IBM-NALAIYA THIRAN

UNIVERSITY ADMIT ELIGIBILITY PREDICTOR

PROJECT REPORT

Submitted by

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    GitHub & Project Demo Link

1.INTRODUCTION

1.1 Project Overview

This project is created using Machine Learning and Regression methods- a statistical technique to predict the outcome of event which is to verify the users' admission eligibility level, considering the universities they have chosen. This is achieved based on the algorithms implemented, when is user feed the application with the required information (GRE Score, SOP, Research, CGPA, etc.) the results that is, whether if the student is selected or not is displayed. The student is also provided with the visualized form of their degree of eligibility compliance with university requirements represented with graphs and plots. Rather having to calculate the eligibility by the students themselves, which is also an error prone process this application helps to provide them the ease of providing them the results based on algorithmic models.

1.2 Purpose

For the fresh graduates of high school who for most part is unaware of the time management techniques that causes them to make mistakes when at haste, choosing a university and doing research on its offerings to its students itself is a strenuous task to do. Though there are many application and also the official websites of the universities that provide insight about everything the universities have to offer, are is not a site that offers them perception of their own level of eligibility which will adhere to the university's criteria. In the light of it, we have created this application implementing Regression, Data mining and Machine learning to solve this issue.

2.LITERATURE SURVEY

2.1 Existing Problem

In consideration to prior research performed in this field, the Bayesian Networks Algorithm have been used to create a decision support network for evaluating the application submitted by foreign students of the university. This model was developed to forecast the progress of prospective students by comparing the score of students currently studying at university. The model thus predicted whether the aspiring student should be admitted to university on the basis of various scores of students. Since the comparisons are made only with students who got admission into the universities but not with students who got their admission rejected, this method will not be much adaptable nor does it provide help students to realize the field the lack in.

2.2 References

1) Prediction probability of getting an admission into a university using Machine Learning
   Publisher: IEEE
   IEEE prediction of admission
   Author-A.Sivasangari, VShivani
   Date of Publication: 06 May 2021

2) Using Data Mining Techniques to Predict Student Performance to Support Decision Making in University Admission Systems
   Publisher: IEEE
   IEEE Decision Making in University Admission System
   Author-Hanan Abdullah Mengash
   Date of Publication: 19 March 2020

3) College Admission Prediction using Ensemble Machine Learning Model
   Publisher: IRJET
   IRJET College Admission Prediction
   Author- Vandit Manish Jain, Rihaan Satia
   Date of publication:12 December 2021

2.3 Problem Statement Definition

It is no secret that the pursuit of higher education does not come cheap. Unfortunately, these expenses start well before college or high school bound students set foot on the hallowed halls of their preferred institution. This gives rise to the question about the application cost. During the 2019-2020 admission cycle, 5.6 million college applications were submitted from students across the nation (NACAC, 2021) yet, the college enrollment numbers for 2020-21 academic year decreased by 4.2% from previous year.

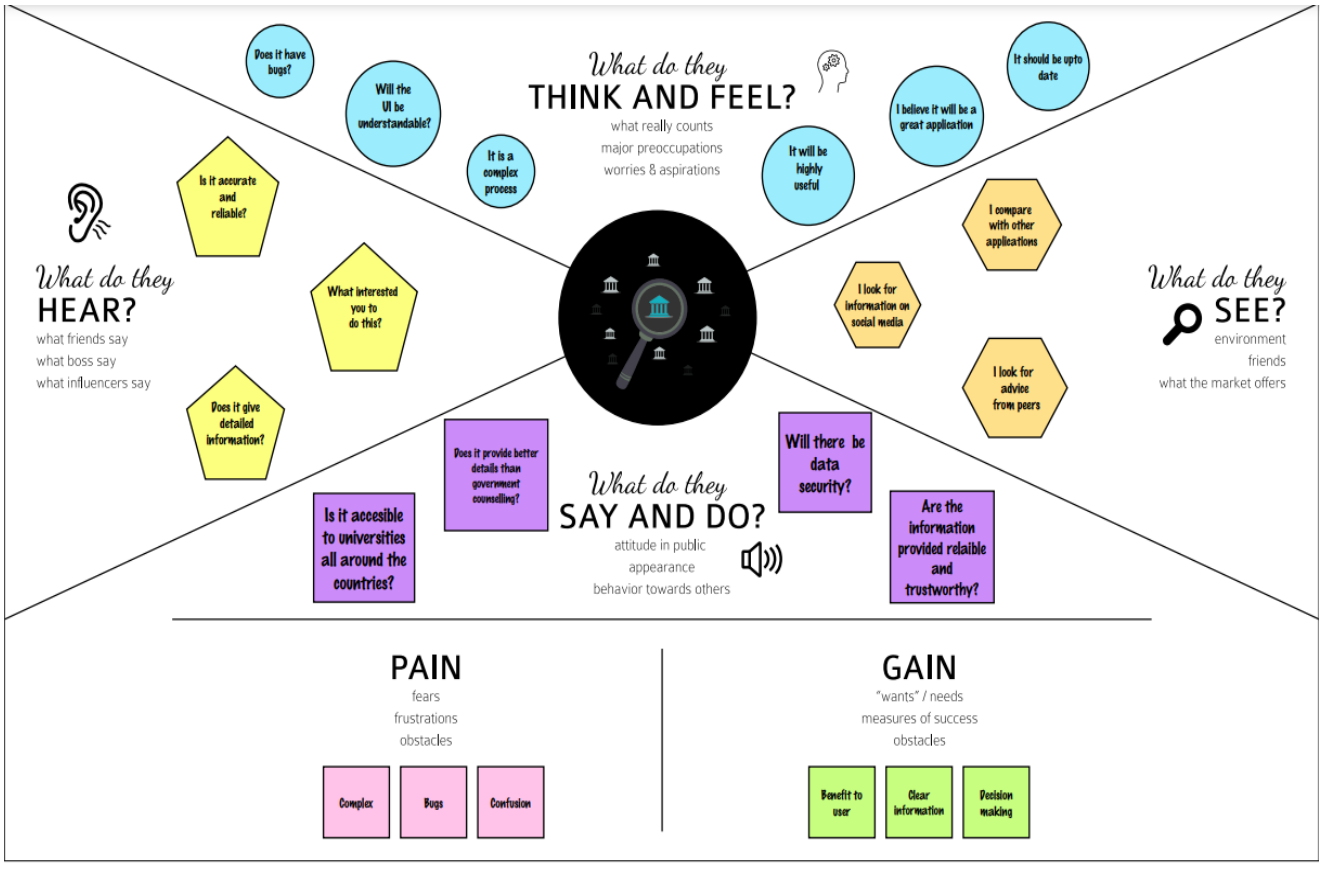
The average college application fee in the U.S. is $50, while the elites charge higher rates. Among 62 four-year institutions with the highest application fees, the average is $77. Most colleges also require the submission of SAT, ACT, OR AP scores. But, the cost for registration for SAT or ACT could end up higher than the cost of application, yet students are still willing to take the tests even multiple times to increase the test scores.

The aforementioned stats clearly show there are students who thirst to learn and to enroll in their dream university. All these hard work and money spent would waste away if they were to ne turned down. The aim of this project is to help students with a system that could guide students and recommend best universities list and predict their admission chance in those universities according to their profile and scores.

3.IDEATION AND PROPOSED SOLUTION

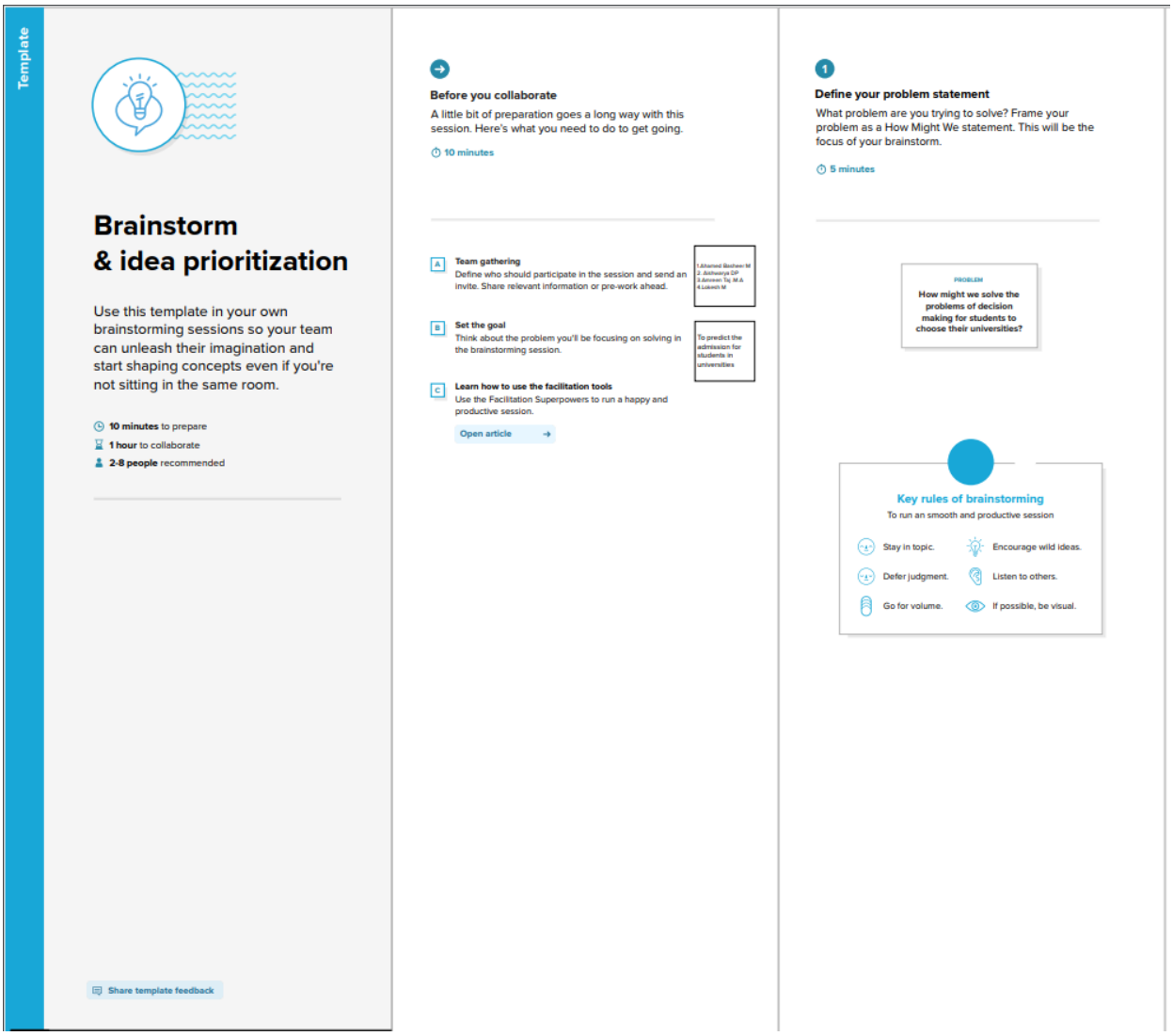
3.1 Empathy Map C

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviors and attitudes. It is a useful tool to helps teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.

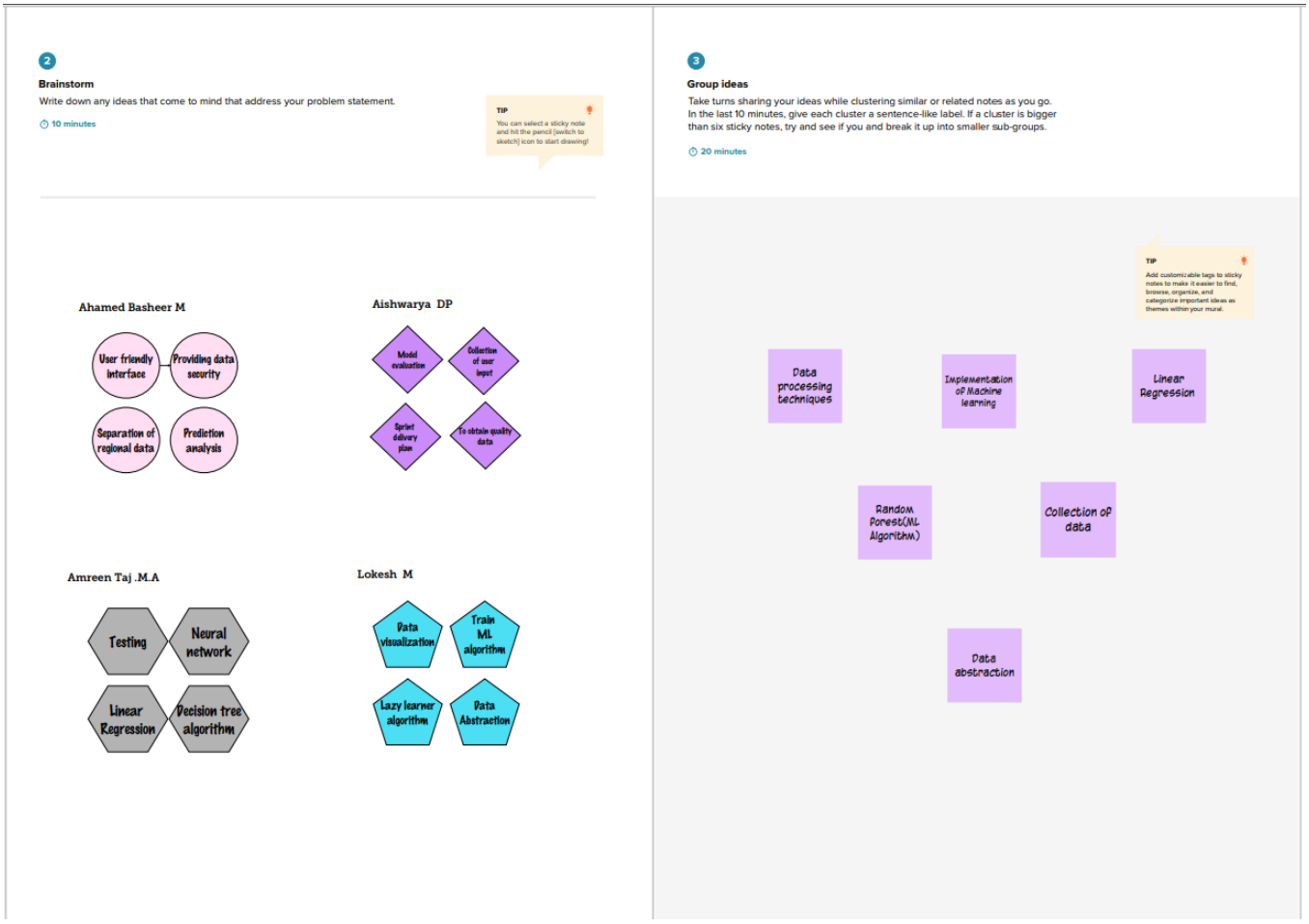


3.2 Ideation and Brainstorming

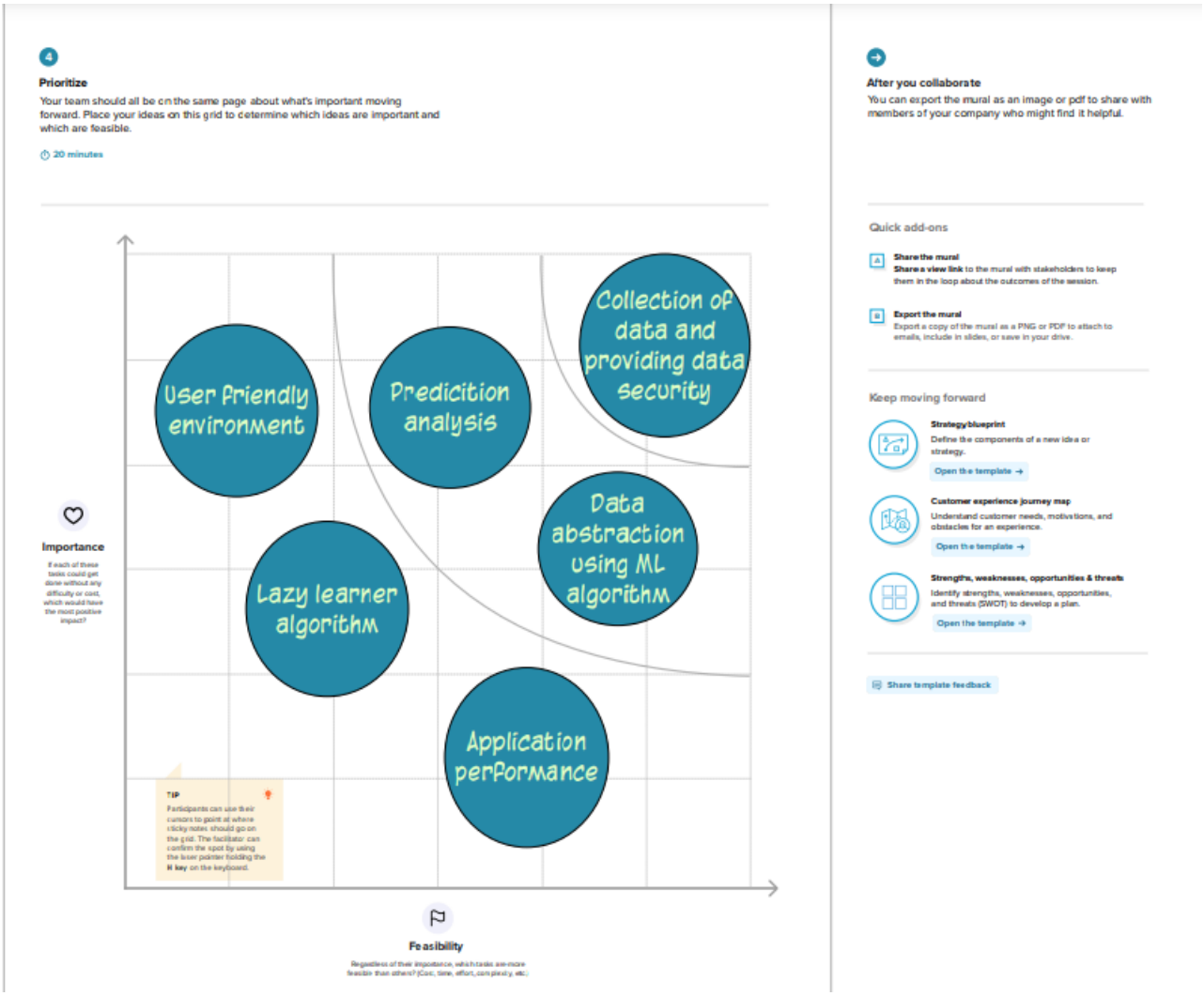
Team Gathering, Set the goal, learn to use the facilitated tools



Brain storming and clustering ideas



Idea prioritization



3.3 Proposed Solution

S.No	Parameter	Description
1.	Problem Statement (Problem to be solved)	This project deals with the problem of finding universities for students, based on their academic scores. Rather than visiting the colleges in person regarding the norms. This application provides them necessary information. This is a time and money saving process especially for students who are located in remote places.
2.	Idea / Solution description	The key research objectives are as follows: • The proposed application would be able to shortlist the universities for the students based on their academic excellence. • The Proposed application provides the students with a vast view of options available for them to be admitted in a university. • In the proposed application provides insight about the university's infrastructure and technological facilities with proof and reviews. • The proposed application can also be used by students who are currently preparing to join their dream university based on the objectives of the admission system with all the students geographically afar.

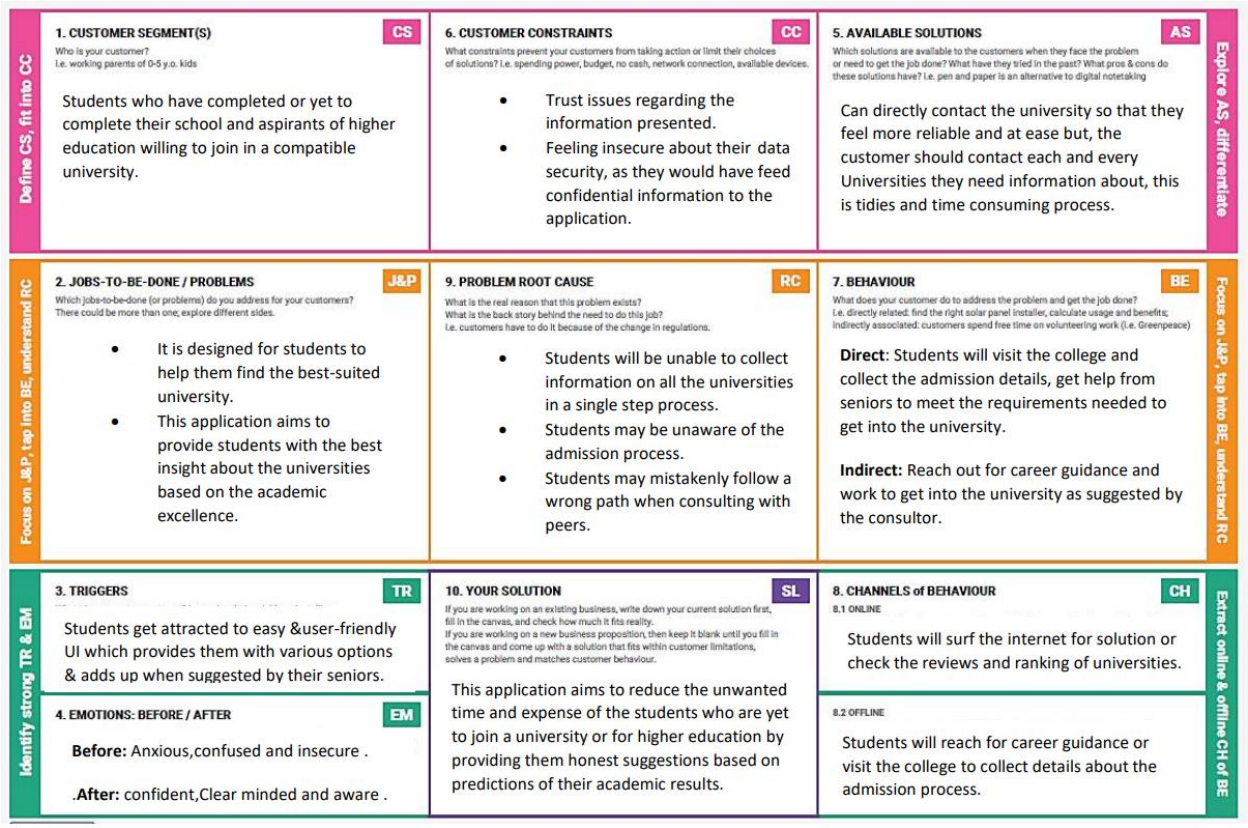
3.	Novelty / Uniqueness	The proposed application aims to be helpful for students and sorts where it *gives* the students chances of making it into a particular program in a university you like. It also lists various facts about the university and, opportunity to compare with various other options available.
4.	Social Impact / Customer Satisfaction	This application reduces the student's investment in time and expense for application process. This project provides good future scope, especially for students who want to pursue their higher education in their dream college.
5.	Business Model (Revenue Model)	Revenue can be generated by advertising for career related guidance and coaching centre. University shall fund the website in order to maintain it for data storage etc.,
6.	Scalability of the Solution	In this regard, a probabilistic insight into college administration for overall rating, cut-offs of the colleges, admission intake and preferences of student is provided.

3.4 Problem Solution Fit

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why.

Purpose

- Solve complex problems in a way that fits the state of your customers.
- Succeed faster and increase your solution adoption by tapping into existing mediums and channels of behavior.
- Sharpen your communication and marketing strategy with the right triggers and messaging.
- Increase touch-points with your company by finding the right problem-behavior fit and building trust by solving frequent annoyances, or urgent or costly problems.
- Understand the existing situation in order to improve it for your target group.



4.REQUIREMENT ANALYSIS

4.1 Functional requirement

Following are the functional requirements of the proposed solution

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Home Page	Description about the application. Guidelines to use the application.
FR-2	User Registration	Registration through Gmail. Enter the required personal details.
FR-3	Log in/Log out	Users can login using their mail id and password. They can logout as and when required.
FR-4	User Confirmation	Confirmation via Email.
FR-5	User Entry	Choose location to find universities in chosen location. Enter academic scores.
FR-6	Result	Lists the universities available by prediction based on the details entered by the user.
FR-7	Resources Page	Provides information to the universities official page. Details of the universities eligibility criteria and admission process.

4.2 Non-functional Requirements

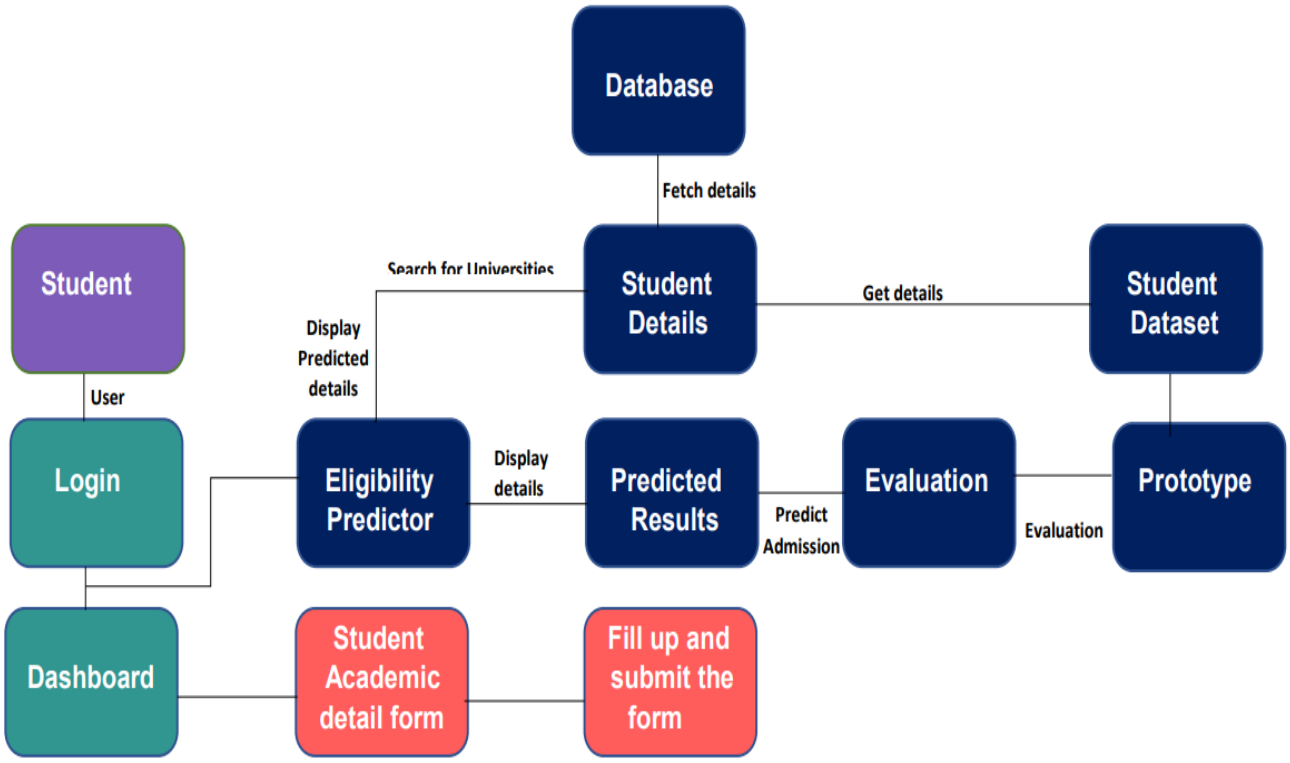
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The application is user friendly and the admission process is made easy to understand that requires only minimal effort of the user.
NFR-2	**Security**	The details of the are maintained confidential and are authorised.
NFR-3	**Reliability**	The information provided are predicted with high accuracy with preferred location.
NFR-4	**Performance**	Reduction in overall time taken to analyse data and prediction criteria with back up hence application doesn't crash.
NFR-5	**Availability**	Available for any user who requires details about Indian universities.
NFR-6	**Scalability**	Supports many users at a time while maintaining optimal performance without a server crash.

5. PROJECT DESIGN

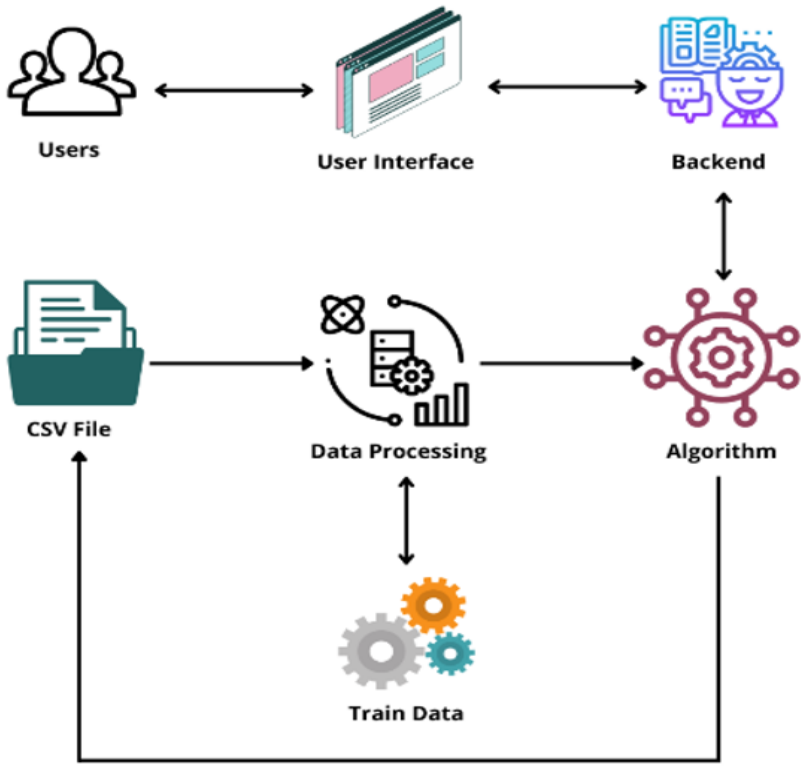
5.1 Data Flow Diagrams

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enter and leaves the system, what changes the information, and where data is stored.



5.2 Solution & Technical Architecture

Solution Architecture:



Technical Architecture:

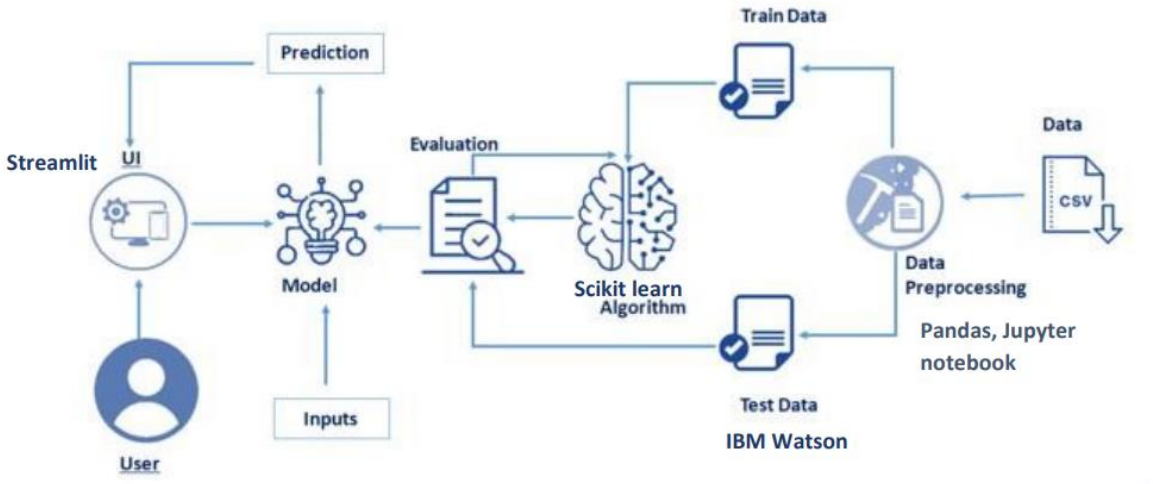


TABLE-1 : COMPONENTS & TECHNOLOGIES

S.No	Component	Technology
1.	User	HTML, CSS, React Js
2.	Application Logic-1	Python
3.	Application Logic-2	IBM Watson
4.	Machine Learning Algorithm	Random Forest

TABLE-2: APPLICATION CHARACTERISTICS

S.No	Characteristics	Technology
1.	Open-Source Frameworks	Flask
2.	Performance	It handles about 100 requests per second

5.3 User Stories

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	itinerary	USN-1	To understand using the detailed description provided.	1	Low	Ahamed Basheer M
Sprint-1	Data analysis	USN-2	To perform Performance of data visualization using matplotlib	2	Medium	Ahamed Basheer M
Sprint-1	Login/Logout	USN-3	As a user, I can login for the application	3	Medium	Ahamed Basheer M
Sprint-2	Web development	USN-4	To Develop a web page using stream-lit with pickle file.	5	High	Aishwarya DP
Sprint-2	Model integration	USN-5	To perform Integration modes	8	High	Aishwarya DP

			using regression methods			
Sprint-3	Web App Hosting	USN-6	Connect the Git-hub repo & branch to the stream-lit cloud platform and set up CI-CD to automatically deploy new changes that's pushed to the repo.	8	High	Lokesh M
Sprint-3	Model deployment	USN-7	Register in IBM cloud. Use IBM Watson ML service and IBM Watson Studio to deploy the Multiple Linear Regression Model. Test the deployment model with few examples	5	High	Amreen Taj MA
Sprint-4	Resource Page	USN-8	Testing the application	8	Medium	Amreen Taj MA
Sprint-4	Results	USN-9	As a user, I can view the results predicted by the application	5	High	Lokesh M

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Product Backlog, Sprint Schedule, and Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Itinerary	USN-1	To understand using the detailed description provided.	1	Low	Ahamed Basheer M
Sprint-1	Data analysis	USN-2	To perform Performance of data visualization using matplotlib	2	Medium	Ahamed Basheer M
Sprint-1	Login/Logout	USN-3	As a user, I can login for the application	3	Medium	Ahamed Basheer M
Sprint-2	Web development	USN-4	To Develop a web page using stream-lit with pickle file.	5	High	Aishwarya DP
Sprint-2	Model integration	USN-5	To perform Integration modes using regression methods	8	High	Aishwarya DP
Sprint-3	Web App Hosting	USN-6	Connect the Git-hub repo & branch to the stream-lit cloud platform and set up CI-CD to automatically deploy new changes that's pushed to the repo.	8	High	Lokesh M
Sprint-3	Model deployment	USN-7	Register in IBM cloud. Use IBM Watson ML service and IBM Watson Studio to deploy the Multiple Linear	5	High	Amreen Taj MA

			Regression Model. Test the deployment model with few examples			
Sprint-4	Resource Page	USN-8	Testing the application	8	Medium	Amreen Taj MA
Sprint-4	Results	USN-9	As a user, I can view the results predicted by the application	5	High	Lokesh M

6.2 Sprint Delivery Schedule

Sprint	**Total Story Points**	**Duration**	**Sprint Start Date**	**Sprint End Date (Planned)**	**Story Points Completed (as on Planned End Date)**	**Sprint Release Date (Actual)**
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Nov 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

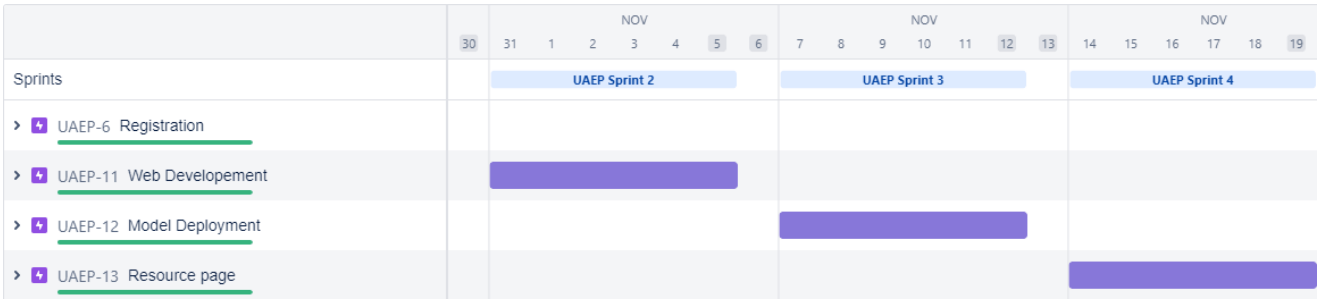
Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let’s calculate the team’s average velocity (AV) per iteration unit (story points per day)

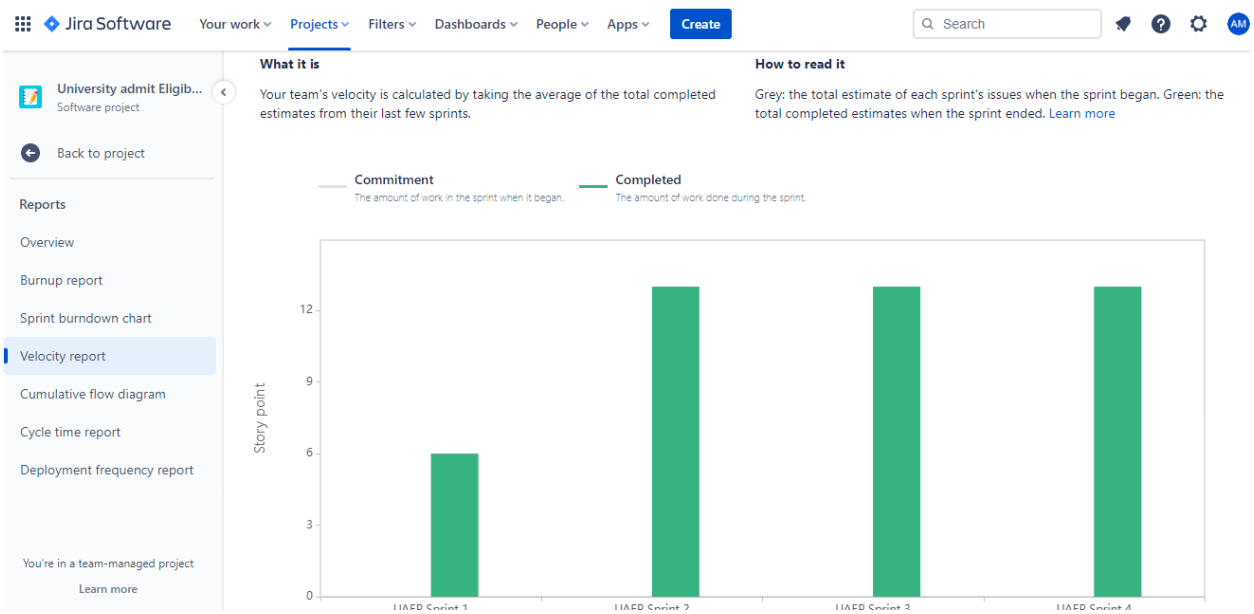
AVERAGE VELOCITY = Total Story Points/No of sprints = 80/4=20

6.3 Reports from JIRA

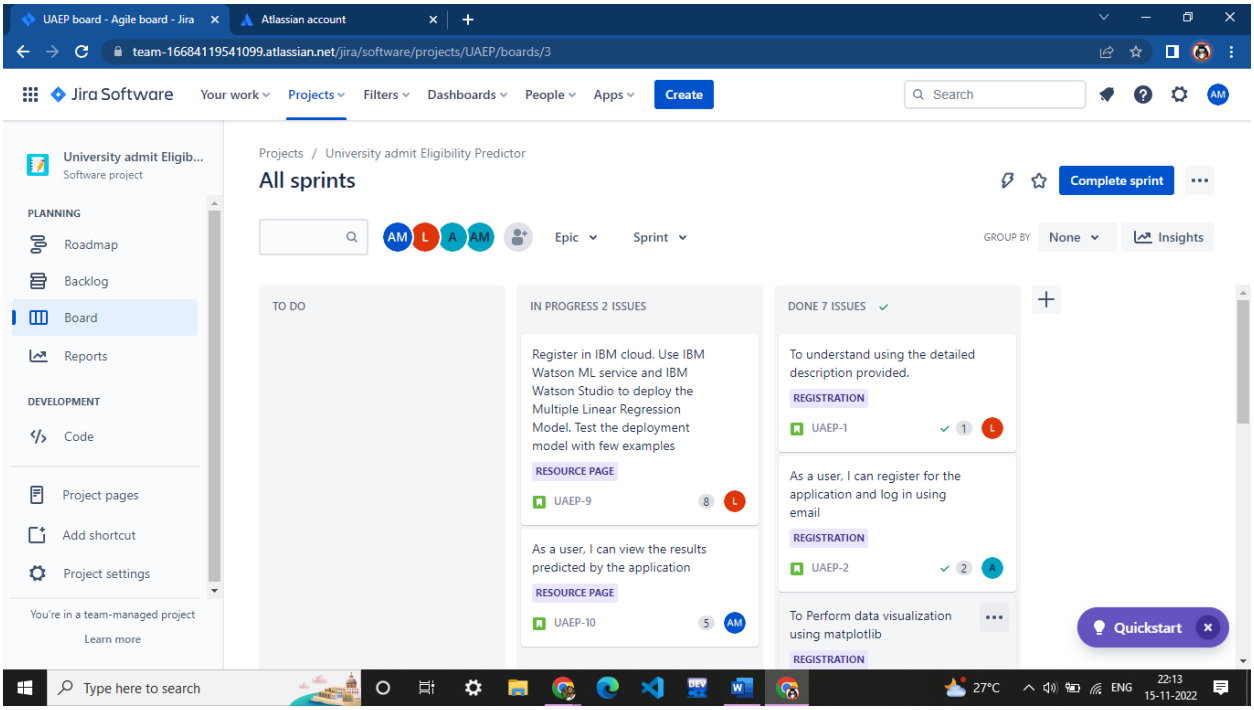
Roadmap:



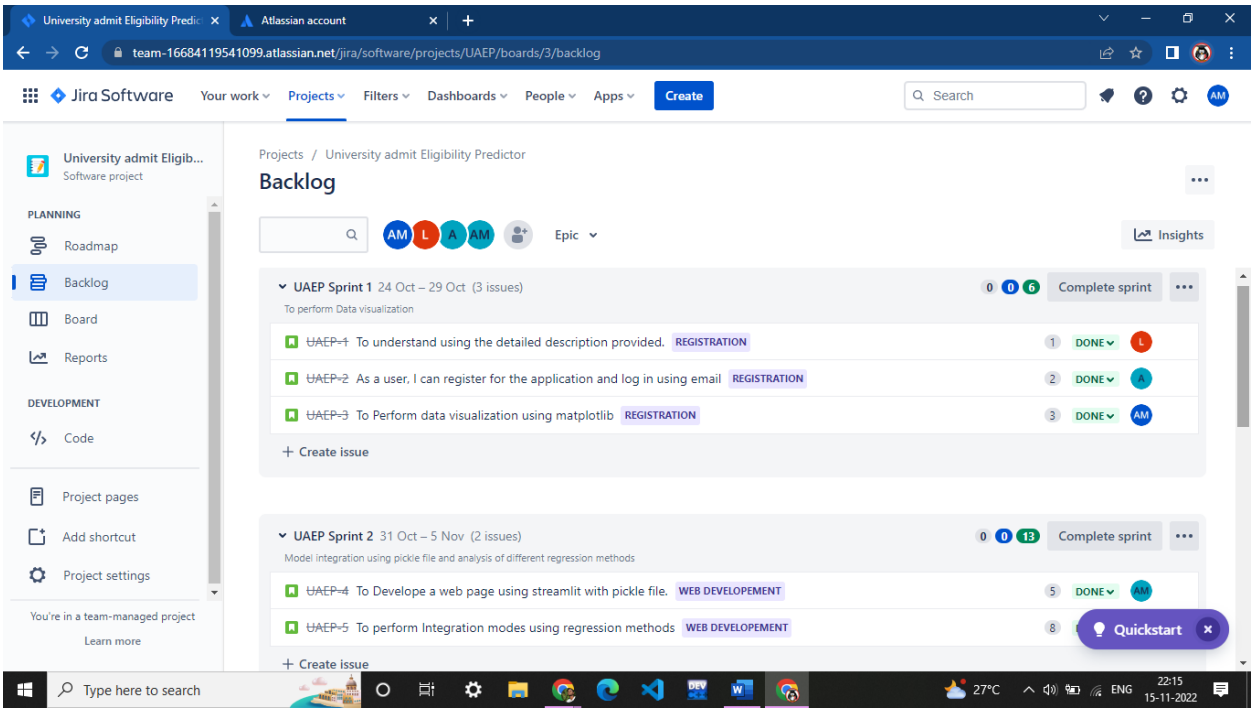
Velocity Report:

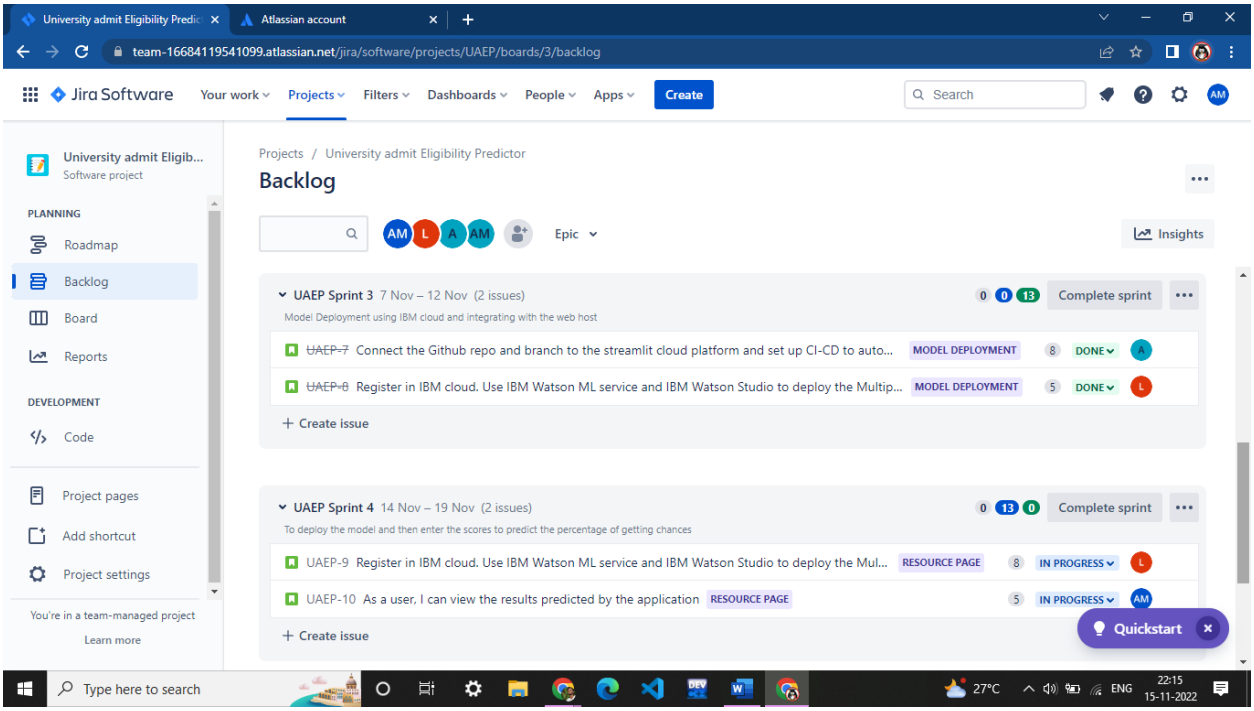


Scrum Board:



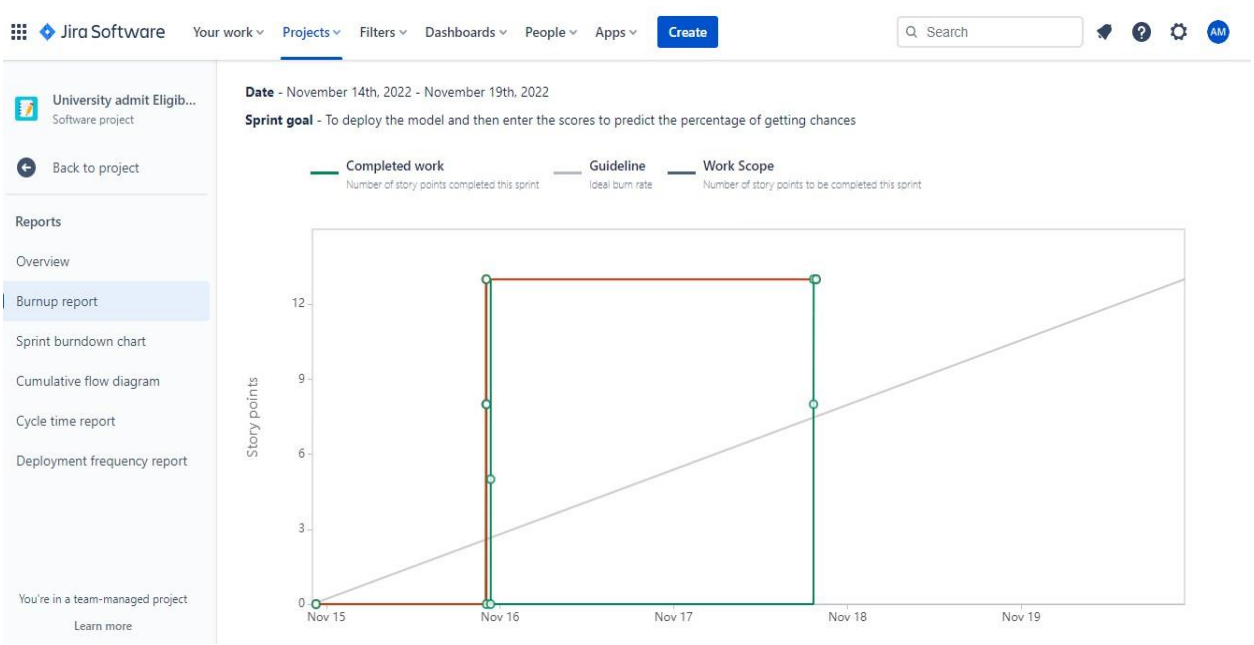
Backlogs:





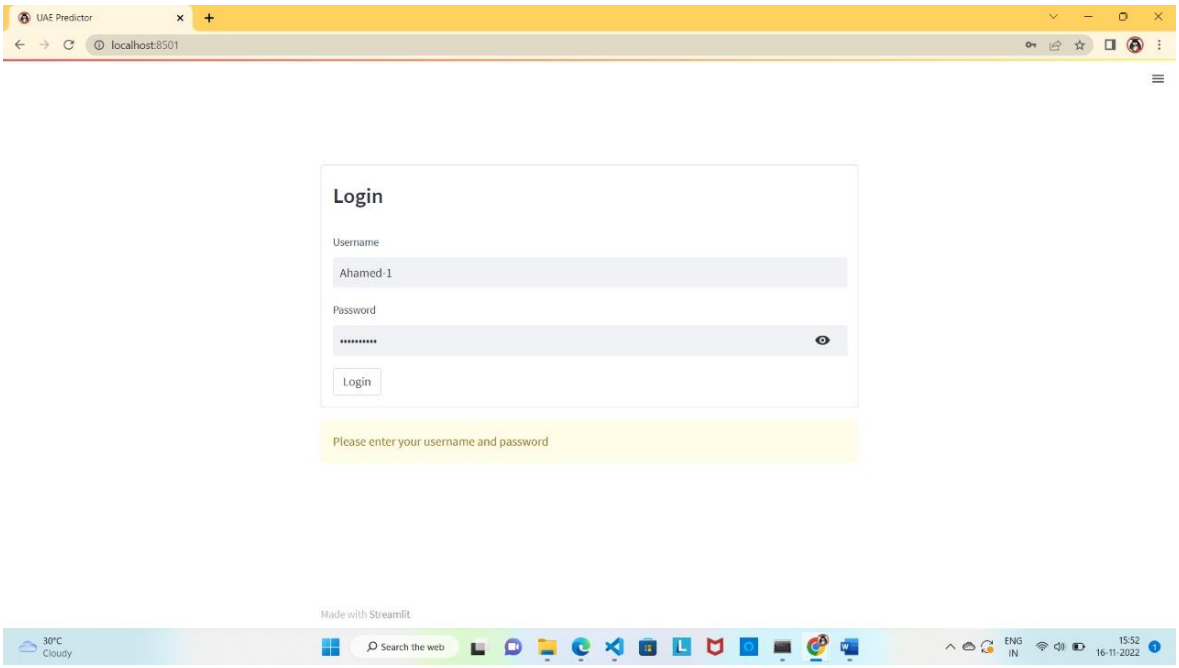
Burn down Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

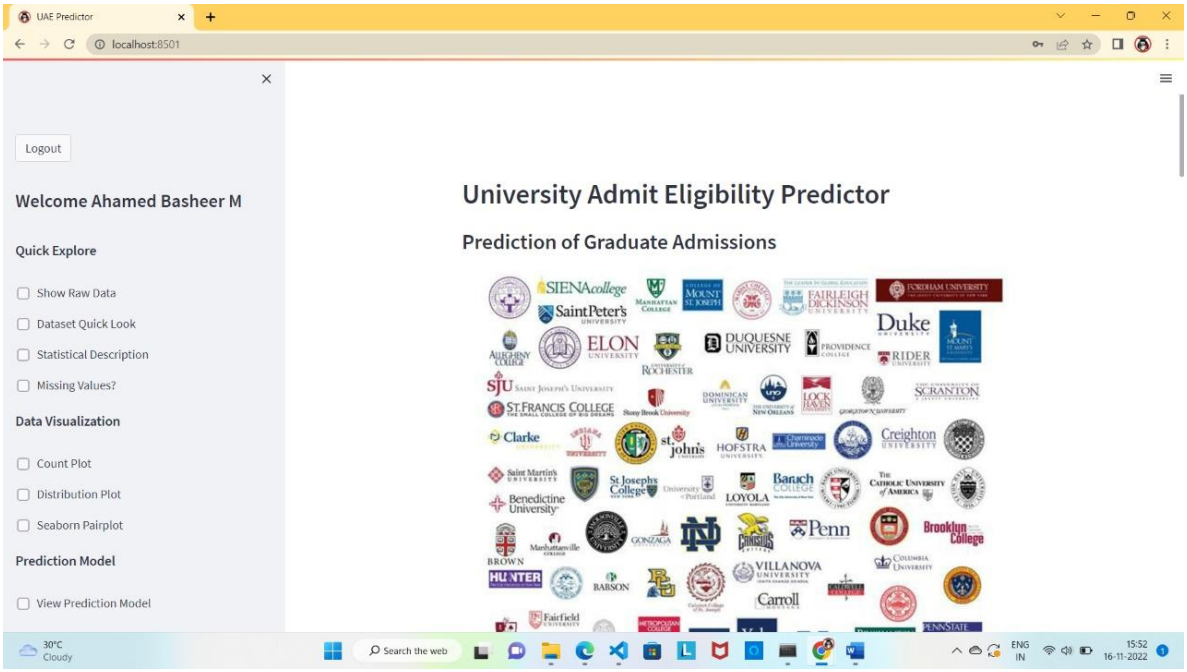


7.CODING & SOLUTIONING

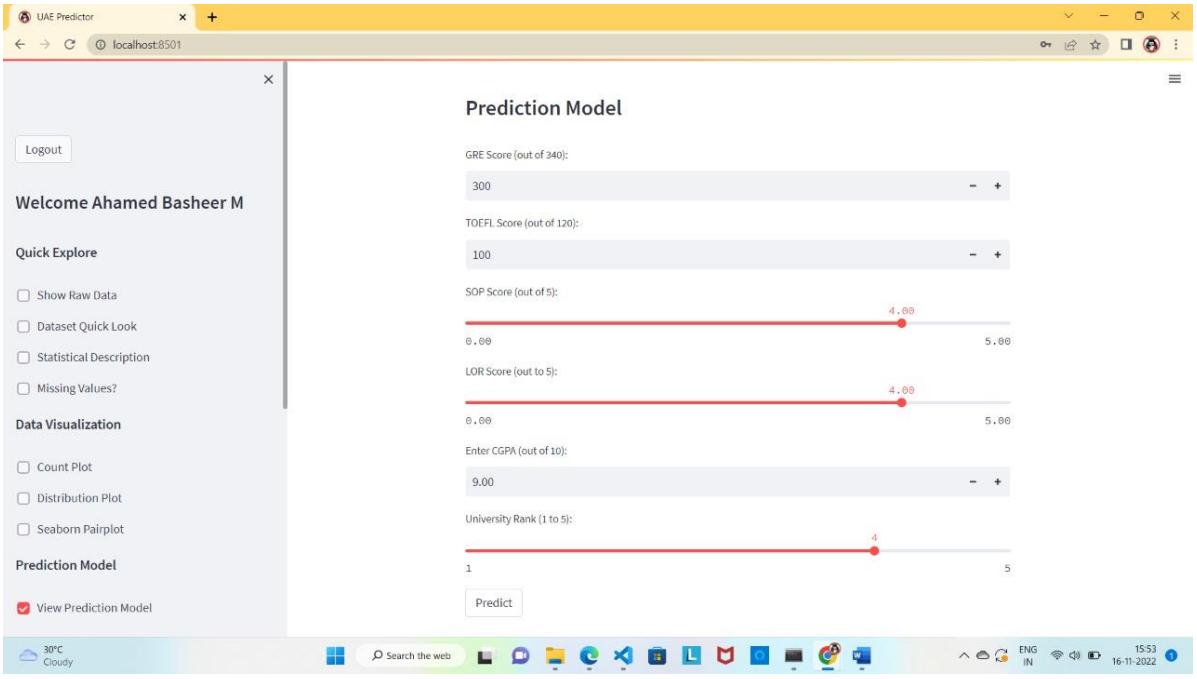
Login Page:



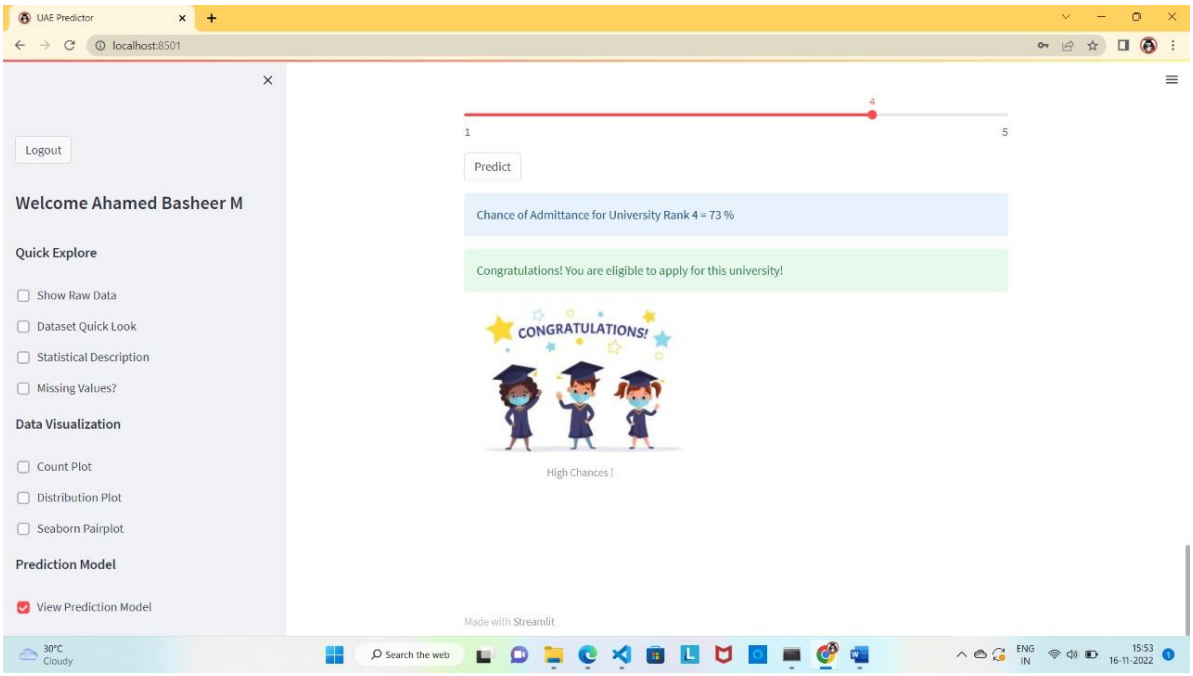
Home Page:



Entry Form:



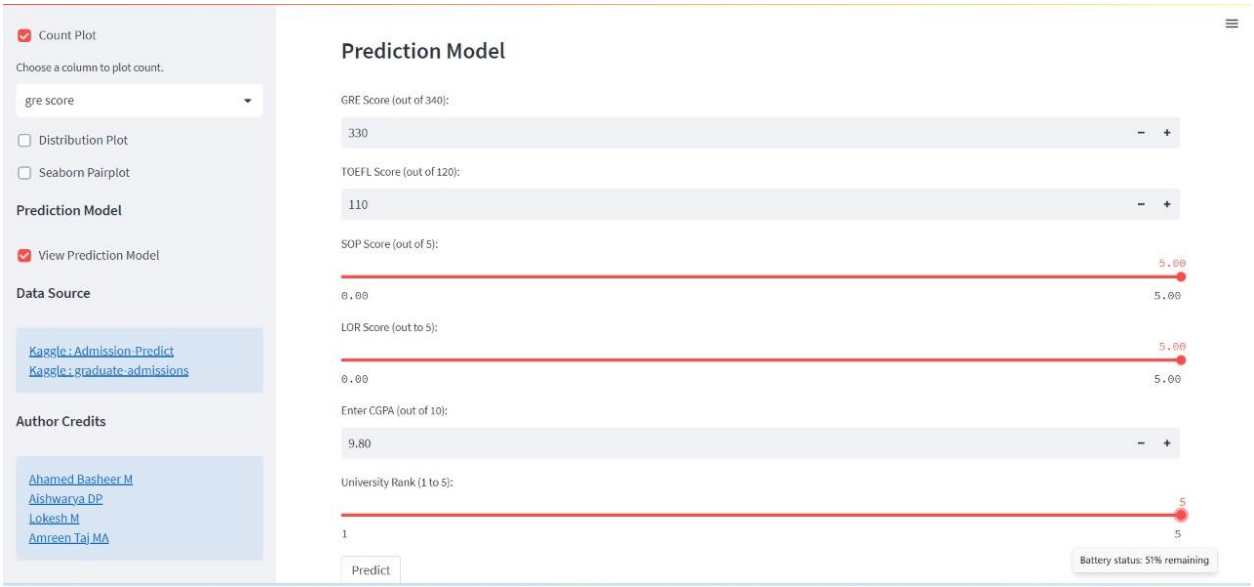
Results

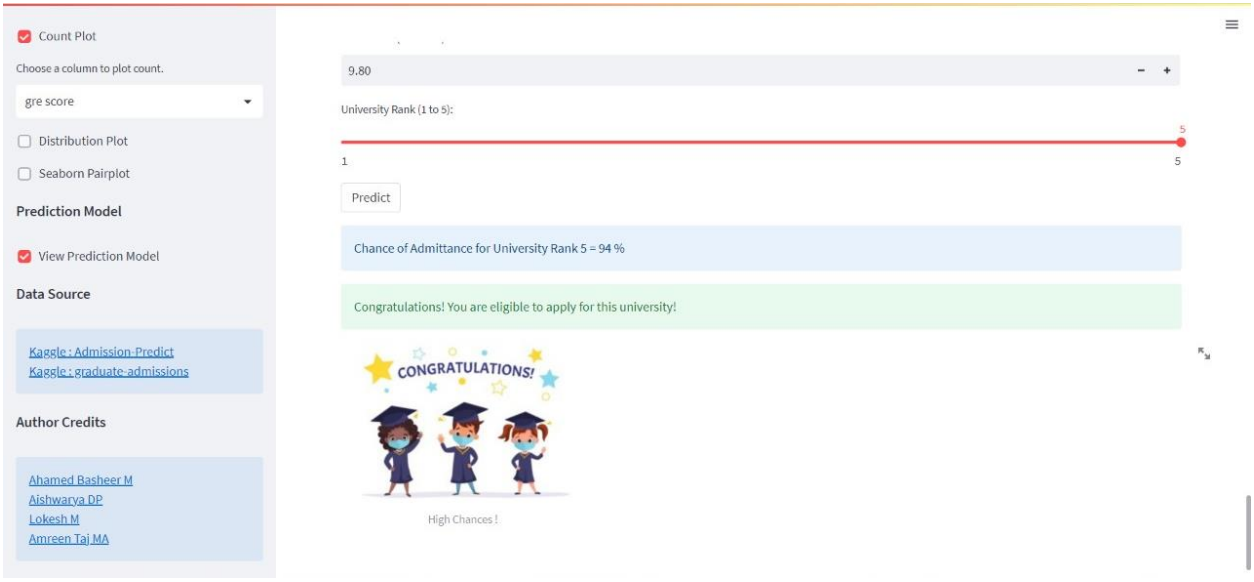


8.TESTING

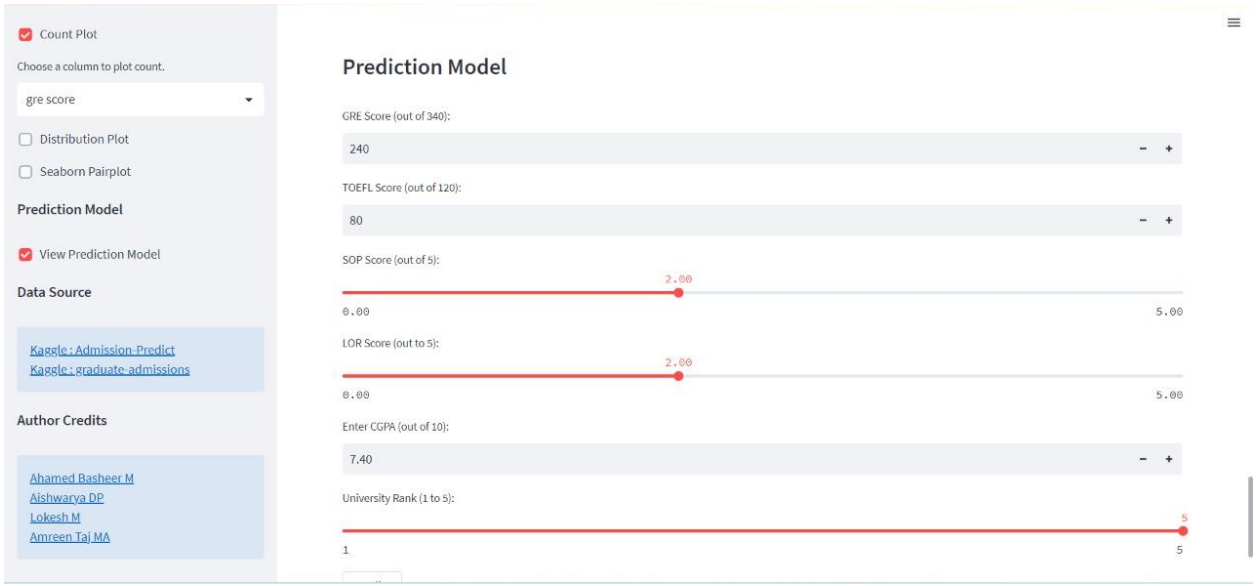
8.1 Test Cases

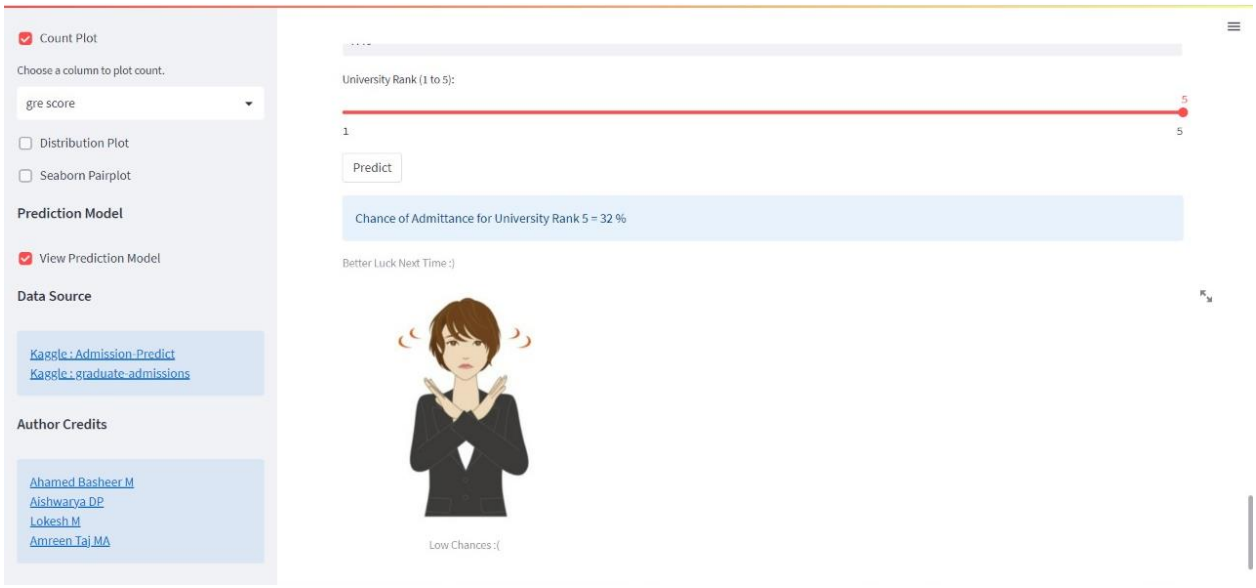
Case 1- For eligible students





Case 2- For not eligible students





8.2 User Acceptance Testing

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status
LoginPage_TC_001	Functional	Home Page	Verify user is able to see the Login	Laptop or Smart phone with internet	1.Enter URL and click go 2.Click on login 3.Verify login popup displayed or	https://uaepredictor.herokuapp.com/	Login popup should display	Working as expected	Pass
LoginPage_TC_002	UI	Home Page	Verify the UI elements in Login/Signup popup	Laptop (or) Smart phone with internet	1.Enter URL and click go 2.Click on My Account dropdown button 3.Verify login with below UI	https://uaepredictor.herokuapp.com/	Application should show below UI elements: a .email text box b. password text box	Working as expected	Pass
LoginPage_TC_003	Functional	Home page	Verify user is able to log into application with Valid credentials	Laptop (or) Smart phone with internet	1.Enter URL and click go 2.Click on My Account dropdown button 3.Enter Valid username/email in Email text box 4.Enter valid password in password text box 5.Click on login button	Username: Ahamed-1 password: Basheer@123	User should navigate to user account homepage	Working as expected	Pass
LoginPage_TC_004	Functional	Login page	Verify user is able to log into application with InValid credentials	Laptop (or) Smart phone with internet	1.Enter URL(https://shopenzer.com/) and click go 2.Click on My Account dropdown button 3.Enter InValid username/email in Email text box 4.Enter valid password in password text box 5.Click on login button	Username: virat05@gmail password: Testing123	Application should show 'Incorrect email or password ' validation message.	Working as expected	pass
AppPage_TC_001	Functional	Login page	Verify user is able to See all the features in application	Laptop (or) Smart phone with internet	1.Enter URL(https://shopenzer.com/) and click go 2.Click on My Account dropdown button 3.Enter Valid username/email in Email text box 4.Enter Invalid password in password text box 5.Click on login button	Username: Ahamed-1 password: Basheer@123	Application should show all the feaatures available	Working as expected	pass
appPage_TC_002	Functional	App page	Verify user is able to Enter the Scores	Laptop (or) Smart phone with internet	1.Enter URL and click go 2.Click on My Account dropdown button 3.Enter Valid username/email in Email text box 4.Enter valid password in password text box 5.Click on login button 6.Go to Prediction Page then enter the scores	Username: Ahamed-1 password: Basheer@123	Application should show the page to enter the input scores	Working as expected	pass

9.RESULTS

9.1 Performance Metrics

Multiple Linear Regression

In [28]:
```
#implying multiple linear regression and determining its score

multiple_lin_reg = LinearRegression()
multiple_lin_reg.fit(x_train,y_train)

y_pred_mlr = multiple_lin_reg.predict(x_test)

r2_score_mlr = r2_score(y_test,y_pred_mlr)
print("Mutiple Linear Regression's score is {:.3f}".format(r2_score_mlr))
```

```
Mutiple Linear Regression's score is 0.816
```

Decision Tree Regression

In [29]:
```
#implying decision tree regression and determining its score

tree_reg = DecisionTreeRegressor()
tree_reg.fit(x_train,y_train)

y_pred_tree = tree_reg.predict(x_test)

r2_score_tree = r2_score(y_test,y_pred_tree)
print("Decision Tree Regression's score is {:.3f}".format(r2_score_tree))
```

```
Decision Tree Regression's score is 0.636
```

Random Forest Regression

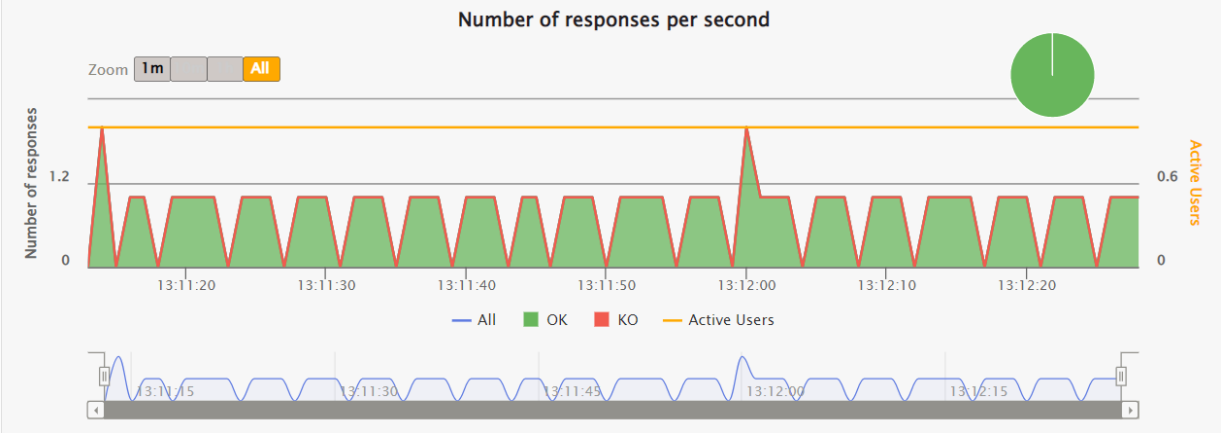
In [30]:
```
#implying random forest regression and determining its score

ran_for_reg = RandomForestRegressor(n_estimators=100,random_state=42)
ran_for_reg.fit(x_train,y_train)

y_pred_rfr = ran_for_reg.predict(x_test)

r2_score_rfr = r2_score(y_test,y_pred_rfr)
print("Random Forest Regression's score is {:.3f}".format(r2_score_rfr))
```

```
Random Forest Regression's score is 0.806
```

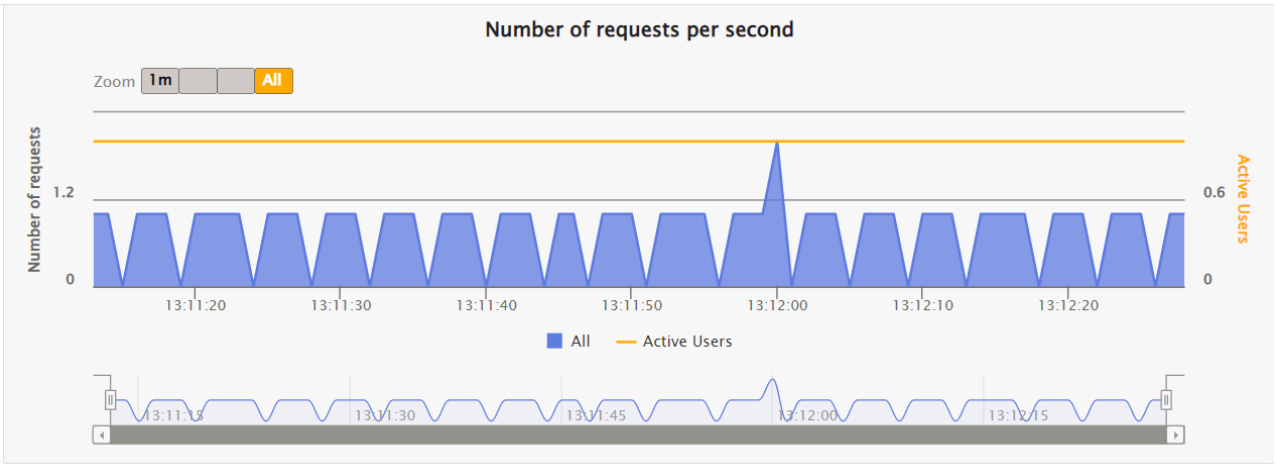
9.2 Performance Testing

PARAMETER: Dashboard design

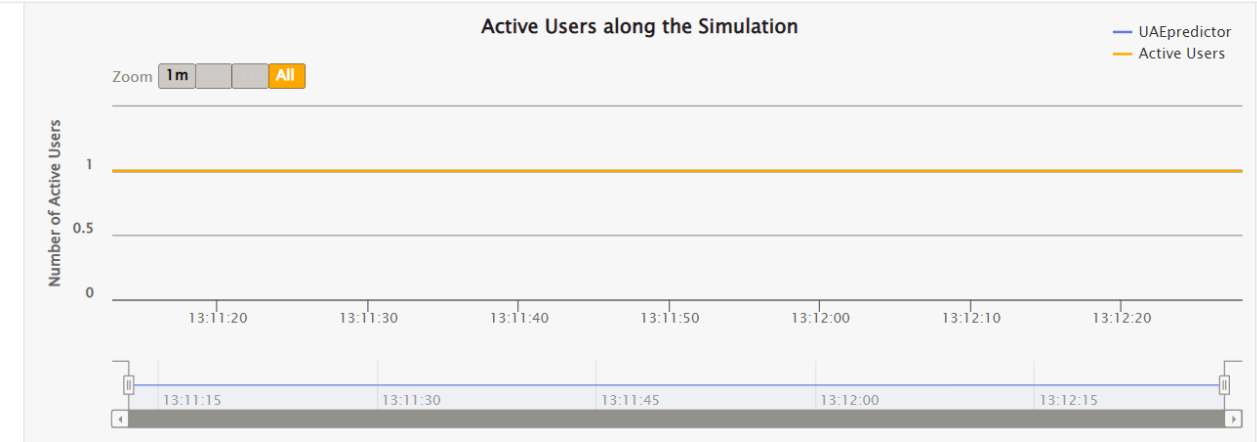
PARAMETER: Data Responsiveness



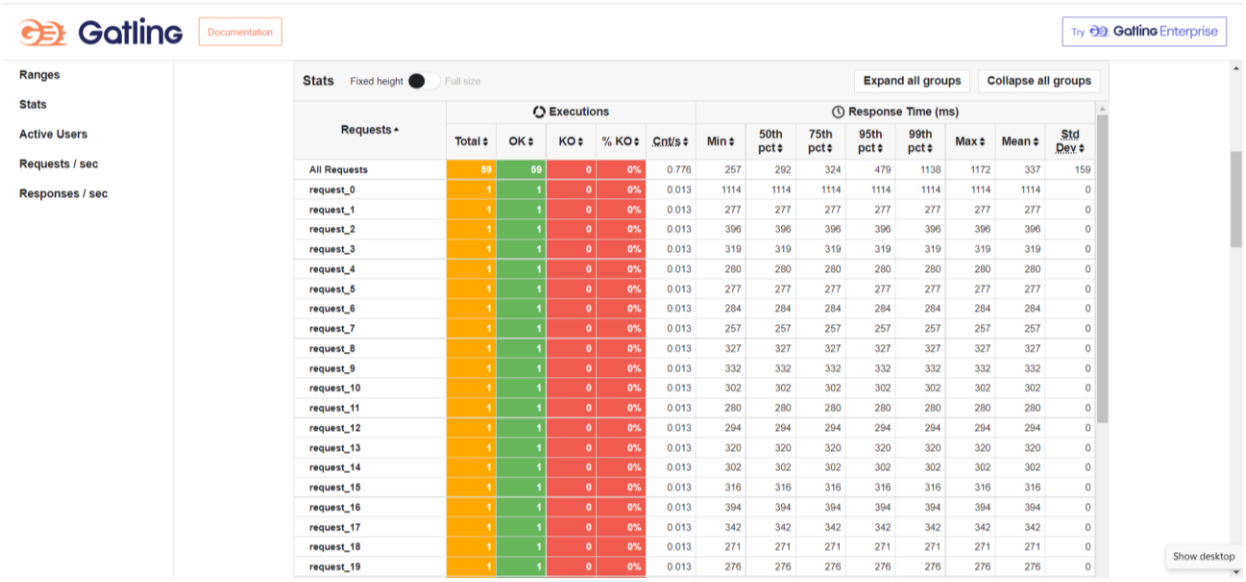
PARAMETER: Amount Data To Rendered



PARAMETER: Effective User Story



PARAMETER: Descriptive Reports




Gatling
Documentation
Try Gatling Enterprise
Ranges
Stats
Active Users
Requests / sec
Responses / sec
request_35 1 1 0 0% 0.013 276 276 276 276 276 276 276 0
request_37 1 1 0 0% 0.013 1172 1172 1172 1172 1172 1172 1172 0
request_38 1 1 0 0% 0.013 286 286 286 286 286 286 286 0
request_39 1 1 0 0% 0.013 284 284 284 284 284 284 284 0
request_40 1 1 0 0% 0.013 284 284 284 284 284 284 284 0
request_41 1 1 0 0% 0.013 283 283 283 283 283 283 283 0
request_42 1 1 0 0% 0.013 309 309 309 309 309 309 309 0
request_43 1 1 0 0% 0.013 261 261 261 261 261 261 261 0
request_44 1 1 0 0% 0.013 281 281 281 281 281 281 281 0
request_45 1 1 0 0% 0.013 260 260 260 260 260 260 260 0
request_46 1 1 0 0% 0.013 320 320 320 320 320 320 320 0
request_47 1 1 0 0% 0.013 288 288 288 288 288 288 288 0
request_48 1 1 0 0% 0.013 316 316 316 316 316 316 316 0
request_49 1 1 0 0% 0.013 303 303 303 303 303 303 303 0
request_50 1 1 0 0% 0.013 347 347 347 347 347 347 347 0
request_51 1 1 0 0% 0.013 260 260 260 260 260 260 260 0
request_52 1 1 0 0% 0.013 283 283 283 283 283 283 283 0
request_53 1 1 0 0% 0.013 479 479 479 479 479 479 479 0
request_54 1 1 0 0% 0.013 269 269 269 269 269 269 269 0
request_55 1 1 0 0% 0.013 289 289 289 289 289 289 289 0
request_56 1 1 0 0% 0.013 277 277 277 277 277 277 277 0
request_57 1 1 0 0% 0.013 285 285 285 285 285 285 285 0
request_58 1 1 0 0% 0.013 292 292 292 292 292 292 292 0
Active Users along the Simulation
UAEpredictor
Active Users
Zoom 1m All
Show desktop

10.ADVANTAGES & DISADVANTAGES

Advantages:

- It helps student for making decision for choosing a right college.
- It is accessible from any location across the nation.
- It is very user friendly.
- This model avoids data redundancy and inconsistency.
- It provides the user with eligibility result instantaneously.

Disadvantages:

- Since the model is built on a limited dataset, the accuracy of the predictor can be affected as a whole.
- There are a number of non-academic factors that can determine whether the students get admitted into the university but the model doesn’t take those into account.

10. CONCLUSION

It is no skeleton in the cupboard that the pursuit of higher education does not come cheap. Unfortunately, it is a complicated process which includes, screening, verifying and evaluating applications and this just adds up to the anxiety of the students, in order to straighten up this process, we have created a web application in the name of University Admit Eligibility Predictor, this application solely focuses on providing the students the result of eligibility and if the student can make it into the particular university of choice by implementing Machine Learning, Regression methods in Stream-lit platform to predict the eligibility using the data entered by the students to the criteria of the university. This user friendly UI displays the result to the users instantly without any complications.

11.FUTURE SCOPE

The project can be further developed by adding on to the features of the application, as in:

- To provide the students with best-in-class loan option.
- Personal service from experienced counsellor.
- To expand this application not only across the nation but across the globe.
- Implementing AI to emulate human intelligence and to provide them creative problem-solution.
- To create even more categories for further development of the application.

APPENDIX

Github link

IBM PROJECT Github Link

Project Demo Link

https://drive.google.com/file/d/1OHXjW6RcFzCNDCVinIvwSA82M3kwkk6U/view

Heroku Link (To use the application in your own device)

https://uaepredictor.herokuapp.com/