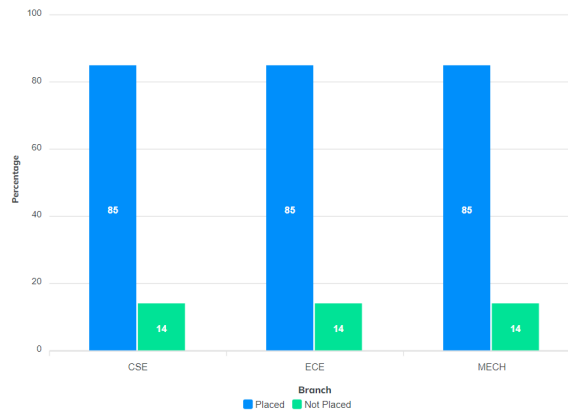


Percentage of Students with Salary > 10 LPA by Branch

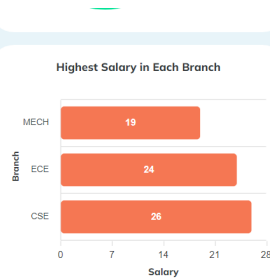


Placed and Not Placed in Each Branch

Percentage of Students Placed and Not Placed in Each Branch

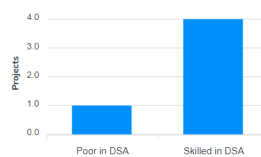


Highest Salary in Each Branch



DSA vs Programming Languages Impact

Average Number of Programming Languages impact on DSA



Average Number of Projects

Students with and without Web Development and Machine Learning skills



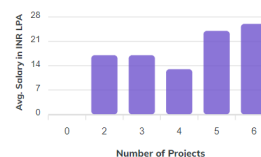
Expected Salary based on Number of Internships



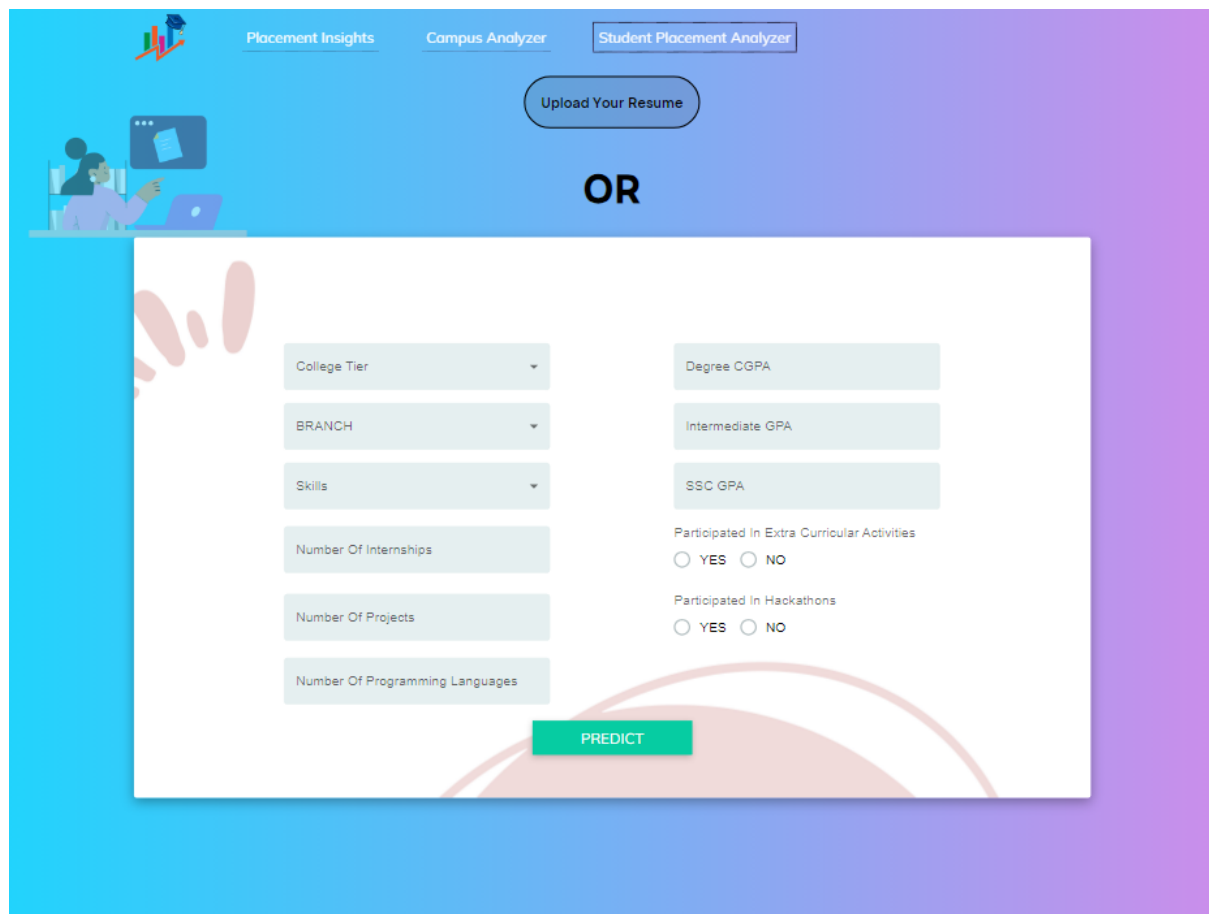
Expected Salary based on Number of Programming Languages



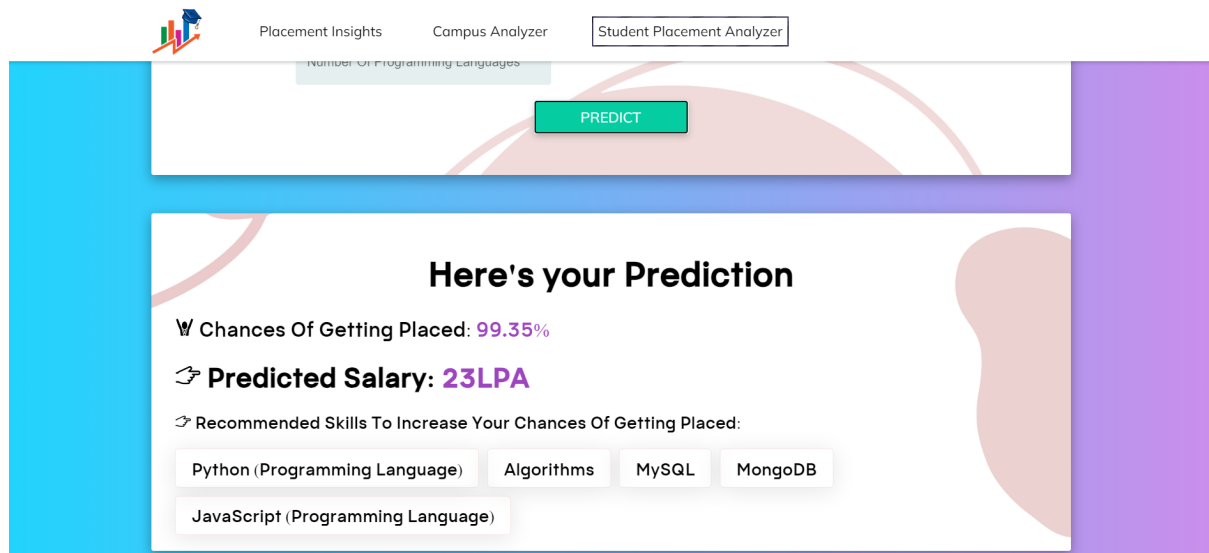
Expected Salary based on Number of Projects



Predict student salary and probability of getting placed



The screenshot shows the 'Student Placement Analyzer' interface. At the top, there are navigation links: 'Placement Insights', 'Campus Analyzer', and 'Student Placement Analyzer'. Below these is an 'Upload Your Resume' button. A large 'OR' is displayed in the center. The form itself is divided into two columns. The left column contains: 'College Tier' (dropdown), 'BRANCH' (dropdown), 'Skills' (dropdown), 'Number Of Internships' (text input), 'Number Of Projects' (text input), and 'Number Of Programming Languages' (text input). The right column contains: 'Degree CGPA' (text input), 'Intermediate GPA' (text input), 'SSC GPA' (text input), 'Participated In Extra Curricular Activities' (radio buttons for YES/NO), and 'Participated In Hackathons' (radio buttons for YES/NO). A green 'PREDICT' button is located at the bottom center of the form.



This screenshot shows the results of the prediction. At the top, the same navigation links are present. Below the 'PREDICT' button, the results are displayed in a white box with a pink background. The title 'Here's your Prediction' is centered. Below it, the 'Chances Of Getting Placed' are shown as 99.35% with a green checkmark icon. The 'Predicted Salary' is 23LPA with a green hand icon. Below this, a section titled 'Recommended Skills To Increase Your Chances Of Getting Placed:' lists five skills in buttons: 'Python (Programming Language)', 'Algorithms', 'MySQL', 'MongoDB', and 'JavaScript (Programming Language)'.

7. Advantages

The Campus Placement Analysis project offers several advantages to educational institutions, students, and recruiters, revolutionising the way campus placements are managed:

Informed Decision-Making:

The project empowers institutions with data-driven insights, enabling them to make informed decisions about curriculum enhancements, skill development programs, and industry partnerships based on placement trends and industry demands.

Enhanced Student Employability:

By providing personalized recommendations, skill gap analysis, and predicted salary ranges, the project helps students prepare more effectively for placements, improving their chances of securing desired job roles. Optimized Placement Strategies: Institutions can refine their

placement strategies by analyzing historical data, improving placement success rates, and catering to industry-specific requirements.

Improved Industry-Academia Collaboration:

With real-time job market trend analysis, colleges can align their offerings with industry needs, training them on those skills, and ensuring that graduates are job-ready.

Visual Data Insights:

The project offers intuitive visualizations that simplify complex data, making it easier for stakeholders to understand placement trends, strengths, and areas for improvement.

Personalized Student Support:

The system's recommendations and insights enable institutions to provide targeted support and counselling to students, helping them align their skills and goals with industry requirements.

Student Motivation:

Visualizing potential salary ranges and success rates motivates students to actively participate in skill enhancement programs and engage more enthusiastically in the placement process.

DisAdvantages

Changing Trends:

Employment trends and job requirements can change rapidly. Models trained on historical data might not accurately predict future placement outcomes if the job market evolves significantly.

Lack of Contextual Information:

While machine learning can provide insights, it might lack the rich contextual information so that human experts can provide. This can limit the depth of understanding regarding certain placement factors.

Unpredictable External Factors: Economic shifts, changes in industries, and unforeseen events (e.g., pandemics) can significantly impact placement outcomes, rendering historical data less relevant.

Applications

The Campus Placement Analysis project holds significant real-world applications

Educational Institutions:

Colleges and Universities: Educational institutions can use the insights to refine their curriculum, offer skill development programs, and strengthen industry collaborations to enhance student employability.

Students Individual Career Planning:

Students can utilise personalized recommendations and predicted salary ranges to make informed decisions about their career paths and skill development priorities.

Skill Enhancement:

The skill gap analysis guides students on areas that need improvement, allowing them to focus on building competencies relevant to their desired roles.

Educational Policy Makers:

Curriculum Design: Educational policymakers can leverage the project's data to inform curriculum design and update educational programs based on industry demands.

Recruiters and Companies:

Talent Acquisition: Recruiters can use historical placement trends and insights to identify colleges producing graduates with relevant skills for their industry, streamlining their talent acquisition process.

Data-Driven Hiring: Access to student profiles and skill data helps recruiters make data-driven hiring decisions, aligning candidate profiles with their organizational needs.

Industry Experts and Consultants:

Consultation Services: Industry experts can offer consultation services to institutions, helping them interpret the data and make strategic decisions for better placement outcomes.

Job Portals and Recruitment Platforms:

Job portals can enhance their matching algorithms by incorporating the skill and placement data to suggest the most relevant job opportunities to candidates.

Conclusion

In conclusion, the Campus Placement Analysis project represents a pivotal step towards transforming the landscape of campus placements and career development. By harnessing the power of data analysis, machine learning, and web technologies.

Through standardised data collection, insightful data visualizations, personalized recommendations, and accurate placement predictions, the project offers an integrated solution that empowers institutions to make informed decisions, enhance curriculum offerings, and strengthen ties with industries. For students, it means personalized guidance, skill development opportunities, and a clearer path towards desired career goals. Recruiters benefit from a refined talent acquisition process and access to candidates aligned with their needs.

The real-world applications of this project extend beyond campus boundaries, impacting educational policies, industry dynamics, and workforce planning. As academia and industry become more closely intertwined, the Campus Placement Analysis project stands as a catalyst for a more efficient, responsive, and effective transition from education to employment. It paves the way for a future where data-driven insights shape careers, educational strategies, and the way society approaches the ever-evolving job market.

Future Scope

Integration of Real-time Data:

Incorporating real-time job market data, economic indicators, and industry trends will enhance the accuracy of predictions and recommendations, keeping the system up-to-date with dynamic market shifts.

NLP and Sentiment Analysis: Implementing Natural Language Processing (NLP) and sentiment analysis can help the system extract insights from job descriptions, company reviews, and industry news, enriching the quality of recommendations and predictions.

Multi-Dimensional Analysis:

Expanding beyond branch-wise analysis, the project can incorporate multi-dimensional insights, such as gender, region, and diversity, to create more inclusive placement strategies.

Personalized Learning Pathways:

Integrating learning platforms with personalized pathways based on placement trends can enable students to proactively develop skills for upcoming job roles.

The future scope for the Campus Placement Analysis project is dynamic and opens doors for continuous innovation, expansion, and integration of emerging technologies. As the project evolves, it has the potential to reshape not only campus placements but also the entire landscape of career development and education-to-employment transition.

Bibilography

- <https://databank.worldbank.org/source/world-development-indicators>
- <https://www.iitm.ac.in/annual-reports>
- <https://ieeexplore.ieee.org/document/9362836>
- <https://sidaartha.com/PlacementAnalyzer/>
- <https://www.scribd.com/document/437314500/Campus-Placement-Analyzer-Using-Supervised-Machine-Learning-Algorithms>
- <https://ieeexplore.ieee.org/abstract/document/9758214/authors#authors>
- Source code:
<https://github.com/smartinternz02/SBSPS-Challenge-9964-Identifying-Patterns-and-Trends-in-Campus-Placement-Data-using-Machine-Learning>