PROJECT REPORT

1. INTRODUCTION

1.1 PROJECT OVERVIEW

Nowadays, the proliferation of automobile industries is directly related to the number of claims in insurance companies. Those companies are facing many simultaneous claims and solving claims leakage The project can be extended to green houses where manual supervision is far and few in between.

In Advanced Artificial Intelligence (AI), machine learning and deep learning algorithms can help to solve these kinds of problems for insurance industries

1.2 PURPOSE

Auto-detection of vehicle damage using photos taken at the scene of an accident can be very useful as it can drastically reduce the cost of processing insurance claims, as well as provide greater convenience to vehicle users.

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM

In proposed system firstly, it collects the pictures of one's damaged automobile, later use these pictures to feed into our ML model that makes use of image processing to identify the details of the image, using Image processing it analyses the percentage of damage of the automobile. Next, it segregates the pictures based on 2 factors which are replace and repair.

2.2 REFERENCES

[1] LeCun, Y., Boser, B., Denver, J.S., Henderson, D., Howard, R.E., Hubbard, W., Jackel, L.D. Back propagation applied to handwritten zip code recognition. Neural computation, 1989, pp. 541-551.

[2] Krizhevsky, A., Sutskever, I., Hinton, G. Imagenet classification with deep convolutional neural networks. In NIPS, 2012, pp. 1097-1105.

[3] Zeiler, M. D., Fergus, R. Visualizing and understanding convolutional neural networks. In ECCV, 2014, pp. 818-833.

[4] LeCun, Y., Bengio, Y., Hinton, G. Deep learning. Nature, 2015(521), pp. 436-444. [5] Simonyan, K., Zisserman, A. Very deep convolutional networks for large-scale image recognition. In ICLR, 2015, pp. 1409.1556.

[6] Shaoqing Ren, Kaiming He, Ross Girshick, Jian Sun. Faster R-CNN: Towards real-time object detection with region proposal networks. In NIPS, 2015, pp. 91-99. [7] Kaiming He, Georgia Gkioxari, Piotr Dollar, Ross Girshick. Mask R-CNN. In ICCV,2017,pp. 2980-2988.

8]. A.Neela Madheswari, J.haripriya, G.Kiruthika, R.M.Meyammai Mahendra Engineering college, India,exterior vehicular damage detection using deep learning, department of computer science and engineering.

[9]. Girish N, Mohammed Aqeel Arshad, car damage detection using machine learning. International journal of advances research in computer and communication engineering,vol. 10, issue 8, August 2021 DOI 10.17148/IJARCCE.2021.10808.

[10]. Phyu Mar Kyu ,car damage detection and classification, faculty of information technology king Mongkut's institute of technology ladkrabang
Bangkok,Thailand 62606003@kmitl.ac.in

2.3 PROBLEM STATEMENT DEFINITION

Mr.Venkataramanan is a 50 years old man. He had a own Car(Duster) and he worked at basic salary for past 30 Years , In this 30 Years he Faced a problem in Choosing Car Damage and Insurance claim.

· Venkataramanan wants to know the better recommendation for insurance claiming.

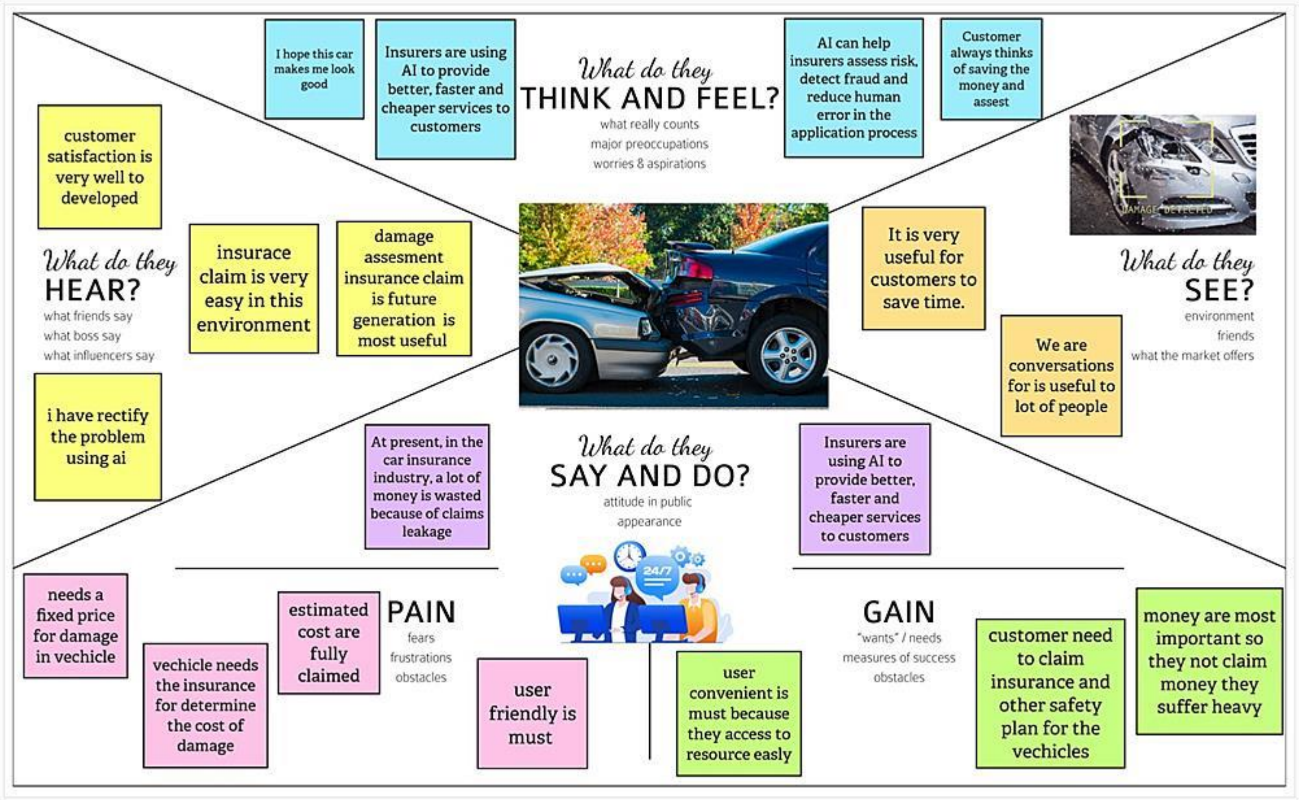
· He has faced huge losses for a long time.

· This problem is usually faced by lot of Customers.

· Mr. Venkataramanan needs to know the result immediately for Insurance claim.

3. IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



What do they THINK AND FEEL?
what really counts
major preoccupations
worries & aspirations

I hope this car makes me look good

Insurers are using AI to provide better, faster and cheaper services to customers

AI can help insurers assess risk, detect fraud and reduce human error in the application process

Customer always thinks of saving the money and assest

What do they HEAR?
what friends say
what boss say
what influencers say

customer satisfaction is very well to developed

insurace claim is very easy in this environment

damage assesment insurance claim is future generation is most useful

i have rectify the problem using ai

What do they SEE?
environment
friends
what the market offers

It is very useful for customers to save time.

We are conversations for is useful to lot of people

What do they SAY AND DO?
attitude in public
appearance

At present, in the car insurance industry, a lot of money is wasted because of claims leakage

Insurers are using AI to provide better, faster and cheaper services to customers

PAIN
fears
frustrations
obstacles

needs a fixed price for damage in vechicle

vechicle needs the insurance for determine the cost of damage

estimated cost are fully claimed

user friendly is must

GAIN
"wants" / needs
measures of success
obstacles

user convenient is must because they access to resource easly

customer need to claim insurance and other safety plan for the vechicles

money are most important so they not claim money they suffer heavy

Figure 3.1.1 Empathy map

3.2 IDEATION & BRAINSTORMING

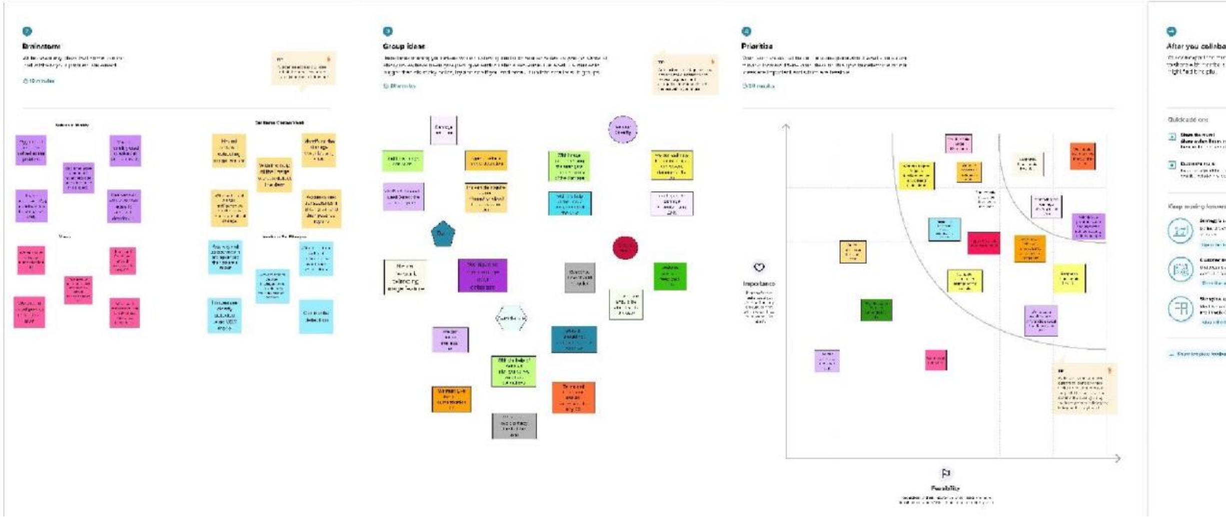


Figure 3.2.1 Brainstorm Diagram

3.3 PROPOSED SOLUTION

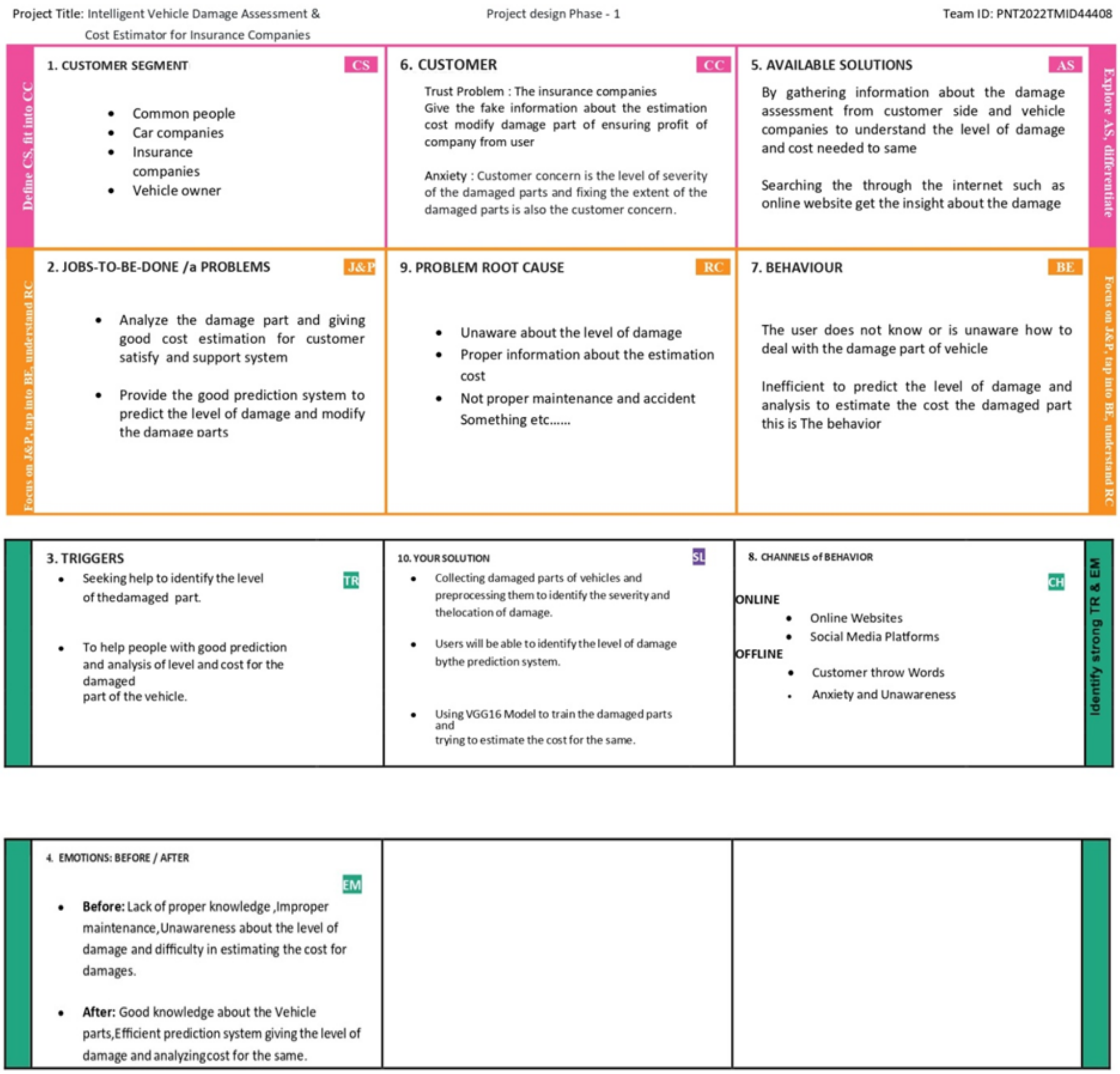
Project team shall fill the following information in proposed solution template

S.No	Parameter	Description

1	Problem Statement (Problem to be solved)	Nowadays lot of money is being wasted in the car insurance business due to leakage claims. Claims leakage Underwriting leakage is characterized as the discrepancy between the actual payment of claims made and the sum that should have been paid if all of the industry's leading practices were applied. Visual examination and testing have been used to may these results. However, they impose delays in the processing of claims. There is no easy way of accessing and knowing about the part of the vehicle getting damaged. Often the processing of such a damaged part of the vehicle carrying the area of damaged part is cumbersome. New methods have to be proposed in order to make it faster and efficient. Processing of Insurance for the cars needs to be assessed in a quicker way so that claims can be provided to the damaged parts.
2	Idea / Solution description	Automobile Industry is one of the major industry in a Country. This proposed system is Intelligent vehicle damage assessment and cost estimator for insurance companies using computer vision in artificial intelligence. The model will predict the location of the damage as in front, side or rear, and the severity of such a damage as in minor, moderate or severe and estimate the cost of damage of both car and bike.
3	Novelty / Uniqueness	Deep learning method used to fixed the problem and then Working on with VGG16 pre[1]trained model by adding extra layers to increase the accuracy while implementing the project.

4	Social Impact / Customer Satisfaction	The model developed will be used to fix the damage caused to the Vehicle quickly so that the vehicle can be modified to the old look and also for faster processing of cost of the damage to claim insurance quickly. This project can be used to save time for calculating the area and level of the damage quickly such that the insurance claim can be made efficiently.
5	Business Model (Revenue Model)	This can also be used to help car companies as well. ·Can collaborate with insurance companies. · Can collaborate with car companies
6	Scalability of the Solution	AI guided Application provides 24/7 service to clear all customer queries and guide them through all the processes. In future, it can be scaled as per the requirements of the insurance or car company to include answers to queries related to the cost based on the inputs provided

3.4 PROBLEM SOLUTION FIT


Define CS, fit into CC
Explore AS, differentiate
Focus on J&P, tap into BE, understand RC
Focus on J&P, tap into BE, understand RC
Identify strong TR & EM
CS
CC
AS
J&P
RC
BE
TR
SL
CH
EM

Project Title: Intelligent Vehicle Damage Assessment & Cost Estimator for Insurance Companies

Project design Phase - 1

Team ID: PNT2022TMID44408

1. CUSTOMER SEGMENT

- Common people
- Car companies
- Insurance companies
- Vehicle owner

6. CUSTOMER

Trust Problem : The insurance companies Give the fake information about the estimation cost modify damage part of ensuring profit of company from user

Anxiety : Customer concern is the level of severity of the damaged parts and fixing the extent of the damaged parts is also the customer concern.

5. AVAILABLE SOLUTIONS

By gathering information about the damage assessment from customer side and vehicle companies to understand the level of damage and cost needed to same

Searching the through the internet such as online website get the insight about the damage

2. JOBS-TO-BE-DONE /a PROBLEMS

- Analyze the damage part and giving good cost estimation for customer satisfy and support system
- Provide the good prediction system to predict the level of damage and modify the damage parts

9. PROBLEM ROOT CAUSE

- Unaware about the level of damage
- Proper information about the estimation cost
- Not proper maintenance and accident Something etc......

7. BEHAVIOUR

The user does not know or is unaware how to deal with the damage part of vehicle

Inefficient to predict the level of damage and analysis to estimate the cost the damaged part this is The behavior

3. TRIGGERS

- Seeking help to identify the level of thedamaged part.
- To help people with good prediction and analysis of level and cost for the damaged part of the vehicle.

10. YOUR SOLUTION

- Collecting damaged parts of vehicles and preprocessing them to identify the severity and thelocation of damage.
- Users will be able to identify the level of damage bythe prediction system.
- Using VGG16 Model to train the damaged parts and trying to estimate the cost for the same.

8. CHANNELS of BEHAVIOR

ONLINE

- Online Websites
- Social Media Platforms

OFFLINE

- Customer throw Words
- Anxiety and Unawareness

4. EMOTIONS: BEFORE / AFTER

- **Before:** Lack of proper knowledge ,Improper maintenance,Unawareness about the level of damage and difficulty in estimating the cost for damages.
- **After:** Good knowledge about the Vehicle parts,Efficient prediction system giving the level of damage and analyzingcost for the same.

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	User Registration	Registration through Gmail
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Interface	User friendly and simple website
FR-4	Collect the datasets	Collect the data from the user side and their vehicle side information. Collect the data from about Insurance companies plans.
FR-5	Final Results	Model should be trained with high accuracy. Results obtained from the model should be displayed to The user with easy interpretability.

NON-FUNCTIONAL REQUIREMENTS

Following are the non-functional requirements of the proposed solution

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Intelligent model used to assessment the damage in the vehicle and estimate the cost to be provided by the insurance company.
NFR-2	**Security**	The credibility of the user and the confidentiality of user details about their vehicle must be maintained.
NFR-3	**Reliability**	This scheme can achieve good accuracy in damage estimation and cost estimation, thus providing accurate and unbiased insurance coverage to the user.
NFR-4	**Performance**	Real-time images are to be captured and uploaded to the website, where the proposed model performs damage assessment and gives the insurance cost accordingly.
NFR-5	**Availability**	The website should be compatible with web browsers on both mobile phones and computers.
NFR-6	**Scalability**	The proposed solution will be scalable in the future due to efficient and rapid analysis and accurate cost estimation

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

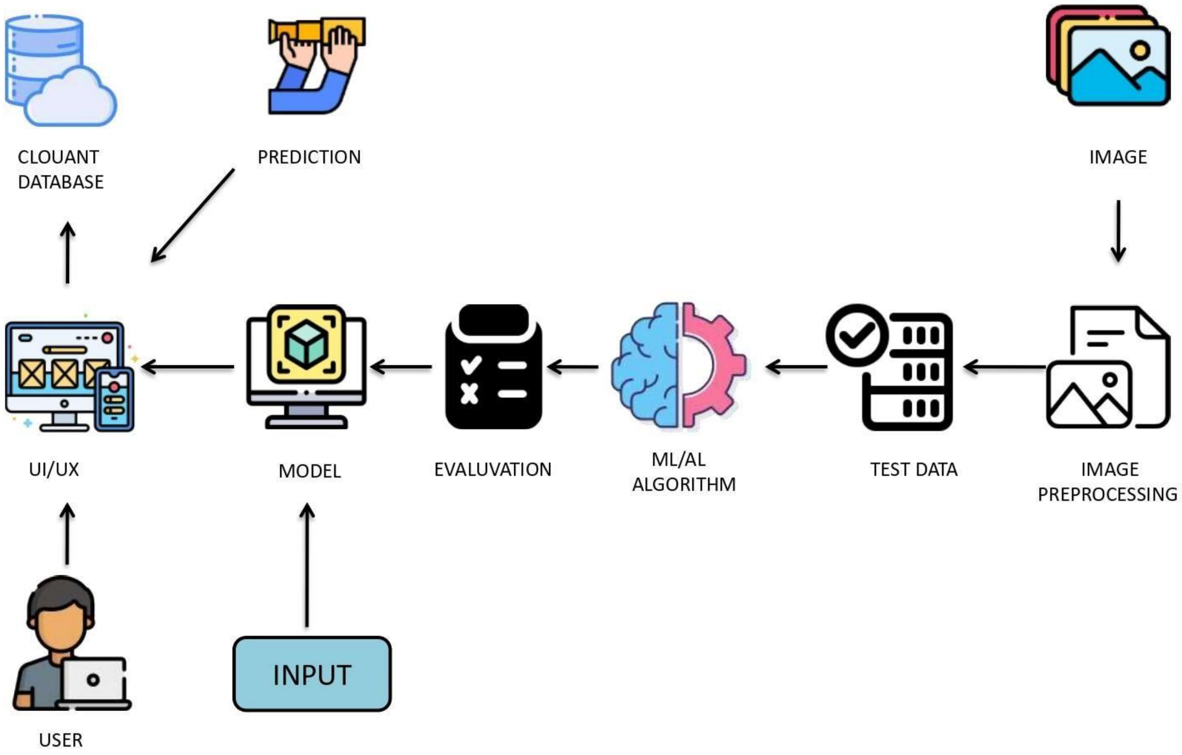


Figure 5.1.1 Data flow diagram

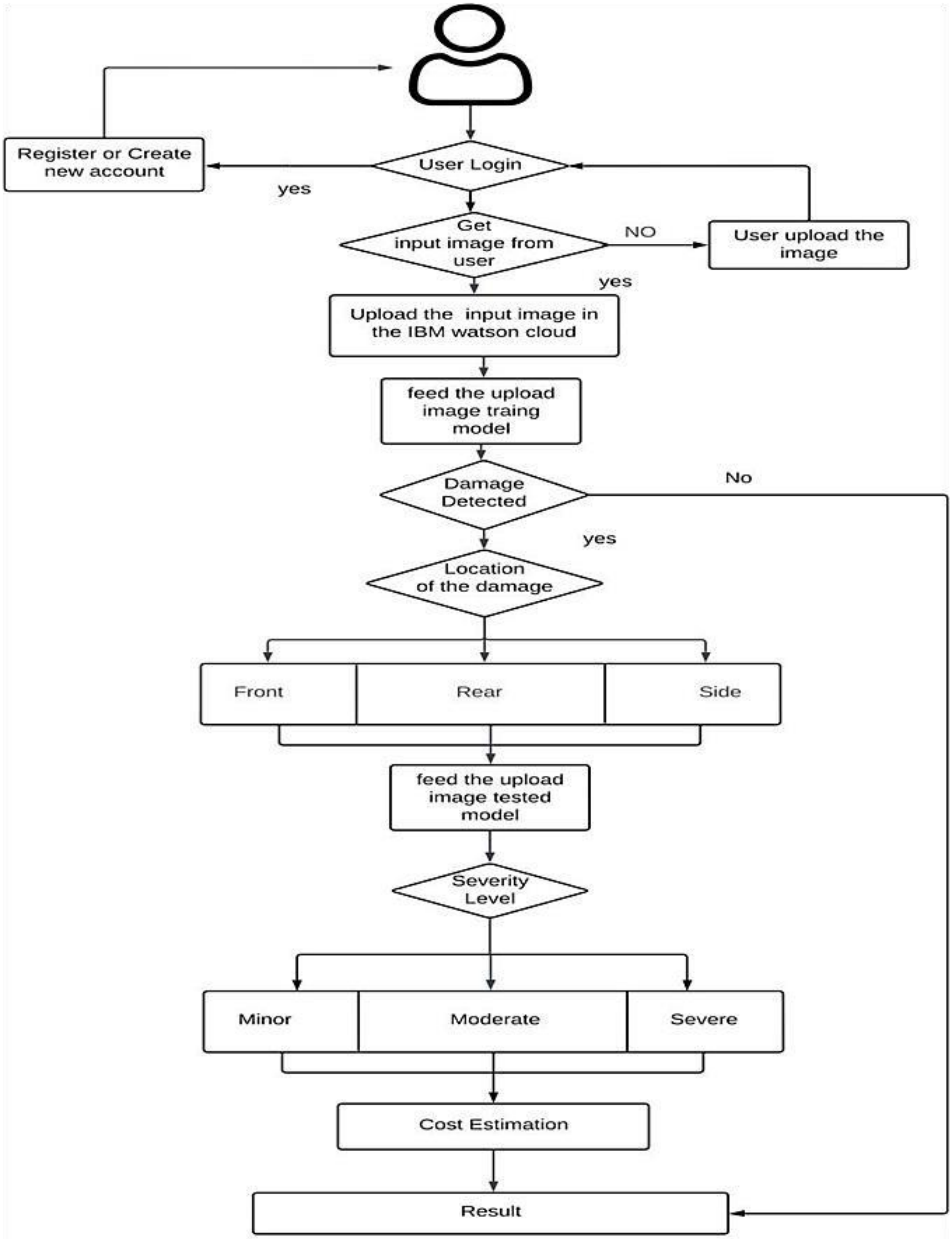

Register or Create new account
User Login
yes
Get input image from user
NO
User upload the image
yes
Upload the input image in the IBM watson cloud
feed the upload image traing model
Damage Detected
No
yes
Location of the damage
Front
Rear
Side
feed the upload image tested model
Severity Level
Minor
Moderate
Severe
Cost Estimation
Result

Figure 5.1.2 Data flow architecture diagram

5.2 SOLUTION & TECHNICAL ARCHITECTURE

Technical Architecture

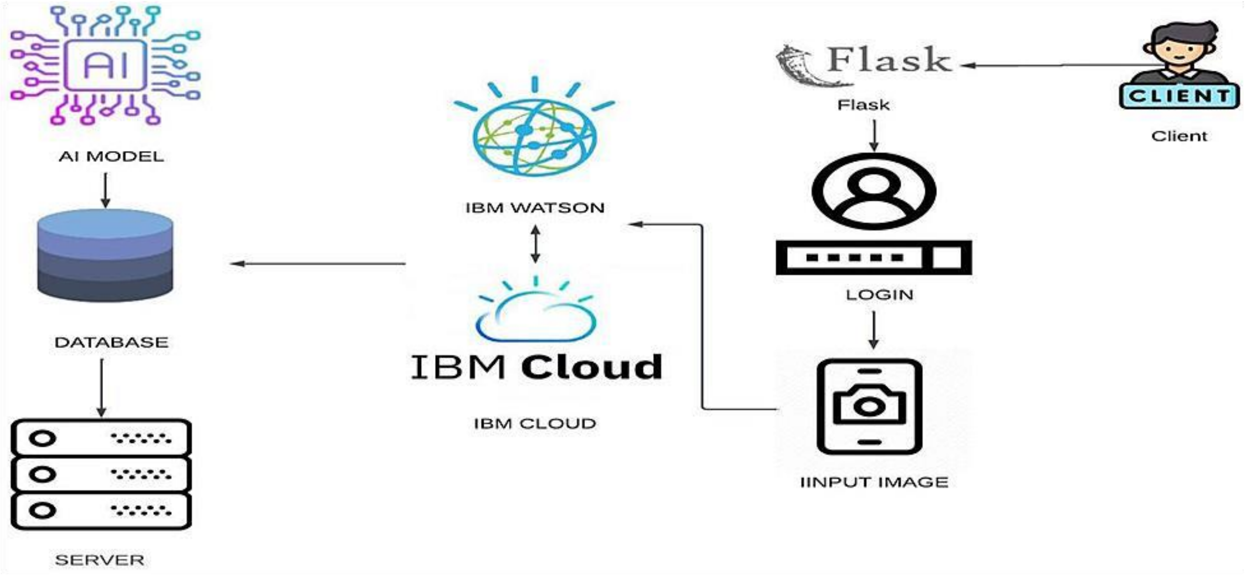


Figure 5.2.1 Technical Architecture

Table-1 : Components & Technologies

S.No	Component	Description	Technology
1	User Interface	The user interacts with the web application	HTML, CSS, Python
2	Application Logic-1	Gets the user input image	Python
3	Application Logic-2	Obtaining model output for damage prediction	IBM Watson , Python
4	Application Logic-3	Obtaining model output for cost estimation	IBM Watson , Python
5	Database	Data Type – Details of images and user inputs is stored	MySQL, Js, IBM DB2

6	Cloud Database	A database service in the cloud	IBM DB2, IBM Cloud ant etc.
7	File Storage	User details and user input received The images of the vehicle are stored in the cloud	IBM Block Storage or Other Storage Service or Local File system
8	Machine Learning Model	The purpose of the AI model is to estimate cost of the damaged vehicle.	The purpose of the AI model is to estimate cost of the damaged vehicle.
9	Infrastructure (Server / Cloud)	Let's use the AI model on the cloud server Using Flask on a Web Page	Local, Cloud Foundry, Kubernetes, Python Flask etc.

Table-2: Application Characteristics

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	IBM Watson Opensource frameworks are used	Open source architecture technology IBM Watson
2.	Security Implementations	IBM Cloud	Certified WatsonAssistant Encrypted file systems are encrypted. Storage systems, key management systems.

3.	Scalable Architecture	Web Server - Static and dynamic website content Existingon the website will be updated accordingly User requestsand suggestionsApplication ServerBasic Upgrade Integrating websitefunctionality and updates The logic in the website can be done Database Server – Based on varying inputs The user supplied databasewill be modified con nuously	IBM Watson Assistant, Python,MySQL
4.	Availability	The AI misleadingly available to users anytime	IBM WatsonCloud assistance
5.	Performance	IBM Watson- Automated processes, deepThe learning model is trained using IBMWatson StudioFor better performance and faster access.	IBM WatsonAssistant

5.3 USER STORIES

Use the below template to list all the user stories for the product.

UserType	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard by entering valid credentials	High	Sprint- 1

Customer Details	Login	USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email& click confirm	High	Sprint1
Customer Uses	Dashboard	USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint4
Customer Options	Details about insurance companies	USN-4	As a user, I can register for the application through Gmail	I can register & access the dashboard with Facebook Gmail	Medium	Sprint1
Customer usage	Login	USN-5	As a user, I can log into the application by entering email &password	I can log in and view my dashboard at my demand on any time	High	Sprint- 1
Customer needs to do	Dashboard	USN-6	As a user I must capture images of my vehicle and upload it into the web portal	I can capture the entire vehicle and upload	High	Sprint- 2
Customer (Web user)	Details about estimated cost based on damage	USN-7	As a user I must receive a detailed report of the damages present in the vehicle and the cost estimated	I can get the estimated insurance cost	High	Sprint- 3
Customer Care Executive	Details about Estimated cost Based on damage	USN-8	As a user, I need to get support from developers in case of queries and failure of service provided	I can have smooth user experiences and all the issues raised is sorted	Medium	Sprint- 4
Administrator	Details about Estimated cost Based on damage	USN-9	We need to satisfy the customer needs in an efficient way and make sure any sort of errors are fixed	I can finish the work without any problems	High	Sprint- 4

6. PROJECT PLANNING & SCHEDULING

Title	**Description**	**Date**
Literature Survey and Information Gathering	Gathering Information by referring the technical papers, research publications etc	10 October 2022
Prepare Empathy Map	To capture user pain and gains Prepare List of Problem Statement	10 October 2022
Ideation	Prioritize a top 3 ideas based on feasibility and Importance	10 October 2022
Proposed Solution	Solution include novelty, feasibility, business model, social impact and scalability of Solution	10 Octobe r 2022
Problem Solution Fit	Solution fit document	11 October 2022
Solution Architecture	Solution Architecture	11 October 2022
Customer Journey	To Understand UserInteractions and experiences with application	18 October 2022
Functional Requirement	Prepare functional Requirement	18 October 2022
Data flow Diagrams	Data flow diagram	18 October 2022
Technology stack	Technology Architecture Diagram	18 October 2022
Milestone & sprint delivery plan	Activity what we done &further plans	3 November 2022

Project Development- Delivery of sprint1,2,3&4	Develop and submit the developed code by testing It	3 November 2022 – 19November 2022

6.1 SPRINT PLANNING & ESTIMATION Product Backlog,Sprint Schedule, and Estimation

Sprint	**Functional Requirement (Epic)**	**User Story Number**	**UserStory / Task**	**Story Points**	**Priority**	**TeamMembers**
Sprint-1	Registration	USN-1	As a user ,I can resister for the application by entering my email,password, and confirming my password.	2	High	Sukumar Reddy
Sprint-1	Registration	USN-2	As a user, I will receive confirmation email once I haveRegistered for the Application	1	High	Sukumar Reddy
Sprint-1	Registration	USN-3	As a user ,I can register for the application Gmail.	2	Low	Sukumar Reddy
Sprint-1	Login	USN-4	As a user ,I can Login to the application by entering email &password .	1	Medium	Chetan Vivek
			As a user ,I can view all the plans and methods in			
Sprint-2	Dashboard	USN-5	the Dashboard.	1	High	Bhargav
Sprint-3	Storage	USN-1	As a user, I can Register for clammy insurance.	2	High	Chetan Vivek

Sprint-3		USN-2	As a us er, I can make a call to support line to get help with a product or service	2	High	Vivek
Sprint-4		USN-3	As a user, I can claim my insurance After getting from the administrator.	1	Medium	Bhargav

6.2 SPRINT DELIVERY SCHEDULE Project Tracker,Velocity & Burndown Chart

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	3 Days	3 Nov 2022	6 Nov 2022	20	
Sprint-2	20	3 Days	6 Nov 2022	9 Nov 2022		
Sprint-3	20	3 Days	9 Nov 2022	12 Nov 2022		
Sprint-4	20	3 Days	12 Nov 2022	15 Nov 2022		

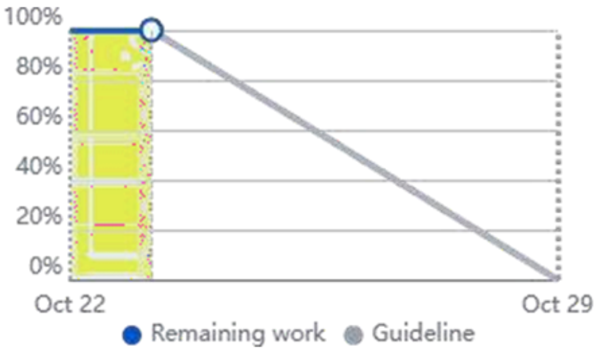
Velocity:

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)

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

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

7.1 FEATURE 1 DASHBOARD

```
<!DOCTYPE html>

<html lang="en">

<head>

  <title>DASHBOARD</title>

  <link rel="stylesheet" href="style.css">

      <meta charset="utf-8">

      <meta name="viewport" content="width=device-width, initial-scale=1"><link
rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">

      <link rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/fontawesome/4.7.0/css/font-awesome.min.css">

      <script src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></script>

      <script
src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></script> <style>
```

```
*{

margin: 0;

padding: 0;


}

.main{

width: 100%;

   background:linear-gradient(to top, rgba(0,0,0,0.5)50%,rgba(0,0,0,0.5)50%),
url("/static/images/2.jpg");

background-position: center;

background-size: cover;      height:

100vh;

}

.navbar{

width: 1200px;

height: 75px;

margin: auto;

}  .icon{

width: 200px;

   float: left;

   height: 70px;

}  .logo{      color:

#ff7200;      font-

size: 35px;      font-

family: Arial;

padding-left: 20px;
```

```
   float: left;
   padding-top: 2px;     margin-
top: 5px
}  .menu{
   width: 700px;
   float:  right;         height:  70px;  }  ul{
float: right;       display: flex;       justify-
content: center;      align-items: center; }
ul li{      list-style: none;      margin-left:
62px;     margin-top: 27px;      font-size:
14px; } ul li a{     text-decoration: none;
   color: #fff;     font-family:
Arial;     font-weight: bold;
transition: 0.4s ease-in-out;
} ul li
a:hover{
color: #ff7200;  }
.search{
width: 330px;
   float: left;
   margin-left: 270px;
}
.srch{     font-family: 'Times New
Roman';     width: 200px;
height: 40px;     background:
```

```
transparent;      border: 1px solid
#ff7200;      margin-top: 13px;
color: #fff;      border-right: none;
font-size: 16px;      float: left;
    padding: 10px;      border-bottom-left-
radius: 5px;      border-top-left-radius: 5px;
}  .btn{      width:
100px;      height: 40px;
background: #ff7200;
border: 2px solid
#ff7200;      margin-top:
13px;
    color: #fff;      font-size: 15px;
border-bottom-right-radius: 5px;
border-bottom-right-radius: 5px;
transition: 0.2s ease;      cursor:
pointer;  }
.btn:hover{
color: #000;
}

.btn:focus{
outline: none;  }
.srch:focus{
outline: none;  }
.content{      width:
```

```
1200px;     height:
auto;     margin:
auto;     color: #fff;
position: relative;
}
.content .par{
padding-left: 20px;
padding-bottom: 25px;
font-family: Arial;
letter-spacing: 1.2px;
line-height: 30px;  }
.content h1{     font-family: 'Times
New Roman';
   font-size: 50px;
padding-left: 20px;
margin-top: 9%;
letter-spacing: 2px;  }
.content .cn{     width:
160px;     height: 40px;
background: #ff7200;
border: none;
margin-bottom: 10px;
margin-left: 20px;
font-size: 18px;
border-radius: 10px;
```

```
cursor: pointer;
transition: .4s ease;
}
.content .cn a{      text-
decoration: none;
color: #000;      transition:
.3s ease;
}
.cn:hover{      background-
color: #fff;
}
.content span{
color: #ff7200;
font-size: 65px
}
.form{      width: 300px;      height: 340px;      background: linear-gradient(to
top, rgba(0,0,0,0.8)50%,rgba(0,0,0,0.8)50%);      position: absolute;      top: -
20px;      left: 870px;      transform: translate(0%,-5%);      border-radius: 10px;
padding: 25px;
}
.form h2{
   width: 220px;
   font-family: sans-serif;
text-align: center;
color: #ff7200;      font-
```

```
size: 22px;
background-color: #fff;
border-radius: 10px;
margin: 2px;      padding:
8px;  }
.form input{      width: 240px;
height: 35px;      background:
transparent;      border-bottom: 1px
solid #ff7200;      border-top: none;
border-right: none;      border-left:
none;      color: #fff;      font-size:
15px;      letter-spacing: 1px;
margin-top: 30px;      font-family:
sans-serif;  }
.form input:focus{
    outline: none;
}
::placeholder{      color:
#fff;      font-family:
Arial;  }  .btnn{
width: 240px;
height: 40px;
background: #ff7200;
border: none;
margin-top: 30px;
```

```
font-size: 18px;

border-radius: 10px;

cursor: pointer;

color: #fff;

transition: 0.4s ease;  }

.btnn:hover{

background: #fff;

color: #ff7200;  }  .btnn

a{      text-decoration:

none;      color: #000;

font-weight: bold;

}  .form .link{      font-family: Arial,

Helvetica, sans-serif;      font-size: 17px;

padding-top: 20px;      text-align: center;

}  .form .link a{      text-decoration: none;

color: #ff7200;

}  .liw{      padding-top:

15px;      padding-

bottom: 10px;

    text-align: center;

}  .icons a{      text-

decoration: none;

color: #fff;  }

.icons ion-icon{
   color: #fff;      font-
size: 30px;      padding-
left: 14px;  padding-
top: 5px;

   transition: 0.3s ease;
}
.icons ion-icon:hover{
color: #ff7200;
}
.end {                  overflow: hidden;
background-color: rgb(63, 63, 63);
                position: auto;
bottom: 0;                  height:
55px;                  width:
100%;
            }
</style>
</head>
<body = onload="flashMessage()">
   <script>          function flashMessage(){
if("{{flash_message}}"      ==      "True"){
alert("account created successfully")
        }
        if("{{flash_message}}" == "Fals"){
alert("invalid credentials")
```

```
        }
        if("{{flash_message}}" == "Fal"){
alert("Logged in successfully")
        }
      }
    </script>
    <body style:"background-image:static\images\2.jpg;">
    <div class="main">
        <div class="navbar">
            <div class="icon">
                <h6 class="logo"></h6>
            </div>

            <div class="menu">
                <ul>
                    <li><a href="{{ url_for('dashboard') }}">HOME</a></li>
                    <!--<li><a href="{{ url_for('login') }}">LOGIN</a></li>-->
                    <!--<li><a href="{{ url_for('register') }}">REGISTER</a></li>-->
                    <li><a href="{{ url_for('prediction') }}">PREDICTION</a></li>
                    <li><a href="{{ url_for('logout') }}">LOGOUT</a></li>
                    <li><a href="#section -1">ABOUT</a></li>
                </ul>
            </div>
        </div>
        <div class="content">
```

```
            <h1>Intelligent Vehicle <br><span>Damage Assessment &<br>Cost Estimator for </span><br>Insurance Companies</h1>

              <br><br><br>

                <button class="cn"><a href="{{ url_for('prediction') }}">PREDICTION</a></button>

            <!--form action="dashboard" method="POST">

                <div class="form">

                    <input type="email" name="email" id="email" placeholder="Enter Your Email Id">

                    <input type="password" name="password" id="password" placeholder="Enter Your Password ">

                    <button class="btnn"><a href="">Login</a></button>

                    <p class="link">Don't have an account<br>

                    <a href="#">Sign up </a> here</a></p>

                </div>

                                    </form!-->

                    </div>

                </div>

        </div>

    </div>

<br><br><br><center>

           <div id= "section -1"> <h2 style:font-family:'Times New Roman', Times, serif;"><center>ABOUT PROJECT</center></h2></div>

<br><br>

           <p style:"font-size:50px;font-family: 'Times New Roman', Times, serif;">Vehicle Damage Detection is used to reduce claims leakage during insurance processing.Vechile Inspectin and validation are usually done.As it takes a long time,because a person need to come and Inspect Damage.Here we are trying to Automate the procedure .Using this Automation we can avoid time consumption for Insurance claim procedure</p>
```

```
<br><br><br><br>
 <a style:"color:white;
                 padding: 22px;
background-color: black;
opacity: 85%;                  border-
radius: 12px;                 margin-left:
25px;
                 margin-bottom: -20px;" href="https://www.facebook.com" class="fa
fafacebook"></a>
         <a style:"color:white;
padding: 20px;
background-color: black;
opacity: 85%;                  border-
radius: 12px;                 margin-
left: 25px;
                 margin-bottom: -20px;" href="https://www.twitter.com" class="fa fa-twitter"></a>
         <a style:"color:white;
padding: 20px;
background-color: black;
opacity: 85%;                  border-
radius: 12px;                 margin-
left: 25px;
                 margin-bottom: -20px;" href="https://www.linkedin.com" class="fa
falinkedin"></a>
         <a style:"color:white;
padding: 20px;
```

```
background-color: black;

opacity: 85%;                        border-

radius: 12px;                       margin-

left: 25px;

                        margin-bottom: -20px;" href="https://www.instagram.com" class="fa
fainstagram"></a>

        </center>

                          </div><br><br><br>

           <div class="end">

               <p style="color:rgb(255, 246, 246);

margin-top: 20px;                            text-align:

center;">

             <b> Copyright &#169;  2022. All Rights Reserved</b>

               </p>

    <script src="https://unpkg.com/ionicons@5.4.0/dist/ionicons.js"></script>

</body>

      </html>
```

7.2 FEATURE 2 PREDICTION

```
<!DOCTYPE html>

<html lang="en">

    <head>

        <title> PREDICTION </title>

        <meta charset="utf-8">

        <meta name="viewport" content="width=device-width, initial-scale=1">
    <link rel="stylesheet"
href="https://cdnjs.cloudflare.com/ajax/libs/fontawesome/4.7.0/css/font-awesome.min.css">
<script src="https://ajax.googleapis.com/ajax/libs/jquery/3.6.0/jquery.min.js"></script>

    <script
src="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/js/bootstrap.min.js"></script>

<style>

      body{

margin: 0;

padding: 0;

        font-family:Arial, Helvetica, sans-serif

      }

     nav{

position:relative;

top: 0;          left: 0;

        width: 100%;

height: 70px;

padding: 10px 100px;

box-sizing:border-box;

      }

      nav .logo{

padding: 15px;

height: 30px;

float: left;          font-

size: 25px;           font-
```

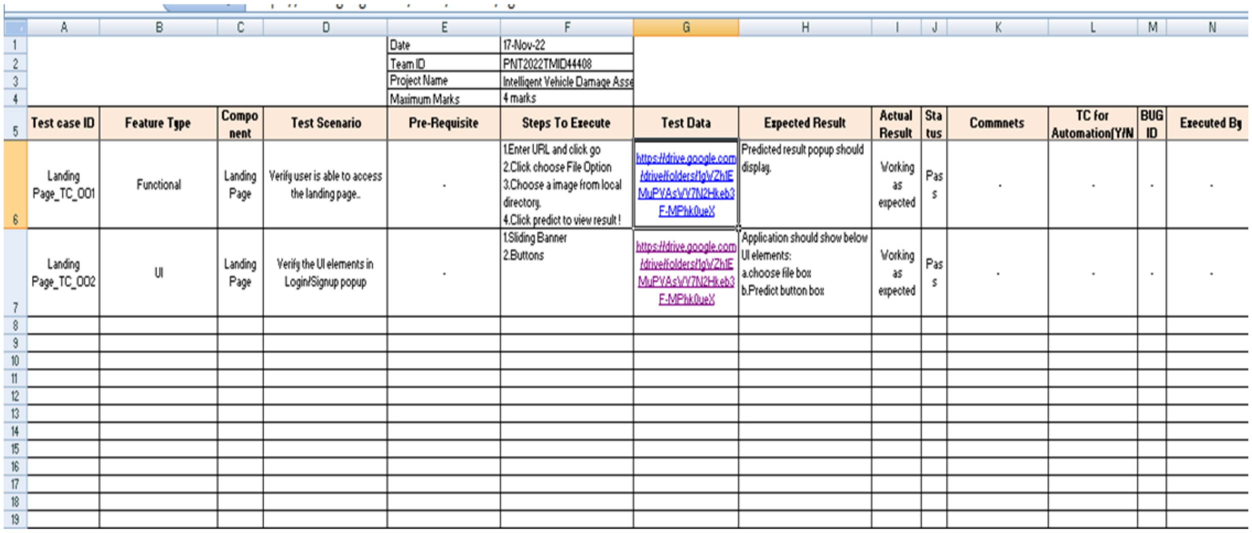
```
weight: bold;
color: #fff;

        }
        nav ul {            list-
style:none;                 float:
right;                  margin: 0;
padding:                        0;
display: flex;              font-
weight: 600;
        }
        nav ul li a{            float:
right;                  display: block;
color: #f2f2f2;                 text-
align: center;              padding:
15px;                 text-decoration:
none;                 font-size: 17px;
        }
        nav         ul         li         a:hover{
background:     rgb(200,     212,     200);
border-radius: 6px;             color: rgb(51,
48, 47);
        }
        nav       ul       li       a.active{
background: #e2472f;              border-
radius: 6px;
```

```
        }
        body {          margin:0;          padding:0;          font-family: sans-serif;
background:                    linear-gradient(to                    top,
rgba(0,0,0,0.5)50%,rgba(0,0,0,0.5)50%),url("/static/images/2.jpg");      background-position:
center;      background-size: cover;      height: 100vh;
}
        .end {          overflow: hidden;
background-color: rgb(63, 63, 63);
          position: fixed;
bottom:            0;
height:         55px;
width: 100%;
  }
  button{            background-
color:black;            opacity:
78%;
              color:   rgb(255,   255,   255);
font-size: 20px;           border-radius: 50px;
width: 150px;"
     }
  input{            background-
color:black;            opacity:
78%;           color: white;
```

```
font-size: 15px;                        width:
250px;
                        }
  </style>
    </head>
    <body style="background image=/static/images/2.jpg;">
        <div class="wrap">
        <nav>
        <div class="logo">PREDICTION  PAGE</div>
        <ul>
            <li><a href="{{ url_for('dashboard') }}">Home</a></li>
            <li><a href="{{ url_for('logout') }}">Logout </a></li>
        </ul>
        </div>
        </nav><br><br><br><br><br><br><br><br><br><br>
    <div style="margin-top: -45px;" class="container">
      <center>
        <h2 style="font-family:'Franklin Gothic Medium', 'Arial Narrow', Arial, sans-serif; color:
#ff7200;"><b>UPLOAD IMAGE TO PREDICT</b></h2><br>
     <form action="{{url_for('prediction')}}" method="POST"  enctype="multipart/form-data">
<div class="input">
                        <input type="file" class="myFile" id="myFile" name="myFile">
                        </div>
        <br><br><br>
      <div class="button">
            <button input type="submit" >Submit</button></div>
    </form>

          <br>

   <!-- <script>          function  flashMessage(){

if("{{ flash_message }}"=='True'){            const

im = document.createElement('img');

        im.src = "{{url_for('static', filename='imagedata/save.png')}}";

im.height = "200px";          im.width = '200px';          im.alt = 'hello

world'

      }

     }

   </script> -->

  <!-- <img src="{{url_for('static', filename='imagedata/save.png')}}"

alt=""     height="200px"     width="200px"

   /> --><br><h2 style="font-family:Arial, Helvetica, sans-serif; color: #ff7200;" > <b> The
Estimated cost for the Damage is = {{prediction_text}}</b></h2>

        </h3>

   </center>

</div>

</body>

</html>
```

8. TESTING

8.1 TEST CASES



Date	17-Nov-22
Team ID	PNT2022TMID44408
Project Name	Intelligent Vehicle Damage Asse
Maximum Marks	4 marks

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Commnets	TC for Automation(Y/N	BUG ID	Executed By
Landing Page_TC_001	Functional	Landing Page	Verify user is able to access the landing page..	-	1.Enter URL and click go 2.Click choose File Option 3.Choose a image from local directory. 4.Click predict to view result !	https://drive.google.com/drive/folders/1gVZh1EMuPYAsVV7N2Hkeb3F-MPhk0ueX	Predicted result popup should display.	Working as expected	Pass	-	-	-	-
Landing Page_TC_002	UI	Landing Page	Verify the UI elements in Login/Signup popup	-	1.Sliding Banner 2.Buttons	https://drive.google.com/drive/folders/1gVZh1EMuPYAsVV7N2Hkeb3F-MPhk0ueX	Application should show below UI elements: a.choose file box b.Predict button box	Working as expected	Pass	-	-	-	-

8.2 USER ACCEPTANCE TESTING

Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved.

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Sub total
By Design	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	0	14	13	26	77

Test Case Analysis

This report shows the number of test cases passed, failed, and untested.

Section	**Total Cases**	**Not Tested**	**Fail**	**Pass**
Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

9. RESULTS

9.1 PERFORMANCE METRICS

User will upload a car image or images and number plate of car, and we extract car registration number in text form using Googles Tesseract OCR. The performance metrics is

	Performances of damage detection	Performances of damage location	Performance of damage severity

Pretrained VGG models	Precision	Recall	F1score	Precision	Recall	F1score	Precision	Recall	F1score
VGG16	**0.94**	**0.94**	**0.94**	**0.71**	0.69	0.69	**0.61**	0.55	0.53
VGG19	0.91	0.91	0.91	0.69	0.66	0.66	0.59	0.54	0.51

10. ADVANTAGES & DISADVANTAGES

ADVANTAGES:

- ✓ The advancement of image analysis and pattern recognition technologies, the auto insurance industry could significantly benefit.
- ✓ Our proposed system is that it was user friendly and highly efficient.
- ✓ The proposed system maintain privacy and also Working accuracy.
- ✓ It saves user time and energy.

DISADVANTAGES:

- The Major Drawback Of The Proposed Model Is That It Only Identifies The Physical Visible Damage And Not Of The Internal Or The Interior Damage.

11. CONCLUSION

- ❖ In this work of Damage analysis of a vehicle in general and insurance reclaim, a system has been designed using CNN and image classification which takes the input from a user as an image to test the severity of damage, which happens in a sequence of two steps.
- ❖ First being the image classification, here the input provided by the user is processed by the neural network to identify the car that is if the car is damaged or not.

12. FUTURE SCOPE

- ◊ This further research is implementing the proposed algorithm with the existing public datasets.

Also, various segmentation algorithms can be implemented to improve accuracy.

- ◊ A higher quality dataset which includes pivotal parameters like location information and repair costs, the research could go a step further in predicting the cost of damage repair based on the image.

13. APPENDIX

13.1 SOURCE CODE

```
from flask import Flask, app, request, render_template
import os import flask import re import flask_login
import base64 from PIL import Image from io import
BytesIO import datetime import cv2 import numpy as
np from tensorflow.keras.models import load_model
from cloudant.client import Cloudant from
cloudant.error import CloudantException from
cloudant.result import Result, ResultByKey model1 =
load_model('Model/level.h5')          model2          =
load_model('Model/body.h5')                         def
detect(frame,model1,f):
   img = cv2.resize(frame,(244,244))    img =
cv2.cvtColor(img,cv2.COLOR_BGR2RGB)
   if(np.max(img)>1):
img=img/255.0     img =
np.array([img])
```

```
prediction =

model1.predict(img)

    if(f):

        label= ['front','rear','side']

else:

        label =['minor','moderate','severe']

preds = label[np.argmax(prediction)]

return preds

client = Cloudant.iam('862d725c-4fb3-4619-bfcb-083c11c6a979-
bluemix','QM5pS9ePdxMpe6Lh-

8yIvNYoZ3SXtoIdQQKnyIRYlwFb',connect=True) name = 'name' email = 'a@b.c'

password = '123' user_database = client.create_database('user_database') user_image_database

= client.create_database('user_image_database') def

image_database_updation(name,email,imagestr):

    global      user_image_database

now   =   datetime.datetime.now()

json_image_document={

        'name':name,

        'email':email,

        'image':imagestr,

        'datetime':now.strftime("%m/%d/%Y, %H:%M:%S")

    }

    new_image_document  = user_image_database.create_document(json_image_document)
if(new_image_document.exists()):

        print('database updated')

else:
        print('database couldn\'t be edited')
    return   def   image_database_retrieval():                 global   user_image_database
image_result_retrieved   =   Result(user_image_database.all_docs,include_docs=True)
image_result  ={}        for  i  in  image_result_retrieved:              if(i['doc']['email']  in
image_result.keys()):              # like current date> rx date('str')
            n = datetime.datetime.strptime(i['doc']['datetime'],'%m/%d/%Y, %H:%M:%S')
o = datetime.datetime.strptime(image_result[i['doc']['email']]['date'],'%m/%d/%Y,
%H:%M:%S')
            if(n>o):
                image_result[i['doc']['email']] =
{'name':i['doc']['name'],'image':i['doc']['image'],'date':i['doc']['datetime']}
        else:
            image_result[i['doc']['email']] =
{'name':i['doc']['name'],'image':i['doc']['image'],'date':i['doc']['datetime']
}     return(image_result) def
database_updation(name,email,password):
    global user_database
jsonDocument    =    {
'name':name,
        'email':email,
        'password':password
    }
    newDocument = user_database.create_document(jsonDocument)  if(newDocument.exists()):
print('database updated')
    else:
        print('database couldn\'t be edited')
return
#database_updation(name,email,password)


def database_retrieval():       global user_database       result_retrieved =
Result(user_database.all_docs,include_docs=True)
    #print(list(result_retrieved))
result   =   {}                 for   i   in
list(result_retrieved):
        result[i['doc']['email']]={'name':i['doc']['name'],'password':i['doc']['password']}
return result
#print(database_retrieval())           app           =
Flask(__name__)   app.secret_key   =   'apple'
login_manager = flask_login.LoginManager()
login_manager.init_app(app)        users        =
{'a@b.c': {'password': '123'}}

class User(flask_login.UserMixin):
    pass
@login_manager.user_loader
def           user_loader(email):
data = database_retrieval()
    if email not in data:
        return
    user = User()      user.id = email
user.name = data[email]['name']
```

```
   return user
@login_manager.request_loader def
request_loader(request):       email =
request.form.get('email')         data =
database_retrieval()       if email not
in data:
       return
   user = User()      user.id = email
user.name   =   data[email]['name']
return   user   @app.route('/')   def
index():
   if(flask_login.current_user.is_authenticated):
return  render_template('dashboard.html')            else:
return flask.redirect(flask.url_for('login'))
@app.route('/register',methods = ['GET','POST']) def
register():
    data = database_retrieval()
    if(flask.request.method == 'GET'):          return
    render_template('register.html')      email =
    flask.request.form['email']      if(email in data):
       return render_template('register.html',flash_message='True')
    else:
       database_updation(flask.request.form['name'],email,flask.request.form['password'])
       #users[email]={'password':flask.request.form['password']}
user    =  User()                 user.id  =  email                 user.name  =
flask.request.form['name']          flask_login.login_user(user)
return render_template('dashboard.html',flash_message='True')
@app.route('/login',methods =['GET','POST']) def
login():
  data = database_retrieval()   if(flask.request.method == 'GET'):        return
render_template('login.html',flash_message='False')              email   =
flask.request.form['email']                 if(email    in    data    and
flask.request.form['password']==data[email]['password']):
     user     =   User()                 user.id   =   email
flask_login.login_user(user)                         return
render_template('dashboard.html',flash_message='Fal')
  #flask.flash('invalid     credentials     !!!')        return
  render_template('login.html',flash_message="True")
  #error = 'inavlid credentials')

@app.route('/dashboard',methods = ['GET','POST'])
@flask_login.login_required  def  dashboard():      if(flask.request.method  ==
'GET'):        return  render_template('dashboard.html',flash_message='False')
email    =    flask.request.form['email']           if(email    in    users    and
flask.request.form['password']==users[email]['password']):
     user     =   User()                 user.id   =   email
flask_login.login_user(user)                         return
render_template('dashboard.html',flash_message="Fal")     return
render_template('dashboard.html',flash_message="Fals")
```

```
@app.route('/logout')

@flask_login.login_required def logout():

    flask_login.logout_user()      return

render_template('logout.html')


@app.route('/prediction',methods = ['GET','POST'])

@flask_login.login_required def

prediction():

    from tensorflow.keras.models import load_model

    model1 = load_model('Model/level.h5')

    model2 = load_model('Model/body.h5')

if(flask.request.method=='POST'):

img = flask.request.files['myFile']

        try:

            os.remove('static\imagedata\save.png')

        except:

pass

        imgstr = base64.b64encode(img.read()).decode('utf-8')

        image_database_updation(flask_login.current_user.name,flask_login.current_user.id,imgstr)

data = image_database_retrieval()          print(flask_login.current_user.id)

        #print(len(base64.b64decode(data[flask_login.current_user.id]['image'].strip())))

image =

Image.open(BytesIO(base64.b64decode(data[flask_login.current_user.id]['image'])))

img_retrived = np.array(image)
```

```
    '''img_retrived =
np.asarray(base64.b64decode(data[flask_login.current_user.id]['image']))
print(data[flask_login.current_user.id]['image'])          print(img_retrived.shape)'''
    #img_retrived = np.resize(img_retrived,(244,244))
img_retrive = Image.fromarray(img_retrived)
img_retrive.save('static\imagedata\save.png')
    '''img_retrived = np.frombuffer(
BytesIO(
        base64.b64decode(data[flask_login.current_user.id]['image'])
        )
      )'''
    print('################################')
result1=detect(img_retrived,model1=model2,f=True)          result2
= detect(img_retrived,model1=model1,f=False)
    value=''          if(result1 == 'front' and
result2 == 'minor'):
      value = '3000 - 5000 INR'          elif(result1
== 'front' and result2 == 'moderate'):
      value = '6000 - 8000 INR'
elif(result1 == 'front' and result2 == 'severe'):
      value = '9000 - 11000 INR'
elif(result1 == 'rear' and result2 == 'minor'):
      value = '4000 - 6000 INR'          elif(result1
== 'rear' and result2 == 'moderate'):
```

```
            value = '7000 - 9000 INR'
elif(result1 == 'rear' and result2 == 'severe'):
            value = '11000 - 13000 INR'
elif(result1 == 'side' and result2 == 'minor'):
            value = '6000 - 8000 INR'          elif(result1
== 'side' and result2 == 'moderate'):
            value = '900 - 11000 INR'
elif(result1 == 'side' and result2 == 'severe'):
            value = '12000 - 15000 INR'
        else:
            value = '16000 - 50000 INR'          print(result1,result2,value)
        print('#################################')
img_retrived = Image.fromarray(img_retrived)
img_retrived.save('static\imagedata\save.png')
print('image uploaded and retrieved')          return
render_template('prediction.html',prediction_text='{}'.format(value),flash_message='False')

    return render_template('prediction.html',flash_message='True') if
__name__ == '__main__':
app.run(debug=True)
```

13.2 GITHUB & PROJECT DEMO LINK

Github Link:

https://github.com/IBM-EPBL/IBM-Project-137-1658213160.git

PROJECT DEMO LINK:

https://drive.google.com/file/d/13Eq-s8rymSyfSZrTOD6n-nCbcNrPiRa2/view?usp=drivesdk

14. SCREENSHOTS

Login page

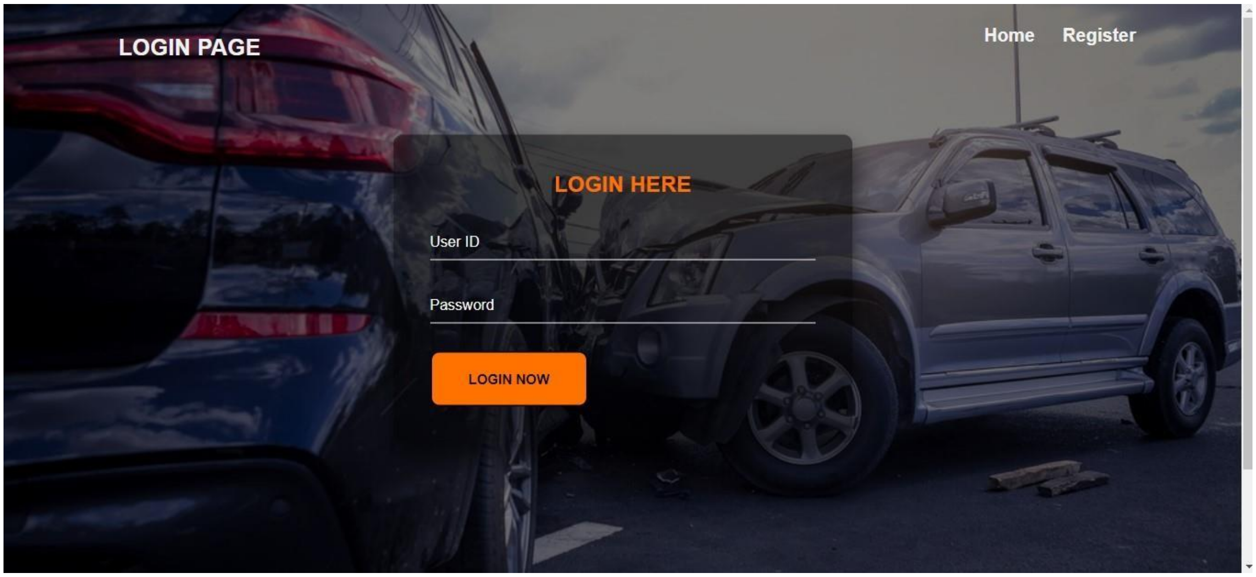


Figure 14.1 Login page

Register page

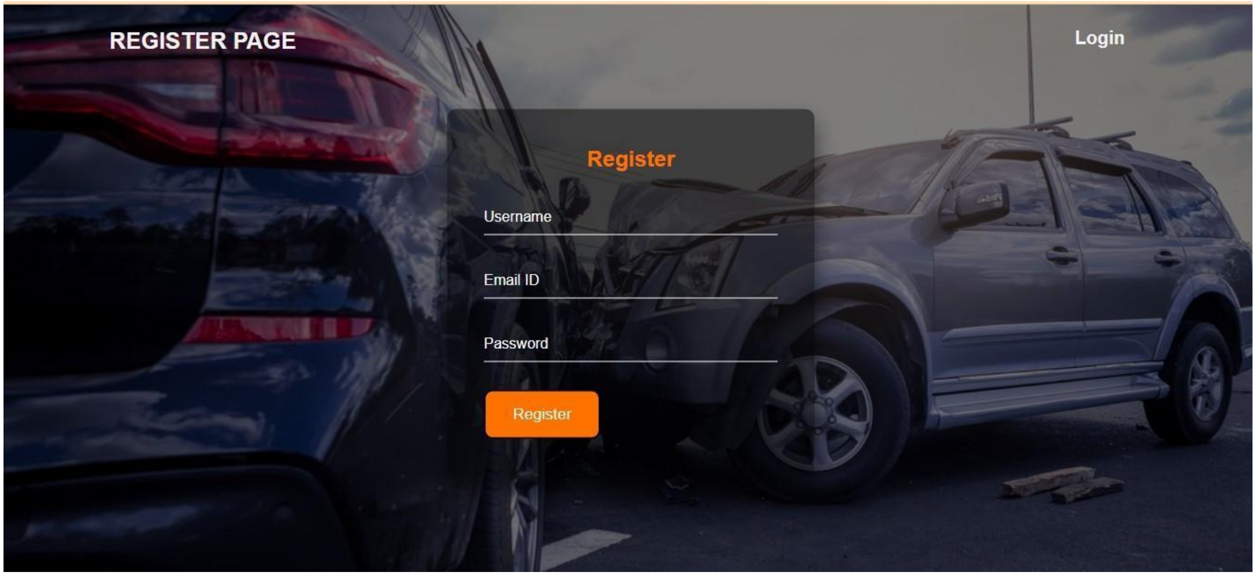
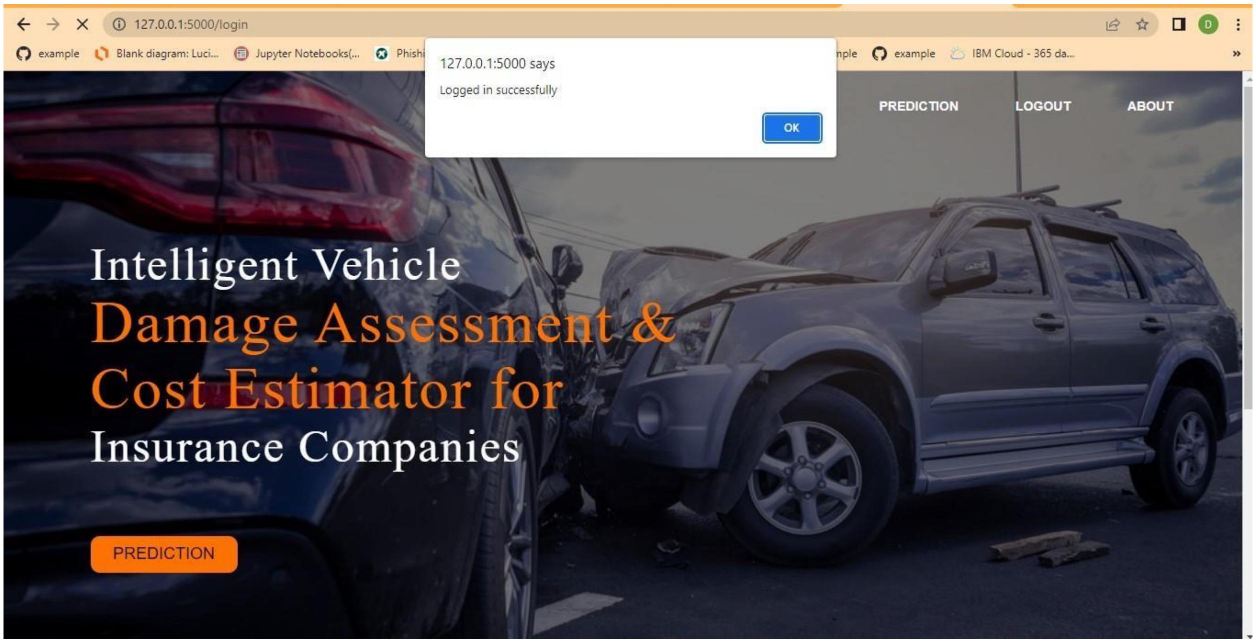


Figure 14.2 Register page

Dashboard



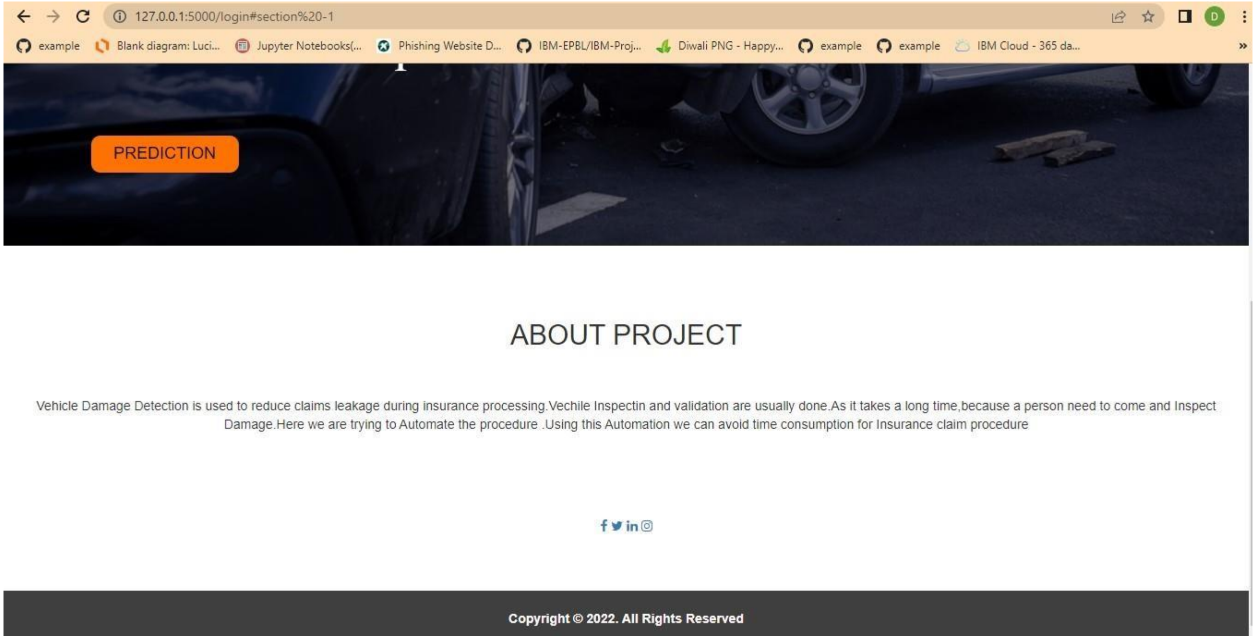
127.0.0.1:5000 says

Logged in successfully

Intelligent Vehicle Damage Assessment & Cost Estimator for Insurance Companies

Figure 14.3 Dashboard

About page



ABOUT PROJECT

Vehicle Damage Detection is used to reduce claims leakage during insurance processing.Vechile Inspectin and validation are usually done.As it takes a long time,because a person need to come and Inspect Damage.Here we are trying to Automate the procedure .Using this Automation we can avoid time consumption for Insurance claim procedure

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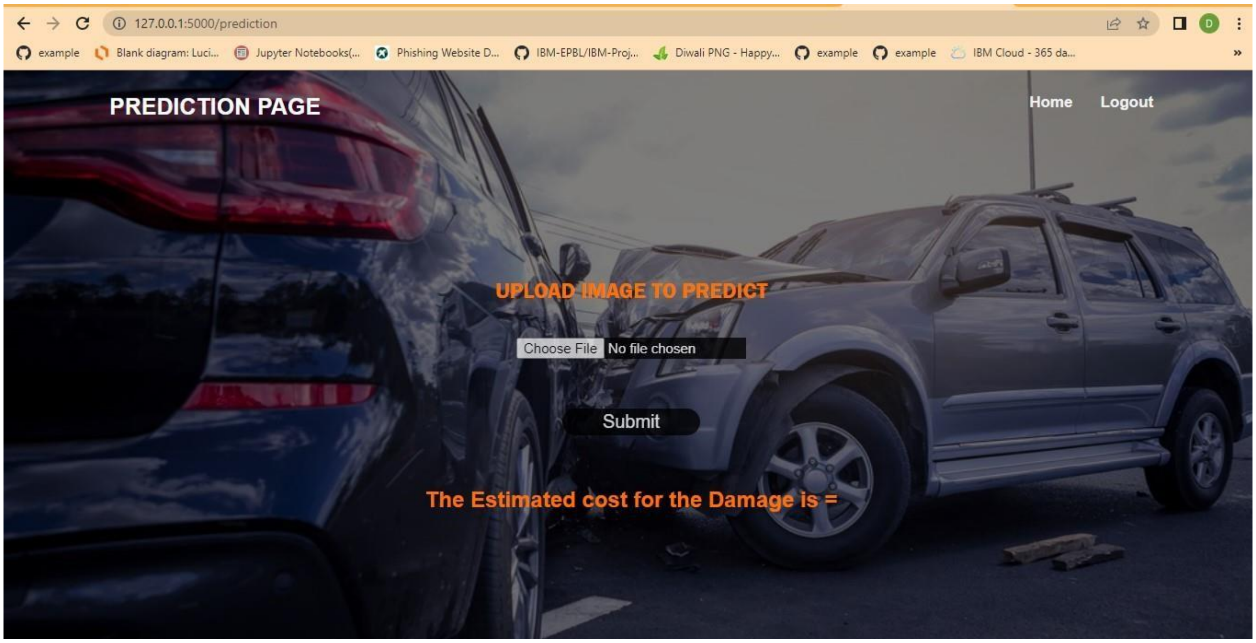
Figure 14.4 About page

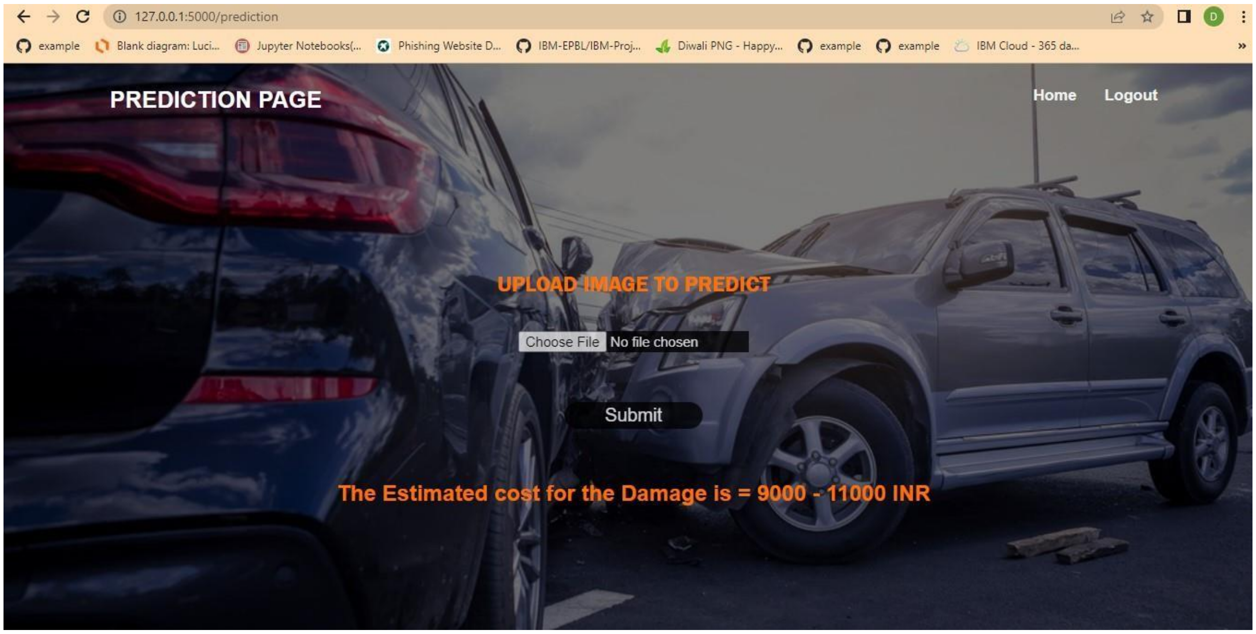
Prediction page



The Estimated cost for the Damage is =

Figure 14.5 Prediction page

Estimated cost



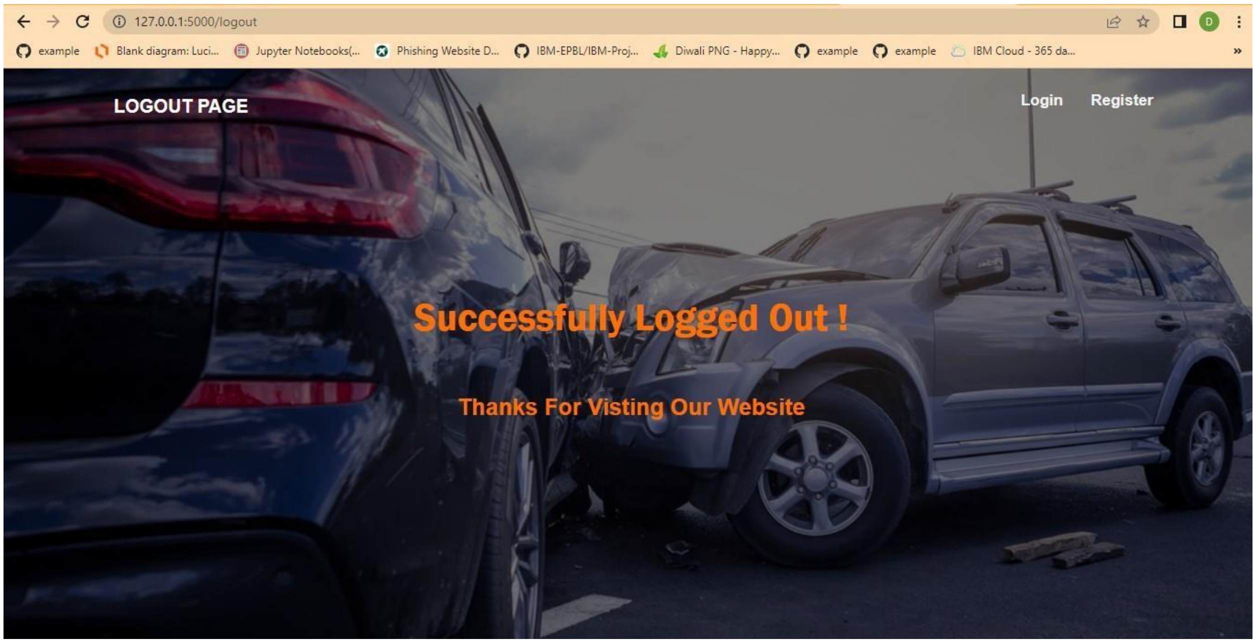
PREDICTION PAGE

UPLOAD IMAGE TO PREDICT

The Estimated cost for the Damage is = 9000 - 11000 INR

Figure 14.6 Estimated cost

Log out page



LOGOUT PAGE

Successfully Logged Out !

Thanks For Visting Our Website

Figure 14.7 Log out page