A

Major Project On

**Campus Placements Prediction & Analysis using Machine Learning**

(Submitted in partial fulfillment of the requirements for the award of Degree)

BACHELOR OF TECHNOLOGY

In

COMPUTER SCIENCE AND ENGINEERING

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##### DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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**2020-2024**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**



#### CERTIFICATE

This is to certify that the project entitled **“CAMPUS PLACEMENTS PREDICTION & ANALYSIS USING MACHINE LEARNING” submitted by G.VAMSHI (207R1A0577), K.SHIVA** (**217R5A0511) & N. KANAKA RAJ(207R1A05A5)** in partial fulfillment of the requirements for the award of the degree of B.Tech in Computer Science and Engineering to the Jawaharlal Nehru Technological University Hyderabad, is a record of bonafide work carried out by them under our guidance and supervision during the year 2023-24.

The results embodied in this thesis have not been submitted to any other University or Institute for the award of any degree or diploma.

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**Submitted for viva voce Examination held on**

Apart from the efforts of us, the success of any project depends largely on the encouragement and guidelines of many others. We take this opportunity to express our gratitude to the people who have been instrumental in the successful completion of this project.

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Placement of students is one of the most important objective of an educational institution. Reputation and yearly admissions of an institution invariably depend on the placements it provides it students with. That is why all the institutions, arduously, strive to strengthen their placement department so as to improve their institution on a whole. Any assistance in this particular area will have a positive impact on an institution’s ability to place its students. This will always be helpful to both the students, as well as the institution. In this study, the objective is to analyse previous year's student's data and use it to predict the placement chance of the current students. This model is proposed with an algorithm to predict the same. Data pertaining to the study were collected form the same institution for which the placement prediction is done and also suitable data pre-processing methods were applied. This proposed model is also compared with other traditional classification algorithms such as Decision tree and Random forest with respect to accuracy, precision and recall. From the results obtained it is found that the proposed algorithm performs significantly better in comparison with the other algorithms mentioned.

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# INTRODUCTION

#### INTRODUCTION

##### PROJECT SCOPE

The project aims to develop a Placement Prediction system using classification algorithms like Decision Trees and Random Forests to forecast the likelihood of undergraduate students securing placements in campus recruitment based on their academic history. By utilizing supervised learning techniques on past student data, the system endeavors to provide valuable insights for colleges and students to enhance placement outcomes. The scope encompasses data analysis of academic records including overall percentage, backlogs, and credits, with a focus on improving placement probabilities and aiding decision-making processes for both educational institutions and individuals.

##### PROJECT PURPOSE

The project aims to utilize classification algorithms like Decision Trees and Random Forest to predict the likelihood of undergraduate students getting placed in campus recruitment, leveraging their academic history data. Through supervised learning, the system helps colleges and students assess placement probabilities, aiding in strategic improvements for both educational institutions and individuals

##### PROJECT FEATURES

This project utilizes supervised learning techniques, specifically Decision Trees and Random Forest, to predict the likelihood of undergraduates getting placed in campus recruitment based on their academic history. By analyzing factors such as overall percentage, backlogs, and credits, it aims to provide valuable insights for both colleges and students to enhance placement outcomes.

## SYSTEM ANALYSIS

##### SYSTEM ANALYSIS

1. **SYSTEM ANALYSIS**

System Analysis is the important phase in the system development process. The System is studied to the minute details and analyzed. The system analyst plays an important role of an interrogator and dwells deep into the working of the present system. In analysis, a detailed study of these operations performed by the system and their relationships within and outside the system is done. A key question considered here is, “what must be done to solve the problem?” The system is viewed as a whole and the inputs to the system are identified. Once analysis is completed the analyst hasa firm understanding of what is to be done.

##### PROBLEM DEFINITION

The project aims to enhance an educational institution's placement process by developing an algorithm to predict students' placement chances using previous year's data. The proposed model is compared with traditional classification algorithms like Decision Tree and Random Forest for accuracy, precision, and recall, demonstrating superior performance.

##### EXISTING SYSTEM

The existing system employs various classification algorithms such as Logistic Regression, ID3, C4.5, Naive Bayes, and Random Tree to predict student placement outcomes based on educational performance data. Among these, Naive Bayes consistently shows higher accuracy, particularly in the context of placement prediction, with an average error rate of 0.28 and an accuracy of 86.15%.

##### DISADVANTAGES OF EXISTING SYSTEM

* The system is not implemented Attribute selection which is not relevant to each other.
* The system is not implemented Cleaning missing values.

##### PROPOSED SYSTEM

In Placement Prediction system predicts the probability of a undergrad students getting placed in a company by applying classification algorithms such as Decision tree and Random forest. The main objective of this model is to predict whether the student he/she gets placed or not in campus recruitment. For this the data consider is the academic history of student like overall percentage, backlogs, credits. The algorithms are applied on the previous years data of the students.

##### ADVANTAGES OF THE PROPOSED SYSTEM

* Some of the attributes in the initial dataset that was not pertinent (relevant) to the experiment goal were ignored. The attributes name, roll no, credits, backlogs, whether placed or not, b.tech % ,gender are not used.
* The random forest algorithm can also be thought of as an ensemble method in machine learning. The input to a random forest algorithm is a dataset consisting of records, with attributes. Random subsets of the input are created.

##### FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are

* ECONOMICAL FEASIBILITY
* TECHNICAL FEASIBILITY
* SOCIAL FEASIBILITY

###### ECONOMIC FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

###### TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

###### SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

##### HARDWARE & SOFTWARE REQUIREMENTS

###### HARDWARE REQUIREMENTS:

Hardware interfaces specify the logical characteristics of each interface between the software product and the hardware components of the system. The following are some hardware requirements.

➢ Processor - Pentium –IV

➢ RAM - 4 GB (min)

➢ Hard Disk - 20 GB

➢ Key Board - Standard Windows Keyboard

➢ Monitor - SVGA

###### SOFTWARE REQUIREMENTS:

Software Requirements specifies the logical characteristics of each interface and software components of the system. The following are some software requirements,

* **Operating system :** Windows 7 Ultimate.
* **Coding Language :** Python.
* **Front-End :** Python.
* **Back-End :** Django-ORM
* **Designing :** Html, css, javascript.
* **Data Base :** MySQL (WAMP Server).

## ARCHITECTURE

##### ARCHITECTURE

##### PROJECT ARCHITECTURE

This project architecture shows the procedure followed for classification, starting from input to final prediction.

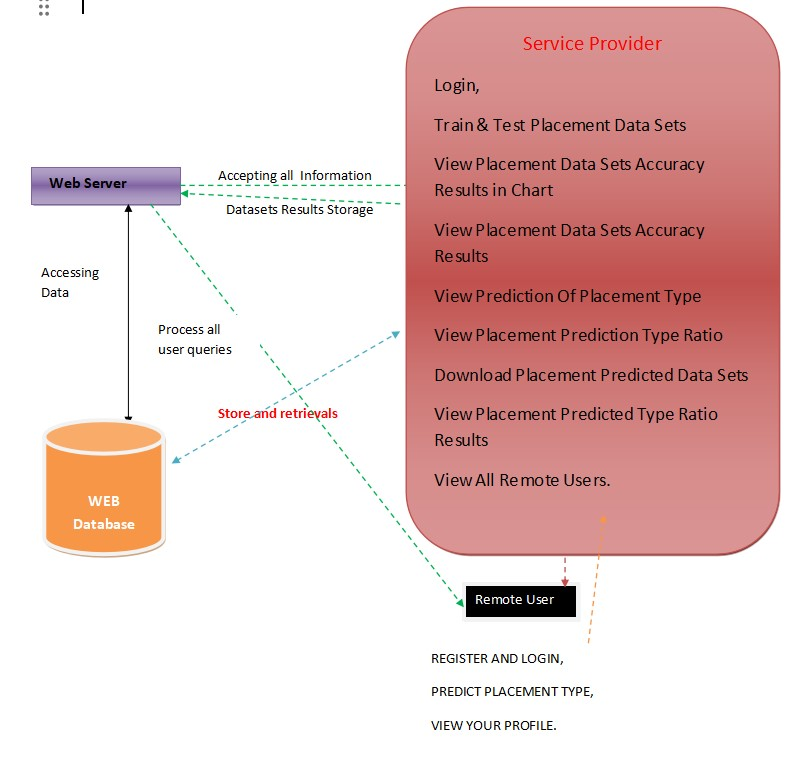


Figure 3.1: Project Architecture for campus plaements prediction & analysis using machine learning

##### DESCRIPTION

The architecture of a Campus Placements Prediction & Analysis project involves several key stages aimed at leveraging machine learning for informed decision-making. Initially, historical data on campus placements, encompassing student profiles, academic records, and placement outcomes, is collected and preprocessed to ensure data quality.

This preprocessing phase includes tasks such as handling missing values, encoding categorical variables, and scaling numerical features. Feature engineering techniques are then employed to extract relevant features such as GPA, skills, and internships from the dataset. Subsequently, exploratory data analysis is conducted to gain insights into the relationships between features and placement outcomes. Model selection involves choosing appropriate algorithms like logistic regression, decision trees, or ensemble methods based on the nature of the data and the problem at hand. These models are trained on a portion of the data and evaluated using metrics like accuracy, precision, and recall. Hyperparameter tuning is performed to optimize the performance of selected models. The trained model is then deployed into a production environment, potentially through a web application interface, where stakeholders can input student data to obtain placement predictions. Backend integration ensures seamless communication between the frontend and the machine learning model. Continuous monitoring and maintenance of the deployed system are essential to ensure its performance and accuracy over time. Regular updates to the model with new data enable it to adapt to changing trends and patterns in placement outcomes. This holistic approach to project architecture ensures the development of an effective and scalable solution for campus placements prediction and analysis, ultimately benefiting educational institutions and students alike.

##### USE CASE DIAGRAM

A use case diagram is a graphical depiction of a user's possible interactions with a system. A use case diagram shows various use cases and different types of usersthe system has. The use cases are represented by either circles or ellipses. The actors are often shown as stick figures.

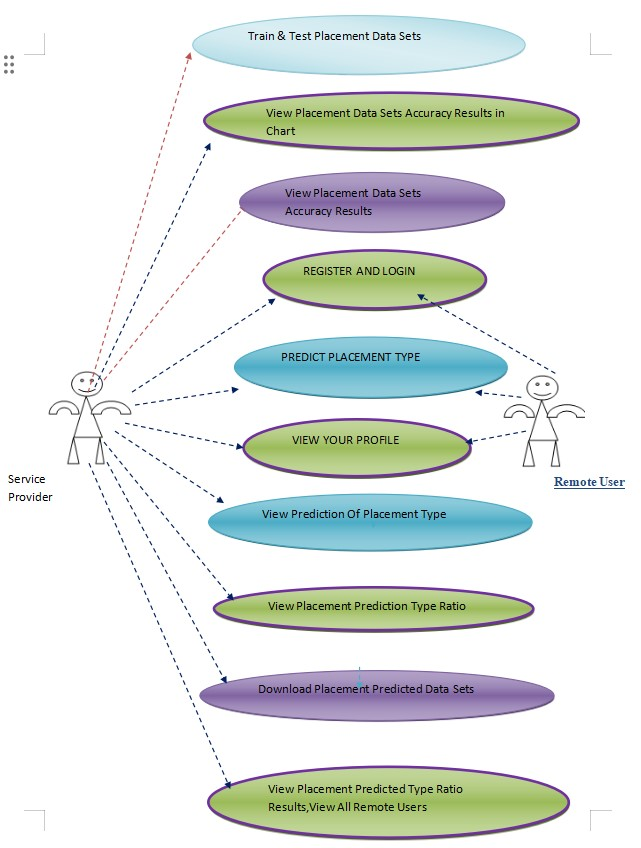


Figure 3.2: Use Case Diagram for campus plaements prediction & analysis using machine learning

##### CLASS DIAGRAM

Class diagram is a type of static structure diagram that describes the structure of a system by showing the system’s classes, their attributes, operations (or methods), and the relationships among objects

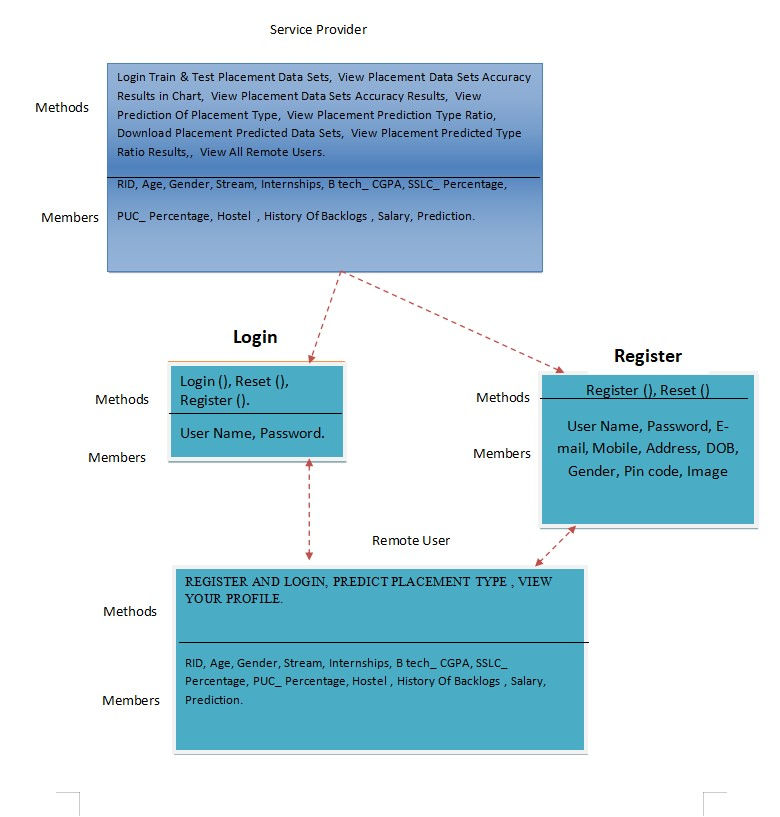


Figure 3.3: Class Diagram for campus plaements prediction & analysis using machine learning

##### SEQUENCE DIAGRAM

A sequence diagram shows object interactions arranged in time sequence. It depicts the objects involved in the scenario and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario. Sequence diagrams are typically associated with use case realizations in the logical view of the system under development.

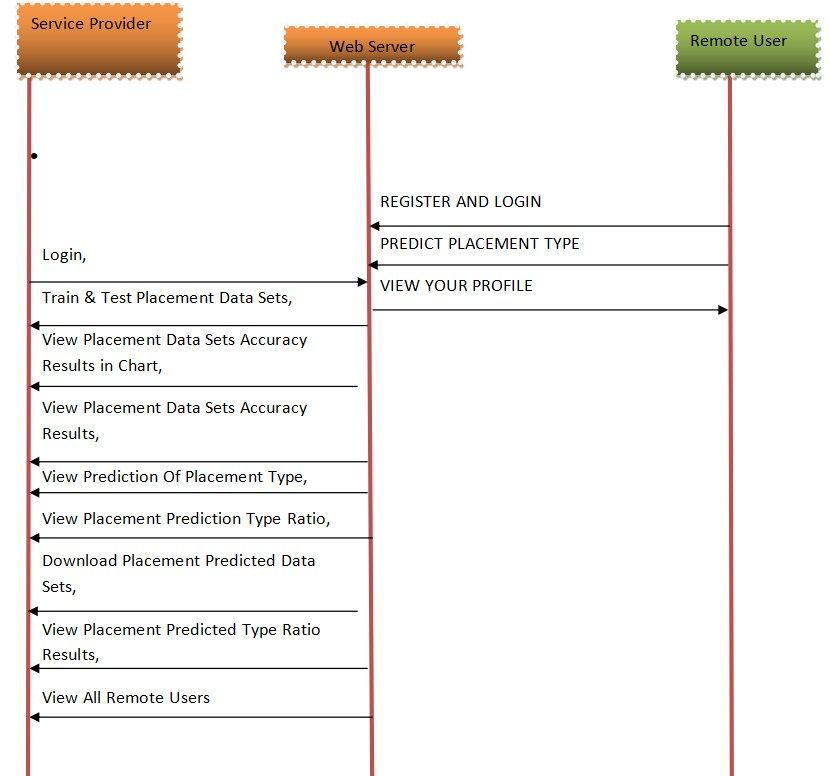


Figure 3.4: Sequence Diagram for campus plaements prediction & analysis using machine learning

## IMPLEMENTATION

##### SAMPLE CODE

from django.shortcuts import render, redirect, get\_object\_or\_404 from admins.models import Prodcuts

from user.forms import UsersForm, PurchaseForm from user.models import Users, Purchase, Feedback

from user.words import positive\_words, negative\_words

def home(request):

products=Prodcuts.objects.all()

return render(request,'user/home.html',{'products':products})

def viewproduct(request,pk): pro=Prodcuts.objects.get(id=pk) pros=Prodcuts.objects.get(id=pk) uid=request.session['userid'] uses=get\_object\_or\_404(Users

, id=uid)

if request.method=="POST": form=PurchaseForm(request. POST)

if form.is\_valid():

ff=form.save(com mit=False) ff.customer=uses ff.purhased=pro ff.totalprice=0 ff.save()

return redirect('user:cart')

else:

form=PurchaseForm()

return render(request,'user/viewproduct.html',{'prod':pro,'ipk':pk,'form':form})

def cart(request):

uid = request.session['userid']

uses = get\_object\_or\_404(Users, id=uid) p=Purchase.objects.filter(customer=uses,stat us='incart')

if request.method == "POST": Purchase.objects.filter(customer=uses, status='incart').update(status='checkout')return redirect('user:home')

return render(request,'user/cart.html',{'p':p})

def viewratings(request,pk):

pro = get\_object\_or\_404(Prodcuts, pk=pk) fedbck=Feedback.objects.filter(product=pro)

return render(request,'user/viewratings.html',{'feedbacks':fedbck})

def addratings(request,pk): pos,neg=0,0 sen='pending'

pro = get\_object\_or\_404(Prodcuts, pk=pk)uid = request.session['userid']

uud = Purchase.objects.get(customer=uses,purhased=pro,status='purchased')stat = 'purchased'

except:

stat='not purchased'

if request.method=="POST": ratings=request.POST.get('rating','') comments=request.POST.get('comm ent','')

for pword in positive\_words: if pword in

comments: pos=pos+1

for nword in negative\_words:if nword in comments: neg=neg+1

if pos>neg: sen='positi ve’

elif neg>pos:

sen='negat ive'elif neg==pos: sen='neutral'

if Feedback.objects.create(user=uses,product=pro,isPurchased=stat,rating=ratings,review=co mments,sentim ent=sen):

return redirect('user:home')

return render(request,'user/addratings.html',{'pro':pro})

def

index(reques t):

message=No ne

if request.method=="POST": username=request.POST.get('userna me','')

password=request.POST.get('passw ord','')try:

users=Users.objects.get(username=username,password=password) request.session['userid']=users.id request.session['username']=users.username

return redirect('user:home') except:

message="User name and password are not matching..."return render(request,'user/index.html',{'msg':message})

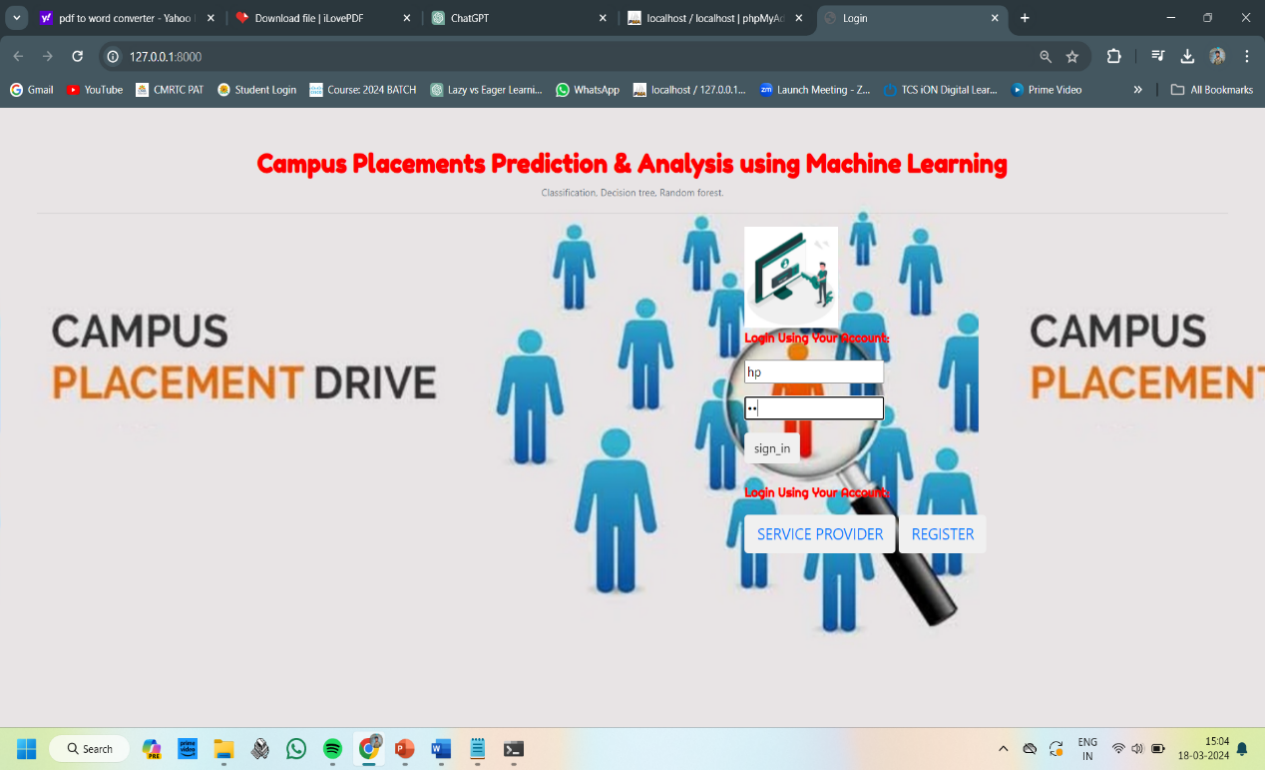
def registration(request):

if request.method=="POST": loca=request.POST.get('locati on','')users = UsersForm(request.POST) if users.is\_valid():

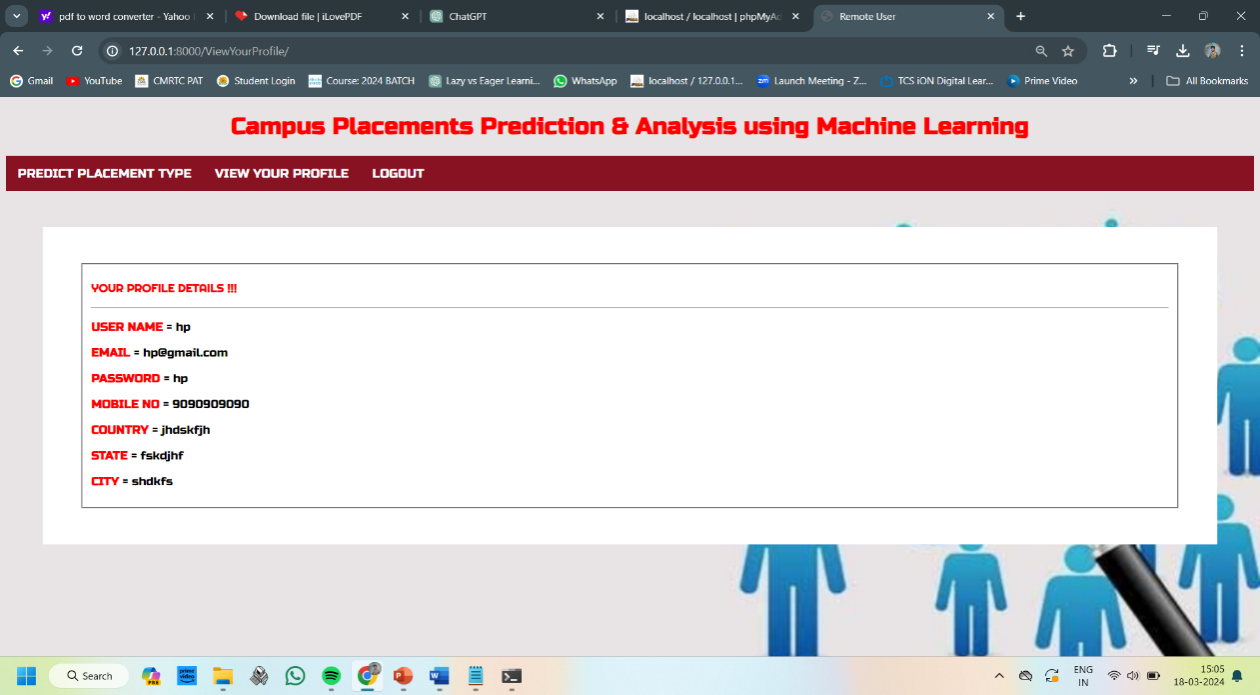
formss=users.save(commit= False)formss.location=loca formss.save()

return redirect('user:index')

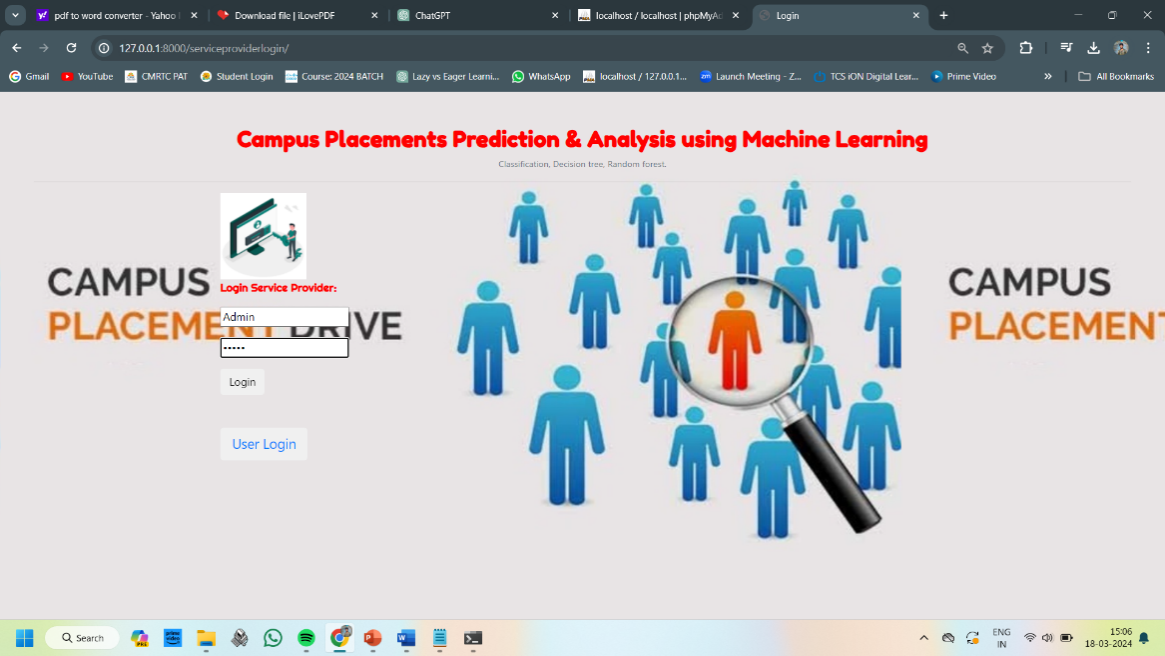
## SCREENSHOTS



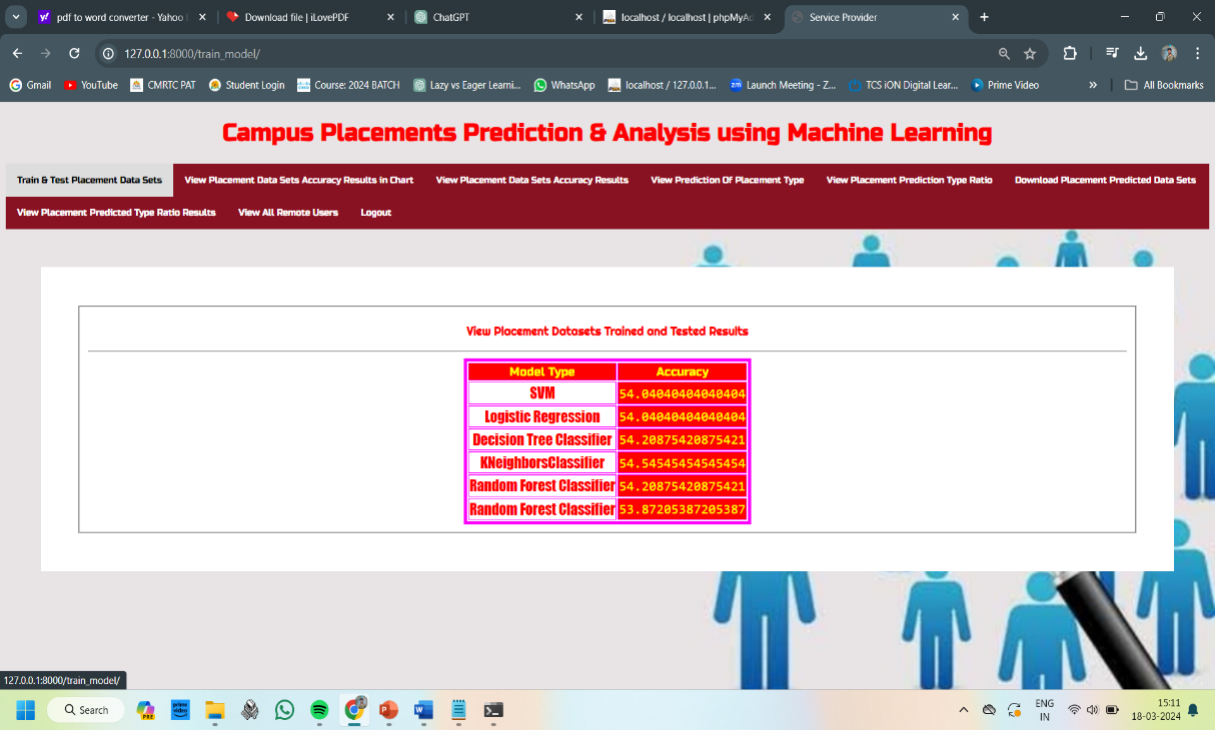
Screenshot 5.1: User Login Page



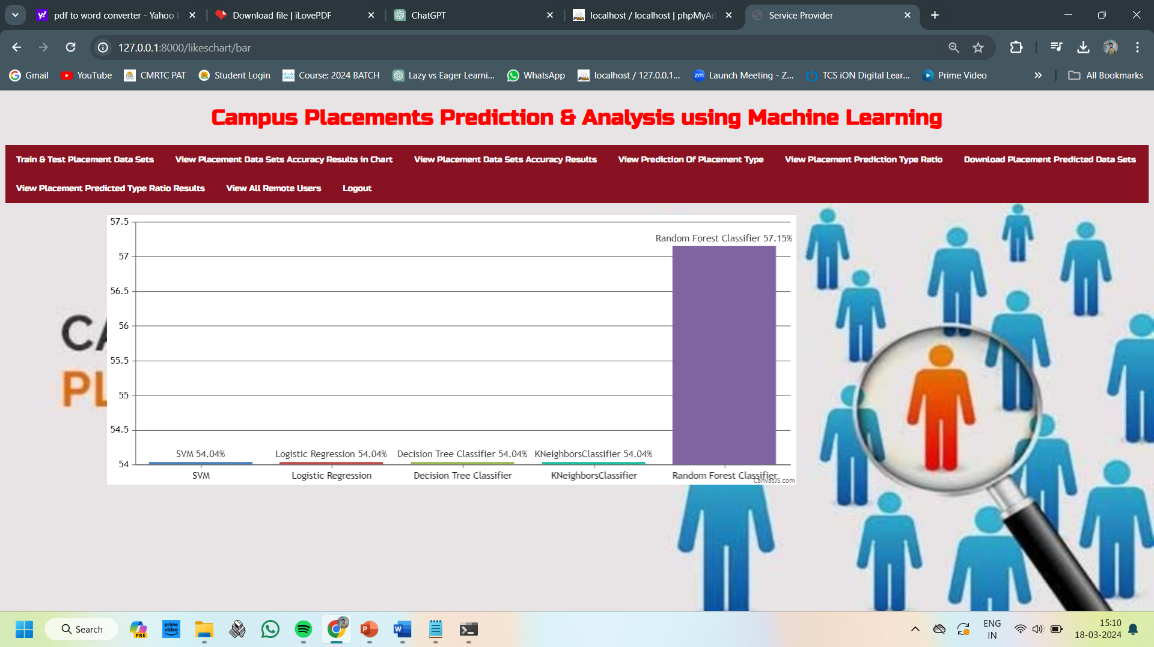
Screenshot 5.2: User Home Page



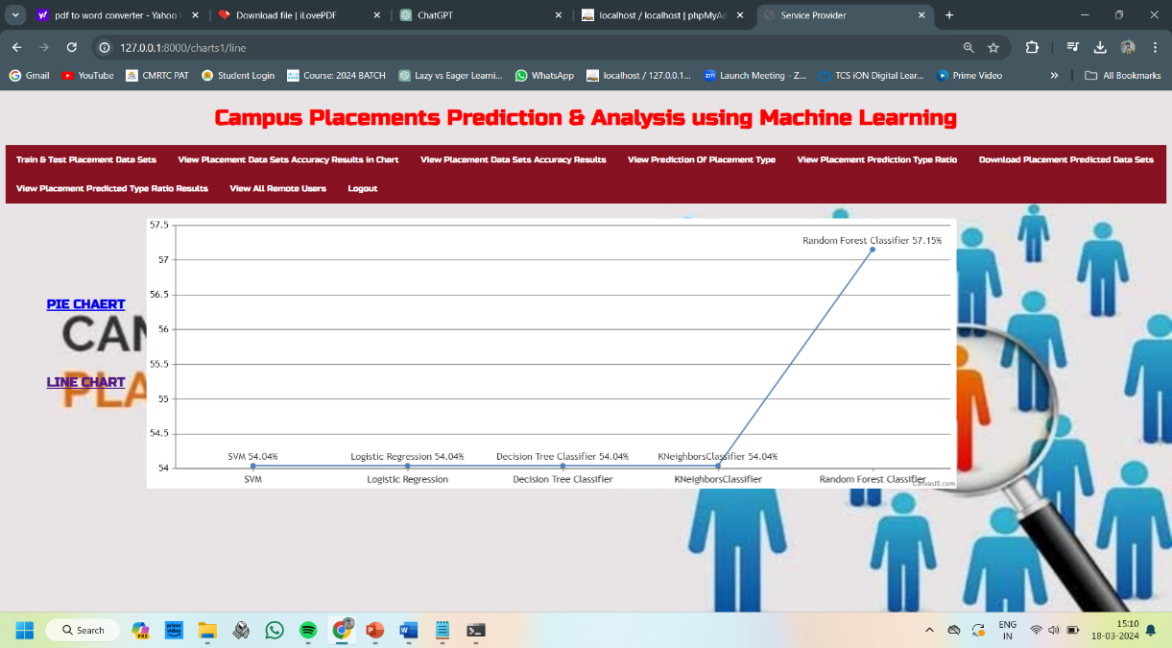
Screenshot 5.3: Admin Login Page



Screenshot 5.4: Admin Home Page



Screenshot 5.5: Sentiment Analysis



Screenshot 5.6: Sentiment Analysis

## TESTING

##### TESTING

##### INTRODUCTION TO TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

##### TYPES OF TESTING

###### UNIT TESTING

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results

###### INTEGRATION TESTING

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

###### FUNCTIONAL TESTING

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.

Functional testing is centered on the following items:

Valid Input : identified classes of valid input must be accepted.

Invalid Input : identified classes of invalid input must be rejected.

Functions : identified functions must be exercised.

Output : identified classes of application outputs must be exercised.

Systems/Procedures: interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

##### TEST CASES

###### CLASSIFICATION

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Test case ID | Test case name | Purpose | Input | Output |
| 1 | Predicting Placement Outcome for a High-Performing Student | To verify if the model accurately predicts the placement outcome | Student's GPA: 3.8  Technical Skills: Python, Java, SQL  Internship Experience: Yes  Extracurricular Activities: Member of Coding | Placed  Successfully |
| 2 | Predicting Placement Outcome for a Student with Average Performance | To verify if the model accurately predicts the placement outcome | Student's GPA: 2.9  Technical Skills: C++, HTML, CSS  Internship Experience: No  Extracurricular Activities: None | Placement  Not  Gurantee |

### 7. CONCLUSION

##### CONCLUSION & FUTURE SCOPE

##### PROJECT CONCLUSION

Based on the analysis comparing Decision Tree and Random Forest algorithms for predicting student placement outcomes, Random Forest demonstrated slightly higher accuracy at 86% compared to Decision Tree's 84%. Thus, the project concludes that utilizing the Random Forest algorithm would be more effective in forecasting placement results, benefiting both institutions and students.

##### FUTURE SCOPE

Using Random Forest algorithm for campus placement prediction shows promising accuracy, indicating potential for further enhancement through feature engineering and ensemble techniques. Future scope includes integrating real-time data sources, refining model interpretability, and exploring personalized recommendation systems for career guidance.

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##### BIBLIOGRAPHY

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##### GITHUB LINK

https://github.com/vamshigaini/Campus-Placement