TEAM ID: PNT2022TMID07067

Project Link: http://ibmsmart.pythonanywhere.com/home

#### 1. INTRODUCTION

### 1.1 Project Overview

Students are often worried about their chances of admission to University. The aim of this project is to help students in shortlisting universities with their profiles. The predicted output gives them a fair idea about their admission chances in a particular university. This analysis should also help students who are currently preparing or will be preparing to get a better idea.

#### 1.2 Purpose

A persons education plays a vital role in their life. While planning for education students oftenhave several questions regarding the courses, universities, job opportunities, expenses involved, etc. Securing admission in their dream university is one of their main concerns. It is seen that often students prefer to pursue their education from universities which have global recognition.

### 2. Literature survey

when it comes to international students the first choice of the majority of them is the United States of America. With the majority of worlds highly reputed universities, wide range of courses offered in every sector, highly accredited education system and teaching, scholarships provided to students, best job market and many more advantages make it the dream destination for the international 1 students. According to research, there are above 8 Million international students studying in more than 1700 public and 2500 private universities and colleges across the USA. (MasterPortal (2017)).

#### 2.1 Existing problem

Universities take into consideration different factors like score on aptitude based examination like the General Record Examination (GRE), command over the English language is judged based on their score in English competency test like Test Of English as a Foreign Language (TOEFL) OR International English Language Testing System (IELTS), their work experience in same or other fields, the quality of the Letters Of Recommendation (LOR) and the Statement Of Purposedocuments provided by the student etc. Based on the overall profile of the student decision is taken by the universities admission team to admit or reject a particular candidate.

#### 2.2 References

1.K.Cs. Ágoston, P. Biró, and I. McBride. Integer programming methods for special college admissions problems. Journal of Combinatorial Optimization 32(4), pp: 1371-1399 (2016)

2.K.Cs. Ágoston, P. Biró, and R. Szántó. Stable project allocation under distrubutional constraints. Operations Research Perspectives, 5, pp:59-68 (2018)

3.P. Biró. Applications of matching models under preferences. In Endriss, U., editor, Trends in Computational Social Choice, chapter 18, pages 345-373. AI Access (2017)

#### 2.3Problem Statement Definition

Build an application that predicts the university admission chances of a student powered by machine learning models. Train the model and host it on IBM cloud. The majority of international

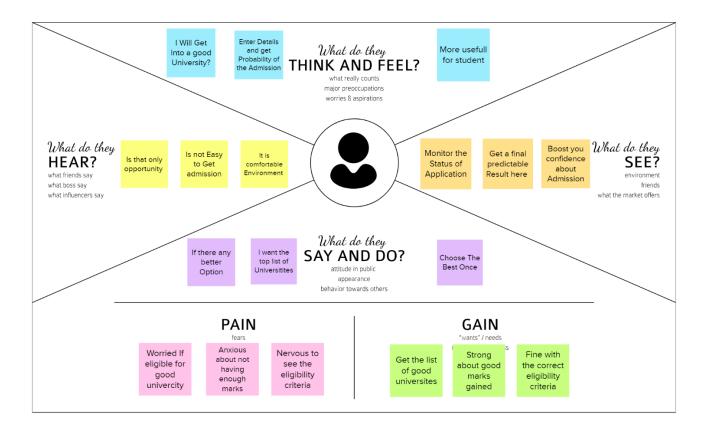
students studying in the USA are from India and China. In the past decade, India has seen a huge increase in the number of students opting to pursue their education from foreign universities in countries like The USA, Ireland, Australia, Germany, etc. Although there are significant universities and colleges in India, students are finding it difficult to get admission in the highly ranked colleges and also getting a job is a challenge as the ratio of number students to the number work opportunities available is quite high. India is one of the leading counties in the number of software engineers produced each year; it becomes tough for the students to find jobs in elite companies due to high competition. This motivates a good number of students to pursue post-graduation in their field. It is seen that the number of students pursuing Masters in Computer Science field from universities in the USA is quite high; the focus of this research will be on these students .

#### 3. IDEATION & PROPOSED SOLUTION

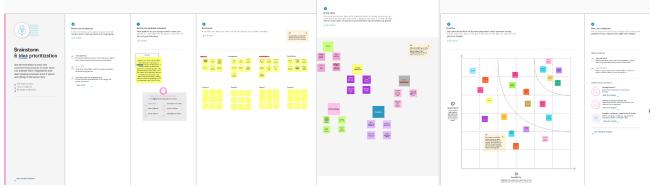
The project aims to develop an application that uses artificial intelligence with the help of chat bot to customize products for the customers which enhances the fame of ecommerce store and reduce the time which customers spends on choosing products. The application also uses IBM cloud storage for storing objects.

An application that predicts the university admission chances of a student powered by machine learning models. Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. The primary objective of this research is to develop a system to solve the problems the international students are facing while applying for universities in the USA.

### 3.1 Empathy Map Canvas



### 3.1 Ideation & Brainstorming



This task of shortlisting the universities where the student has high chances of admission is difficult for mainly for the international students, so they end up with applying to many universities in hopes of getting admission in few of them thus investing an extra amount of money in the applications. There are several portals and websites which provide informationand help to students in shortlisting the universities, but they are not reliable. Most of the students dont take the risk of evaluating the colleges by themselves, and they seek the help of the education consultancy firms to do it for them. Again for this students have to pay a huge amount of fee to the education consultant.

### 3.2 Proposed Solution

Finally, K Nearest Neighbours and Decision Tree algorithms were used as they were found to be the best fit for the system developed. Also, we will be creating a simple user interface which will help the users to input the data related to student profile and get the predicted result for the application based on the profile as output. This research will thus eventually help students saving the extra amount of time and money they have to spend at the education consultancy firms. And also it will help them to limit their number of application to a small number by proving them the suggestion of the universities where they have the best chance of securing admission thus saving more money on the application fees.

#### 3.3 Problem Solution fit

Define CS, fit into CC	CUSTOMER SEGMENT(S)  Students who have recently completed their schooling/College and aspire to get admitted into prominent universities.	Customers might not trust the accuracy /reliability of the predictor and this could prevent them from using it.  Moreover, users would have to feed confidential information to the model, so a certain section of customers might refrain from using the predictor due to a fear of data misuse.	5. AVAILABLE SOLUTIONS  Apart from factors like grades and GPA, we willalso consider IELTS/TOFEL-GRE that plays major role in the admission process of some universities, thereby further enhancing the reliability of the predictor.  Secondly, we will put the model through rigorous tests in order to boost the accuracy of the predictor.	Explore AS, differentiate
Focus on J&P, tap into BE, understand RC	JOBS-TO-BE-DONE/ PROBLEMS  Data collection is probably the most important step in designing the predictor hence it must be ensured that it is done properly.  Customers should be assured of optimum data security in order to sustain their trust in our model.	9. PROBLEM ROOT CAUSE  The reliability of the predictor might be affected if the collected data is found to be inaccurate or not enough factors are considered to judge the eligibility.  Secondly, customers might refrain from using our product if they find it to be prone to cyber attacks.	7. BEHAVIOUR  The most important aspect of the predictor from a customer's point of view is its accuracy, since they would go through with their admissions based on its results	Focus on J&P, tap into BE, understand RC
Identify strong TR & EM	3. TRIGGERS  User can be provided with comparisons between the required scores versus their actual scores.  4. EMOTIONS: BEFORE/ AFTER  Users would feel that they are in complete control in the admission process since they can wholeheartedly trust the predictor.	10. YOUR SOLUTION  Design a predictor with the help of the data collected, and ensure that it is accurate/ reliable. Also make sure that the data collected from the users is safe and secure.	8. CHANNELS of BEHAVIOUR  Customers might search for reliable eligibility predictors that are available online and rate them based on their liking.  Students would discuss amongst their peer group about such predictors and if they find one to be reliable enough, they would spread the word about it.	Extract online & offline CH of BE

#### 4. REQUIREMENT ANALYSIS

Requirements analysis, also called requirements engineering, is the process of determining user expectations for a new or modified product. These features, called requirements, must be quantifiable, relevant and detailed. In software engineering, such requirements are often called functional specifications. Requirements analysis is critical to the success or failure of a systems or software project. The requirements should be documented, actionable, measurable, testable, traceable, related to identified business needs or opportunities, and defined to a level of detail sufficient for system design.

### 4.1 Functional requirement

- prediction
- input form
- percentage of chance

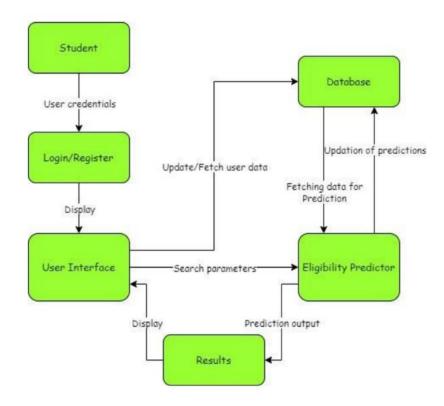
### 4.2 Non-Functional requirements

- Speed
- Security

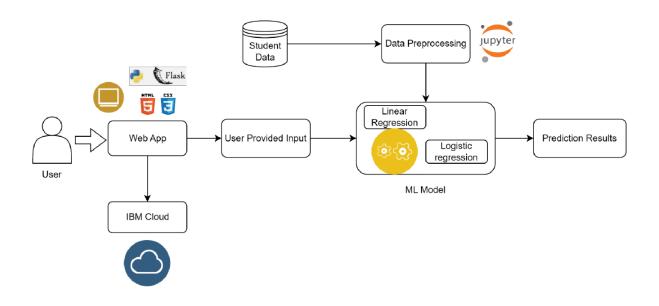
- Portability
- Compatibility
- Capacity
- Reliability
- Environment
- Localization

### 5. PROJECT DESIGN

### 5.1 Data Flow Diagrams



### **5.2 Technical Architecture**



### **5.3 User Stories**

A user story is an informal, natural language description of features of a software system. They are written from the perspective of an end user or user of a system, and may be recorded on index cards, Post-it notes, or digitally in project management software.[1] Depending on the project, user stories may be written by different stakeholders like client, user, manager, or development team.

U∺er Typ≘	Functional Requirement (Epic)	User Story Number	User Story (Task	Acceptance criteria	P≀iority	.celease
Student	Registration	USN-1	User can register by entering the username, email :D and password can access my account / dashboard		ivledium	Sprint-1
	Confirmation	USN-2	As a user, I will receive confirmation via email.OTP on registering	I can receive a confirmation email with O. P to verify email ID	Low	Sprint-2
		USN-3	As a user, I can register to the application through Gmail	I can access my account	Low	Sprint-2
	Login	USN-4	As a user, I can log into the application by entering email & password	I can access my account	Medium	Sprint-1
	Update Profile	USN-5	As a user, after logging in post registration, I will have to update my profile	I can complete the profile updation by filling in details	Medium	Sprint-2
	Choose University	USN-6	As a user, I will be able to view the list of universities that the students are eligible to apply.	I can choose the university of interest form the drop down menu of universities list	High	Sprint-1
	Prediction Results	USN-7	Can manually enter details and get prediction results	I can see the prediction results of chances	High	Sprint-1
	Top n prediction results	USN-8	Can get the chances for top n universities	I can see the prediction results of chances for n universities	Medium	Sprint - 3
	User predictions history	USN-9	User can view a list of past prediction results	I can see the list of past prediction results for the inputs I used	Low	Sprint-3
	Submit admission data	USN-10	Can submit their admission results with their profile details	I can submit my admission data and receive a confirmation that my data is submitted	Medium	Sprint 4

### 6. PROJECT PLANNING & SCHEDULING

### **6.1 Sprint Planning & Estimation**

Sprint	Functional Requirement (Epic)	ent (Epic) Number		Story .ºoints	Priority	Team Me.nbers	
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	Ž.	High	2	
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	,	
Sprint-1		USN-3	As a user, I can register to the application through Gmail	1	Medium	1	
Sprint-1	Login	USN-4	As a user, I can log into the appli ation by entering email & password	1	High	1	
Sprint-2	Update Profile	USN-5	As a user, after logging in, I will have to update my profile by providing all the required details.	3	High	3	
Sprint-3	Choose University	USN-6	As a user, I will be able to view the list of Universities that the students are eligible to apply.	5	High	5	
Sprint-3	Choose Course	USN-7	As a user, I will be able to view the list of courses that the students are eligible to apply	5	Medium	5	
Sprint-4	Admission Process	USN-8	As a user,I will be able to view the details of Admission process like date and venue of certification verification.	2	Low	2	
Sprint-1	Authentication	USN-9	As a admin, the login credential of the user is authenticated my me.	3	High	3	
Sprint-2	Update Profile	USN-10	As a admin,I can verify the user entered details.	2	High	2	
Sprint-3	Prediction	USN-11	As a admin,I can test the trained ML model by analysing the user details by ML algorithms like Logistic Regression.	5	High	5	
Sprint-4	Output	USN-12	As a admin,I can upload the confirmation of user for the prediction into the Database.	3	High	3	

### **6.2 Sprint Delivery Schedule**

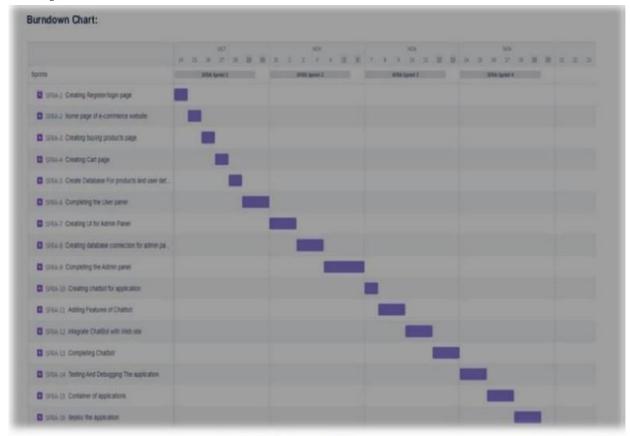
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	5 Days	29 Oct 2022	04 Nov 2022	20	03 Nov 2022
Sprint-2	20	4 Days	04 Oct 2022	08 Nov 2022	20	07 Nov 2022
Sprint-3	20	4 Days	08 Nov 2022	11 Nov 2022	20	10 Nov 2022
Sprint-4	20	4 Days	11 Nov 2022	14 Nov 2022	20	13 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)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

### 6.3 Reports from JIRA



### **BURNDOWN CHART**

### 7. CODING & SOLUTIONING

### 7.1 Feature 1 - FLASK APP

The following is the flask app code and working

```
from flask import Flask, render_template, redirect, url_for, request
app = Flask(__name__)
@app.route("/", methods = ['POST', 'GET'])
def index():
   if request.method == 'POST':
       arr = []
       for i in request.form:
          val = request.form[i]
          if val == '':
              return redirect(url_for("demo2"))
           arr.append(float(val))
       # deepcode ignore HardcodedNonCryptoSecret: <please specify a reason of ignoring this>
       API_KEY = "wf8mge_OQdwV08ao2kmWCtfx0fLW18442SH44V85v2Ls"
       token_response = requests.post('https://iam.cloud.ibm.com/identity/token', data={
           "apikey": API_KEY,
           "grant_type": 'urn:ibm:params:oauth:grant-type:apikey'
          })
       mltoken = token_response.json()["access_token"]
       header = {'Content-Type': 'application/json', 'Authorization': 'Bearer ' + mltoken}
       payload_scoring = {
            "input_data": [{"fields":[ 'GRE Score',
                                        'TOEFL Score',
                                        'University Rating',
                                        'SOP',
                                       'LOR ',
                                       'CGPA',
                                        'Research'],
                           "values": [arr]
                           }]
```

```
response_scoring = requests.post(
                                       "https://us-south.ml.cloud.ibm.com/ml/v4/deployments/8308fd4c-24a5-46ab-96fa-263657ae4ad0/predictions?version=2022-10-18", and the contraction of the contraction o
                                      headers=header
                          ).json()
                          result = response\_scoring['predictions'][\theta]['values']
                          if result[0][0] > 0.5:
                                      return redirect(url_for('chance', percent=result[0][0]*100))
                                      return redirect(url_for('no_chance', percent=result[0][0]*100))
                         return redirect(url_for("demo2"))
@app.route("/home")
def demo2():
           return render_template("demo2.html")
@app.route("/chance/<percent>")
def chance(percent):
            return render_template("chance.html", content=[percent])
@app.route("/nochance/<percent>")
def no_chance(percent):
            return render_template("noChance.html", content=[percent])
@app.route('/<path:path>')
def catch_all():
             return redirect(url_for("demo2"))
if __name__ == "__main__":
             app.run()
```

```
<!DOCTYPE html>
 <html lang="en">
 <head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
     <meta name="viewport" content="width=device-width, initial-scale=1.0">
     <meta name="viewport" content="width=device-width, initial-scale=1, maximum-scale=1, user-scalable=no">
     k rel="stylesheet" type="text/css" rel="noopener" target="_blank" href="../static/css/styles.css">
    < link href="https://cdn.jsdelivr.net/npm/bootstrap@5.2.2/dist/css/bootstrap.min.css" rel="stylesheet" integrity="sha384-Zenh87qX5JnK2Jl0vWa8Ck2rdkQ2Bzep5IDxbcnCeu0xjzrPF/6</pre>
     <script type="text/javascript" src="../static/js/script.js" asvnc></script>
    <title>University Admit Eligibility Predictor</title>
 c/heads
     <nav class="navbar navbar-expand-lg bg-light">
        <div class="container-fluid">
            <a class="navbar-brand text-responsive-h" href="/">
                <img src="..\static\img\hat.png" alt="Logo" width="30" height="24" class="d-inline-block align-text-top ">
                University Admission Eligibility Prediction System
            </a>
        </div>
    {% block body %}
    <h1> Index Page </h1>
    <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.2.2/dist/js/bootstrap.bundle.min.js" integrity="sha384-OERcA2EqjJCMA+/3y+gxIOqMEjwtxJY7qPCqsdltbNJua0e923+mo//f6V8Qbs</pre>
 </body>
 </html>
{% extends 'index.html' %}
{% block body %}
   <div class="p-4">
       <div class="row mb-3">
           <div class="col-4">
               <h2 class="text-responsive-h">
                   Enter your details and get probability of your admission
               Students are often worried about their chances of admission to University. The aim of this project is to help students in shortlisting universities with th
               \verb| <div class="d-flex justify-content-right"> \\
                   <img src="../static/img/animated-teach.gif" border="0" alt="..." />
               </div>
               </div>
            <div class="col-8">
               <div class="card p-2 ms-2 my-2">
                   <div class="card-body">
                       <h5 class="card-title pb-4">
                           Enter the details
                       <form action="/" method="post" id="theForm">
                           <div class="row mb-3">
                               <label for="gre" class="col-lg-2 col-form-label">GRE Score:</label>
                                   <input type="number" class="form-control" id="gre" name="gre" min="250" max="340" required>
                               </div>
                           </div>
                           <div class="row mb-3">
                               <label for="tofel" class="col-lg-2 col-form-label">TOFEL Score:</label>
                                   <input type="number" class="form-control" id="tofel" name="tofel" min="50" max="120" required>
                               </div>
                           </div>
```

```
<div class="row mb-3">
        \verb|\class="col-lg-2"| col-form-label">University Rating:</label>| col-form-label">University Rating:| col-form-label">Uni
        <div class="col-lg-10">
                 <input type="number" class="form-control" id="university_rating" step="0.01" name="university_rating" min="1" max="5" required>
        </div>
</div>
<div class="row mb-3">
         <label for="sop" class="col-lg-2 col-form-label">SOP:</label>
                <input type="number" class="form-control" id="sop" name="sop" step="0.01" min="1" max="5" required>
        </div>
</div>
<div class="row mb-3">
        <label for="lor" class="col-lg-2 col-form-label">LOR:</label>
         <div class="col-lg-10">
                  <input type="number" class="form-control" id="lor" name="lor" step="0.01" min="1" max="5" required>
        </div>
</div>
<div class="row mb-3">
        <label for="cgpa" class="col-lg-2 col-form-label">CGPA:</label>
         <div class="col-lg-10">
                 <input type="number" class="form-control" id="cgpa" name="cgpa" step="0.01" min="5" max="10" required>
</div>
<fieldset class="row mb-3">
        <legend class="col-form-label col-sm-2 pt-0">Research:</legend>
        <div class="col-sm-10">
                          <input class="form-check-input" type="radio" name="yes_no_radio" id="gridRadios1" value="1">
                            <label class="form-check-label" for="yes_no_radio">
                            Yes
                           </label>
                  </div>
```

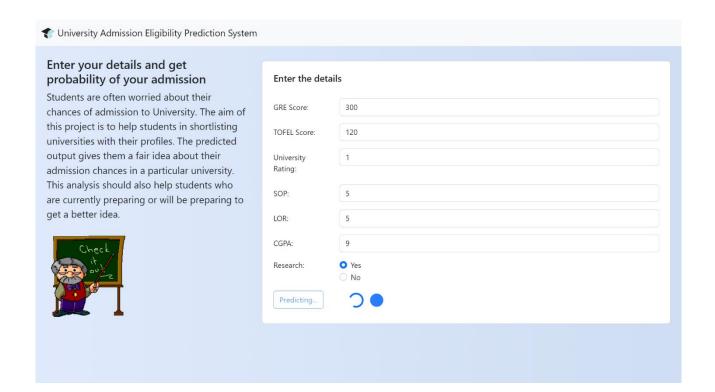
```
<div class="form-check">
                                                                                                                                                            \label{localization} $$ \class="form-check-input" type="radio" name="yes_no_radio" id="gridRadios2" value="0" checked> $$ \class="form-check-input" type="radio" name="yes_no_radio" n
                                                                                                                                                            <label class="form-check-label" for="yes_no_radio">
                                                                                                                                                            </label>
                                                                                                                                            </div>
                                                                                                                             </div>
                                                                                                              </fieldset>
                                                                                                              <div class="row lg-3">
                                                                                                                             <div class="col-lg-2 mb-2 me-3">
                                                                                                                                             <button type="submit" class="btn btn-primary" id="button">Predict</button>
                                                                                                                              <div class="col-lg-2" id="spinner">
                                                                                                                                          <div class="spinner-border text-primary m-1" role="status">
                                                                                                                                                        <span class="visually-hidden">Loading...</span>
                                                                                                                                             <div class="spinner-grow text-primary m-1" role="status">
                                                                                                                                                           <span class="visually-hidden">Loading...</span>
                                                                                                                            </div>
                                                                                            </form>
                                                                            </div>
                                                             </div>
                                               </div>
                              </div>
{% endblock %}
```

7.2

```
{% extends 'index.html' %}
{% block body %}
<div class="container text-center p-4">
   <div class="d-flex justify-content-center">
        <div class="card" style="width: 34rem;">
           <img src="...\static\img\chance.png" class="card-img-top" alt="...">
               <h5 class="card-title">You Have Chance</h5>
               <a href="/home" class="btn btn-primary">Go Back</a>
           </div>
   </div>
</div>
{% endblock %}
{% extends 'index.html' %}
{% block body %}
<div class="container text-center p-4">
    <div class="d-flex justify-content-center">
        <div class="card" style="width: 34rem;">
           <img src="...\static\img\noChance.jpg" class="card-img-top" alt="...">
            <div class="card-body">
               <h5 class="card-title">You have a LOW / NO chance</h5>
                \label{lem:continuous} $$ \c class="card-text">The model has predicted that you only have $$ \c content[0]}\\ %$ \c chance $$ \c class="card-text">The model has predicted that you only have $$ \c content[0]\\ %$ \c content[0]$ 
                <a href="/home" class="btn btn-primary">Go Back</a>
           </div>
        </div>
    </div>
</div>
{% endblock %}
```

```
const button = document.getElementById('button');
const theForm = document.getElementById('theForm');
const loading = document.getElementById('spinner');
const disableButton = () => {
   console.log('Submitting form...');
   button.disabled = true;
   button.className = "btn btn-outline-primary";
button.innerHTML = "Predicting..."
    loading.style.display = "block"
};
const enableButton = () => {
   console.log('Loading window...');
    button.disabled = false;
    button.className = "btn btn-primary"
    button.innerHTML = "Predict"
    loading.style.display = "none"
theForm.onsubmit = disableButton;
window.onload = enableButton;
```

```
margin: 0;
    padding: 0;
    border: 0;
body {
    font: 62.5%/1.5 "Lucida Grande", "Lucida Sans", Tahoma, Verdana, sans-serif;
    background: -webkit-linear-gradient(to right, #e0eafc, #cfdef3);
    background: linear-gradient(to right, #e0eafc, #cfdef3);
    color: #000000;
    text-align:center;
h1 {
    font-size: 2.2em:
    font-size: 2.0em;
h4 {
    font-size: 1.6em;
    font-size: 1.2em;
 padding: 3px;
 border: 1px solid #999999;
img {
   max-width: auto;
   height: auto;
   font-size: calc(50% + 0.6vw + 0.6vh);
.text-responsive-h {
   font-size: calc(80% + 0.6vw + 0.6vh);
```



### 8.TESTING

### 8.1 Test Cases

1 - Serial No.	GRE Score	TOEFL Score	University Rating	509	LOR	CGPA	Research	Chance of Admit
	207	190		45	45	9.65		0.92
	324	107			4.5	8.87		0.76
	316	104			3.5			0.72
	322	110		15	2.5	1.57		6.8
	314	103				8.21		0.65
	330	115		45		934		0.9
	3211	109				82		0.75
1.8	308	101				7.9		0.68
	302	102			15			0.5
1 10	323	108				8.6		0.45
	325	106		35		84		0.52
13 12	327	111			45			0.54
	328	112			45	9.3		0.78
	307	109						0.62
15 15	211	104		15		82		0.61
7 16	314	105		35	2.5	8.3		0.54
	317	107				8.7		0.66
13 14	319	106						0.65
20 19	318	110				8.8		0.63
11 20	303	102		15		8.5	0	CEO.
	312	107				7.9		0.64
	325	114				8.4		0.7
	328	116				9.5		0.94
5 24	334	119			43	9.7		0.95
	236	119			3.5	9.8		0.97
26 T	340	100		45	45	9.6		0.94
	322	109		45	15	8.8		0.75

### 8.2 User Acceptance Testing

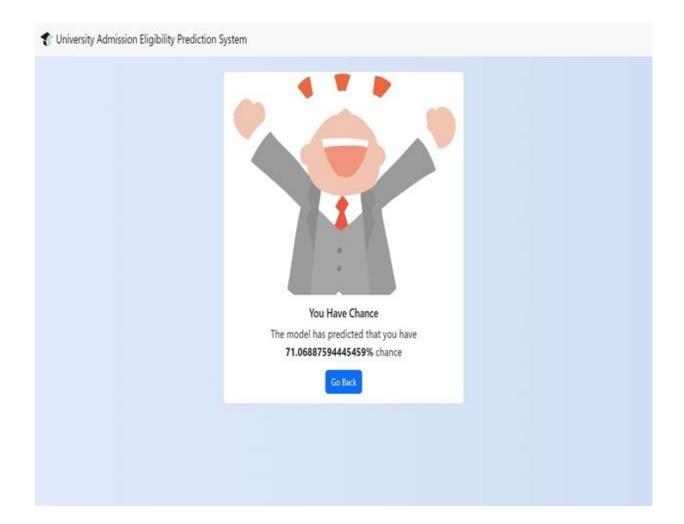
User Acceptance Testing (UAT) is a type of testing performed by the end user or the client to verify/accept the software system before moving the software application to the production environment. UAT is done in the final phase of testing after functional, integration and system testing is done. The User Acceptance of this product is not surveyed enough to give a solid conclusion. The theretical and hypothetical acceptance is calculated to be high enough to conclude that this product is usable and valuable.

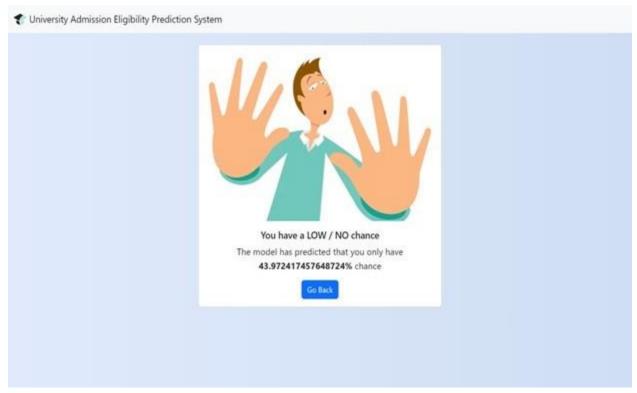
### 9 RESULTS

### 9.1 Performance Metrics

The Performance is the Accuracy of the model trained. The training accuracy of the model is 92%.

The testing accuracy of the model is 89%.





#### 10 ADVANTAGES & DISADVANTAGES

#### **➤ ADVANTAGE**

- 1. Know the percentage 2.Lower investigation 3.Provide Relevant Material
- 4. Reduce time consumption
- 5. Good user experience

#### **➤ DISADVANTAGE**

1. Significiant investments required 2. Inable to capture changes 3. Privacy concerns

#### 11. CONCLUSION

We have successfully developed an application using python flask, HTML, CSS. By using the application we can predict weather we can get admittion in the desired University or not.

### 12. FUTURE SCOPE

In fut re we would like to enhance the existing model in such a way that consumer feels the same way when purchasing in store using Virtual reality and other upcoming technologies. Reaserch to improve the accuracy of the system is under progress.

### 13. APPENDIX Source Code GitHub & Project Demo Link

**Project Link:** http://ibmsmart.pythonanywhere.com/home

github: https://github.com/IBM-EPBL/IBM-Project-29183-1660121864

Demo:

