

Project Report Format

1. INTRODUCTION

1.1 PROJECT OVERVIEW :

The Vehicles counts are increased rapidly now a days. Because most of the people were use vehicles for their personal or business purpose. Accidents may happen because of driving the vehicles at high speeds or does not follow the traffic rules. When the accident occurs, people may file a report for claim the insurance to repair thier vehicles. Most of the insurance companies doesn't provide correct insurance amount or the claim procedure takes more time. Instead of taking that much of time, a system may perform it in a minute by giving a damaged vehicle image. The system may analysis the image to detect the damagesa in the vehicle.

1.2 PURPOSE :

Most of the people may use vehicles for their day to day life. The accident may happen when the people are driving the vehicle at high speed. When an accident occurs, people may claim insurance easily by using this system. The people only upload their damaged vehicle image and the system may analysis the image then provide a correct insurance amout for the vehicle.

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM :

Insurance fraud is one of the most prevalent kinds of fraud. In particular, the cost of automotive insurance fraud is significant for property insurance companies and has a longterm influence on insurance businesses' pricing tactics. And Car insurance fraud detection has become required in order to reduce insurance prices. Although predictive models for detecting insurance fraud are widely used in practise, there are few published research on the use of machine learning algorithms to identify insurance fraud, most likely due to a lack of available data. Evaluate 13 machine learning approaches in this paper using real-world data. Predicting insurance fraud has become a big difficulty due to the uneven datasets in this domain. Because our data consists primarily of "non-fraud claims" with a minor number of "fraud claims." As a result, classification models predict fraud poorly; thus, the current study seeks to propose an approach that improves machine learning algorithms' results by using resampling techniques, such as Random over Sampler, Random under Sampler, and hybrid methods, to address the issue of unbalanced data.

2.2 REFERENCES :

Vaibhav Agarwal, Utsav Khandelwal, Shivam Kumar, Raja Kumar, Shilpa 2022
IJCRT | Volume 10, Issue 4 April 2022 | ISSN: 2320-2882

R.E. van Ruitenbeek, S.Bhulai Machine Learning with Applications Volume 9, 15
September 2022, 100332

Ruixing Ming, Using Machine Learning Models To Compare Various Resampling
Methods In Predicting Insurance Fraud, 2021

Siddhant Gole, Car Damage Assessment to Automate Insurance Claim, 2022

2.3 PROBLEM STATEMENT DEFINITION :

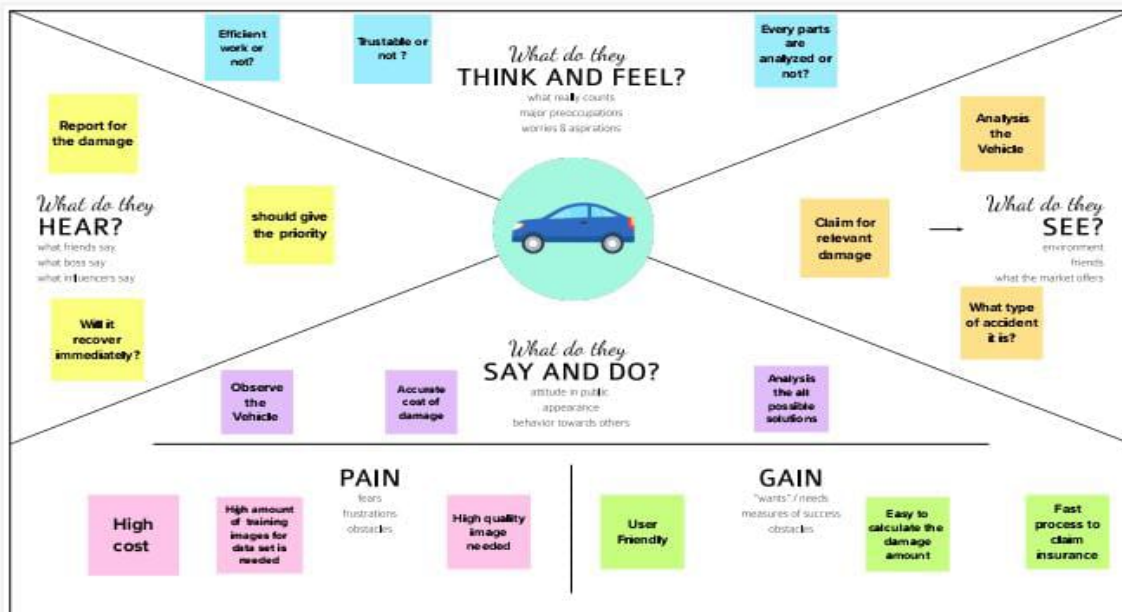
Nowadays, a lot of money is being wasted in the car insurance business due to leakage claims. Claims leakage Underwriting leakage is characterized as the discrepancy between the actual payment of claims made and the sum that should have been paid if all of the industry's leading practices were applied. Visual examination and testing have been used to may these results. However, they impose delays in the processing of claims. So we decide to overcome these issue without any delay and efficiently this is our proposed system.The discrepancy between the company's actual spending and what they should have really spent is known as claim leakage. Ineffective claim processing, erroneous payments, human error such as a lack of quality control or poor customer service or even claim fraud may be to blame for this. Auditing closed claim files is the only way to find claim leakage.

3. IDEATION & PROPOSED SOLUTION

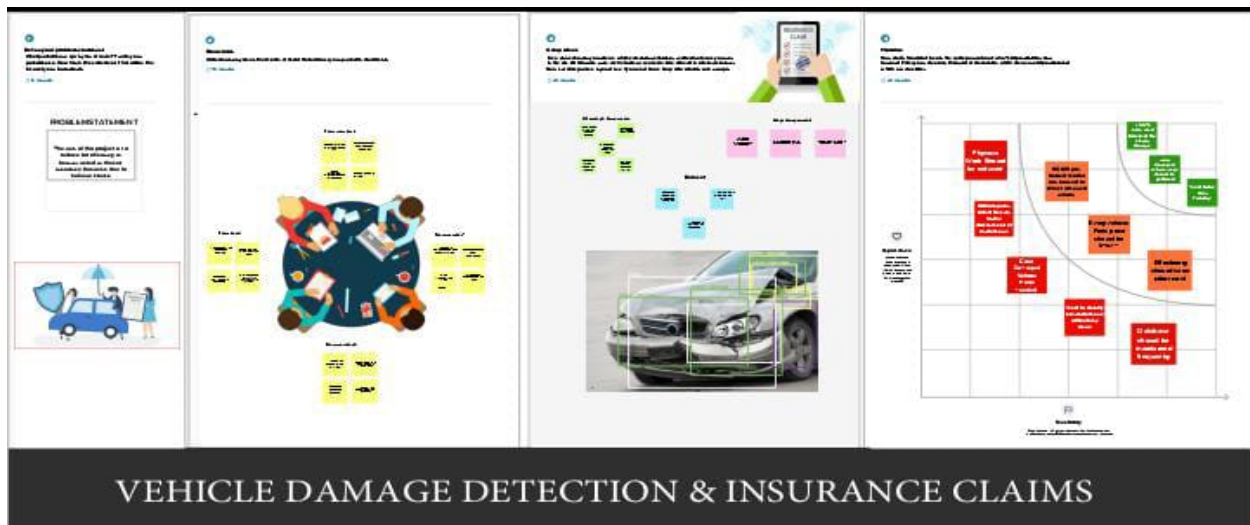
3.1 EMPATHY MAP CANVAS

Empathy Map :-

Intelligent Vehicle Damage Assessment & Cost Estimator for Insurance Companies



3.2 IDEATION & BRAINSTORMING



3.3 PROPOSED SOLUTION

Date	30 September 2022
Team ID	PNT2022TMID32157
Project Name	Intelligent Vehicle Damage Assessment & Cost Estimator for Insurance Companies
Maximum Marks	2 Marks

S.No.	Parameter	Description
1	Problem Statement (problem to be solved)	To develop a VGG16 Model, that is used to detect the damaged area in the car. This is used in a insurance companies to easy and faster way to claim the insurance. The amount will be detected by user uploading a damaged image of the car and model.
2	Idea / Solution Description	To accomplish this, firstly create Train and Test Folders. Secondly, image processing in which Import the image data generator library and apply image data generator functionality to Trainset and test set. The third step is Model Building in which Import the model building Libraries, Adding Flatten layers then Adjoin Output Layer further Creating Model Object and Configure the Learning Process & next Train, Save, Test The Model. Step four is Cloud and DB in which Register & Login to IBM Cloud subsequently Create Service Instance and Credentials then Launch Cloud and DB thereupon Create Database. The last step is Application Building in which Building HTML Pages and Build Python Code accordingly. Finally Run the Application.
3	Novelty / Uniqueness	Image processing Detected a car in AI based.
	Social Impact / Customer satisfaction	There is no need to give full amount to the policy holder. The amount is based on the damage.
	Business Model (Revenue Model)	Subscription and advertising model.
	Scalability of the solution	It may provide, the client to avoid giving the total insurance amount to the policyholder for a small damage in a vehicle.

3.4 PROBLEM SOLUTION FIT

Problem-Solution fit canvas 2.0

Intelligent Vehicle Damage Assessment & Cost Estimator for Insurance Companies

Define CS, fit into CC	<div>1. CUSTOMER SEGMENT(S)</div> <div>CS</div> <p>Who is your customer? The Insurance Company and People are the customer for our Project</p>	<div>6. CUSTOMER CONSTRAINTS</div> <div>CC</div> <p>What constraints prevent your customers from taking action or limit their choices of solutions? I.e. spending power, budget, no cash, network connection, available devices</p> <p>The main reason behind this is very difficult to implement in this project in real time without any prior experience.</p>	<div>5. AVAILABLE SOLUTIONS</div> <div>AS</div> <p>Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? I.e. pen and paper is an alternative to digital notetaking</p> <p>To claim Vehicle Insurance they need to contact insurance company and one of them try to visit manually and check the damage and given a report to the company based on that report the cost for the damage is given but those are very less.</p>	Explore AS, differentiate
	<div>2. JOBS-TO-BE-DONE / PROBLEMS</div> <div>J&P</div> <p>Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one, explore different sides.</p> <p>The Damage should be addressed properly with high efficiency in that.</p>	<div>9. PROBLEM ROOT CAUSE</div> <div>RC</div> <p>What is the real reason that this problem exists? What is the back story behind the need to do this job? I.e. customers have to do it because of the change in regulations.</p> <p>The inconsistent examine of vehicle damage and their not effective insurance claim</p>	<div>7. BEHAVIOUR</div> <div>BE</div> <p>What does your customer do to address the problem and get the job done? I.e. directly related: find the right solar panel installer, calculate usage and benefits; Indirectly associated: customers spend free time on volunteering work (I.e. Greenpeace)</p> <p>They need to capture damaged vehicle and upload in our project and remaining details will be provided by our project</p>	
Identify strong TR & EM	<div>3. TRIGGERS</div> <div>TR</div> <p>What triggers customers to act? I.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.</p> <p>Getting correct insurance claim from other vehicle insurance Company</p>	<div>10. YOUR SOLUTION</div> <div>SL</div> <p>If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.</p> <p>The image need to be perfectly analyzed by the pre developed VGG16 model or by VGG19 model</p>	<div>8. CHANNELS of BEHAVIOUR</div> <div>CH</div> <p>8.1 ONLINE What kind of actions do customers take online? Extract online channels from #7 They need to upload an image of the vehicle and just follow the user interface.</p> <p>8.2 OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.</p> <p>There is nothing they need to take in offline mode.</p>	Extract online & offline CH of BE
	<div>4. EMOTIONS BEFORE / AFTER</div> <div>EM</div> <p>How do customers feel when they face a problem or a job and afterwards? I.e. lost, insecure > confident, in control - use it in your communication strategy & design.</p> <p>They will feel very happy while getting effective amount claim from their vehicle insurance company</p>			

Problem-Solution fit canvas is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 license
 Created by Daria Nepriakhina / Amaltama.com

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	No Registration needed.
FR-2	Image	Image of the Damaged Vehicle is needed to predict the damage cost
FR-3	PC / Desktop or Mobile	Device needed to run the application

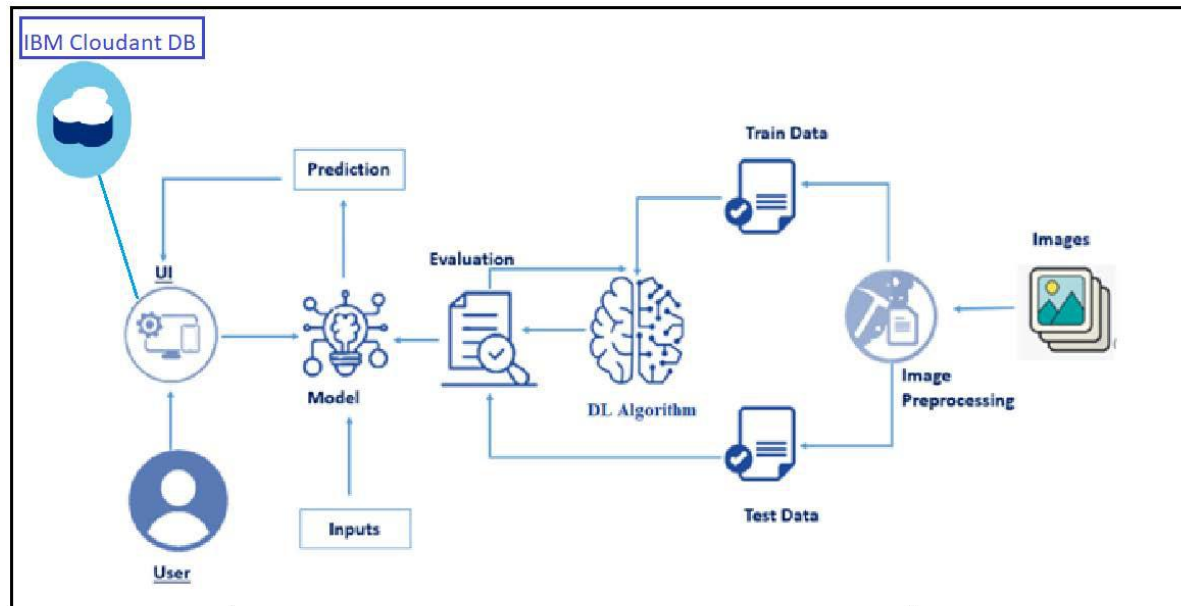
4.2 NON FUNCTIONAL REQUIREMENTS

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

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Used to predict damage of the vehicle
NFR-2	Security	No security needed while using this application
NFR-3	Reliability	Reliable on anytime anywhere with the environment
NFR-4	Performance	High performance to predict damage which is difficult to predict by manual
NFR-5	Availability	Available for customers on both web and mobile
NFR-6	Scalability	Scalable with predicting outer damage which is known but the interior is not possible at this time

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS :



5.2 SOLUTION ARCHITECTURE

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

Solution Architecture Diagram:

5.3 USER STORIES :

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Dashboard	USN-1	As a user, I can use this user-friendly application without any registration and login	I can access this dashboard	High	Sprint-2
	Predict page	USN-2	As a user, I can upload the image of the damaged vehicle	I can access this predict page	Medium	Sprint-3
	Solution	USN-3	As a user, I can get the solution with the trained model	I can access this on predict page	Medium	Sprint-3
Customer (Web user)	Dashboard	USN-1	As a user, I can use this user-friendly web application without any registration and login	I can access this dashboard	High	Sprint-2
	Predict page	USN-2	As a user, I can upload the image of the damaged vehicle	I can access this predict page	Medium	Sprint-3
	Solution	USN-3	As a user, I can get the solution with the trained model	I can access this on predict page	Medium	Sprint-3

6. PROJECT PLANNING & SCHEDULING

Date	18 October 2022
Team ID	PNT2022TMID32157
Project Name	Project - Intelligent Vehicle Damage Assessment & Cost Estimator for Insurance Companies
Maximum Marks	8 Marks

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Pre-Processing	USN-1	As a user, I can upload any kind of Car images that need to be process	2	High	LingaPrabu Abinanthan
Sprint-1		USN-2	As a user, I will upload any resolution images	1	Low	Surya Ramkumar
Sprint-2	Model Building	USN-3	As a user, I will know the damage condition of the car	2	High	Surya Abinanthan
Sprint-2		USN-4	As a user, I need to know whether damaged in front or backside	2	Medium	LingaPrabu Ramkumar
Sprint-3	UI	USN-5	As a user, I can log into the application by entering email & password	5	High	LingaPrabu Abinanthan
		USN-6	As a user, I will need a Home page which contain basic details	2	Low	Abinanthan Ramkumar
		USN-7	As a user, I need a simple page for registration	5	Medium	Surya Abinanthan
Sprint-4		USN-8	As a user, I will need a page for upload vehicle image to analyse the damage cost	8	High	Ramkumar Surya

	Cloud Deployment	USN-9	As a user, I can access the app all over the world	13	High	LingaPrabu Surya
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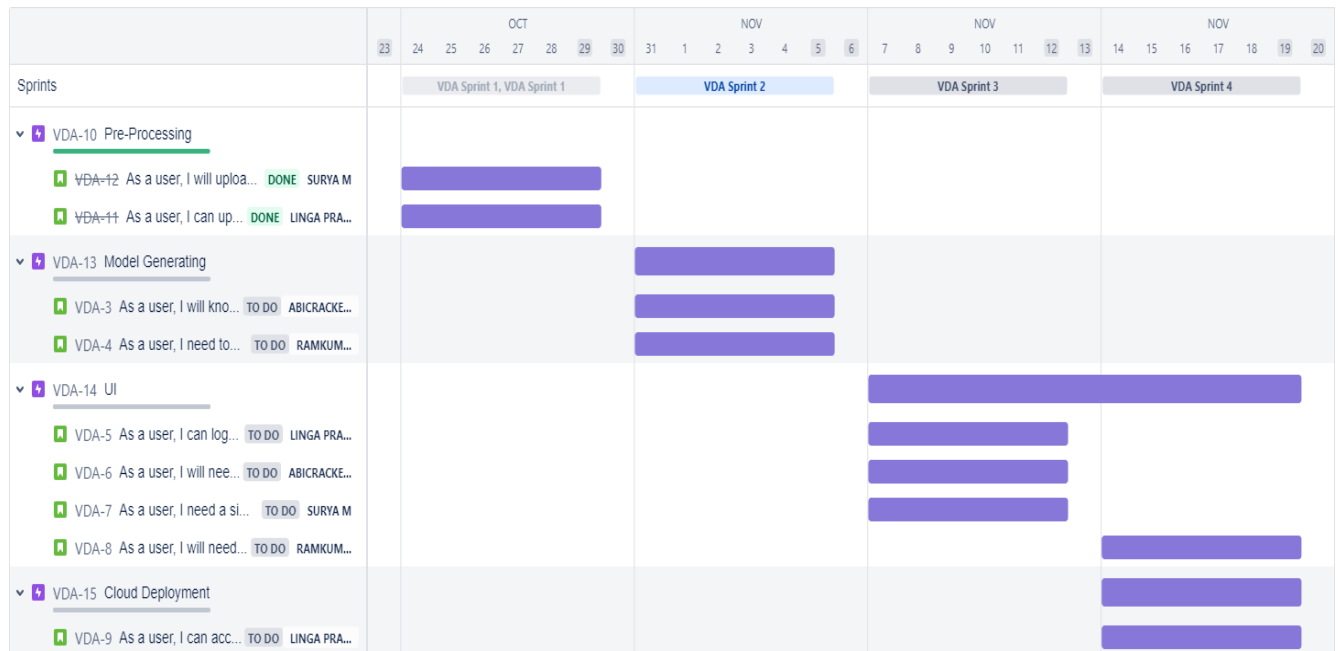
6.2 SPRINT DELIVERY SCHEDULE

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	3	6 Days	24 Oct 2022	29 Oct 2022	3	29 Oct 2022
Sprint-2	4	6 Days	31 Oct 2022	05 Nov 2022	4	05 Nov 2022
Sprint-3	12	6 Days	07 Nov 2022	12 Nov 2022	12	12 Nov 2022
Sprint-4	21	6 Days	14 Nov 2022	19 Nov 2022	21	19 Nov 2022

Velocity:

$$\text{Average Velocity} = \frac{\text{Sprint Duration}}{\text{Velocity}} = 20/8 = 2.5$$

6.3 REPORTS FROM JIRA :



7. CODING & SOLUTIONING

7.1 FEATURE 1

Intelligent Vehicle Damage Assessment & Cost Estimator for Insurance Companies

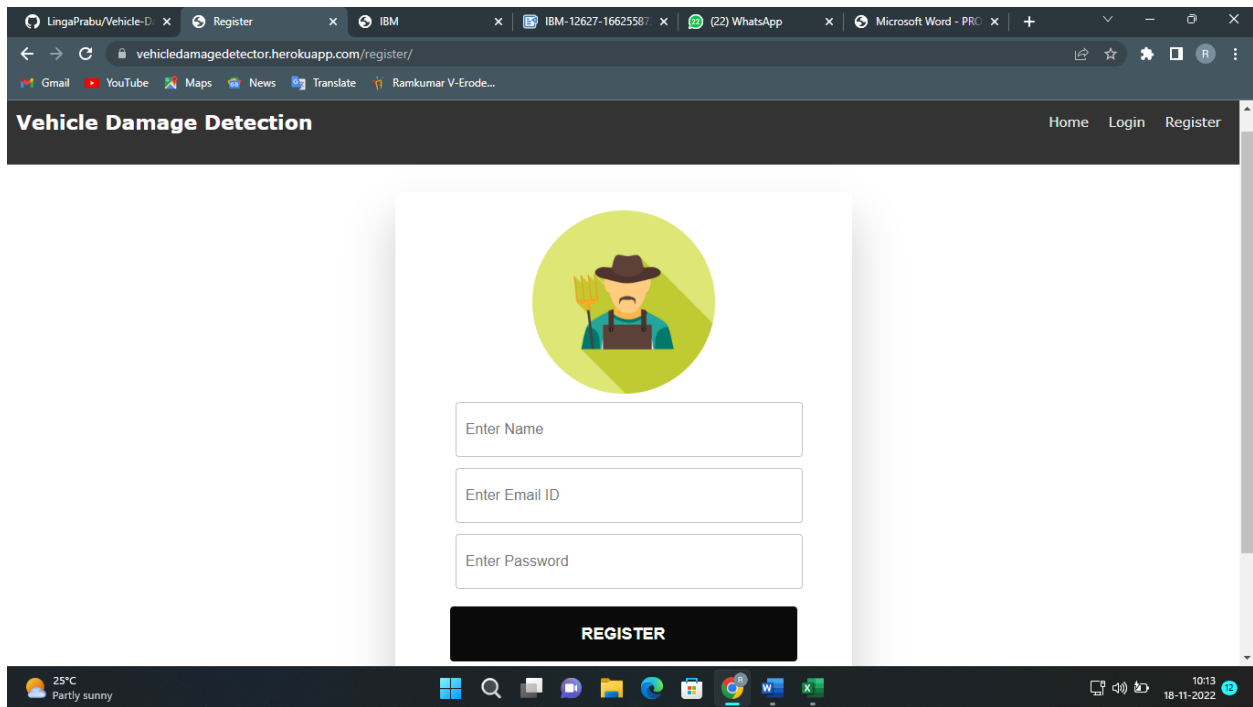
Home Login Register Prediction

ABOUT PROJECT

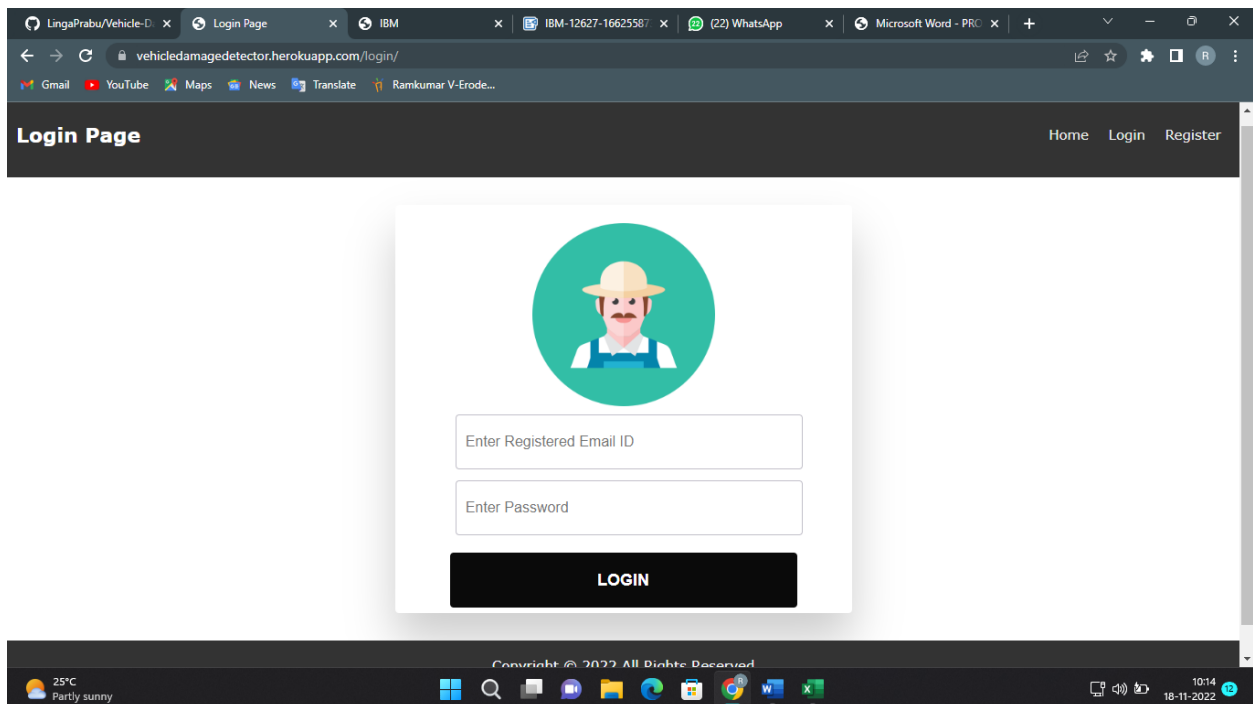
Vehicle damage detection is used to reduce claims leakage during insurance processing. Visual inception and validation are usually done. As it takes a long time, because a person needs to come and inspect the damage. Here we are trying to automate the procedure. Using this automation, we can avoid time conception for the insurance claims.

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7.2 FEATURE 2



7.3 FEATURE 3



8. TESTING

8.1 TEST CASES

Test case ID	Feature Type	Component	Test Scenario
Test Case - O1	Functional	web Page	Verify user is able to see the page popup when user they enter to web page
Test Case - O2	UI	Home Page	Verify the UI elements in Homepage
Test Case - O3	Functional	Home page	Verify user is able to See the deatils about the webpage
Test Case - O4	Functional	Introduction	Verify user is able to details about uses of the Vehicle Damage Assessment
Test Case - O5	Functional	Register	Verify user is able to navigate and Register
Test Case - O6	Functional	Login	Verify user is able to navigate and Login

8.2 USER ACCEPTANCE TESTING

Date	15 November 2022
Team ID	PNT2022TMID32157
Project Name	Project - Intelligent Vehicle Damage Assessment & Cost Estimator for Insurance Companies
Maximum Marks	4 Marks

1.Purpose of document

The purpose of this document is to briefly explain the test coverage and open issuesof the [**Intelligent Vehicle Damage Assessment**] project at the time of the release to

User Acceptance Testing (UAT).

2. 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	Subtotal
By Design	6	2	0	1	9
Duplicate	2	0	3	0	5
External	3	2	0	0	5
Fixed	10	3	2	16	31
Not Reproduced	0	0	0	0	0
Skipped	0	0	1	1	2
Won't Fix	0	0	0	0	0
Totals	21	7	6	18	52

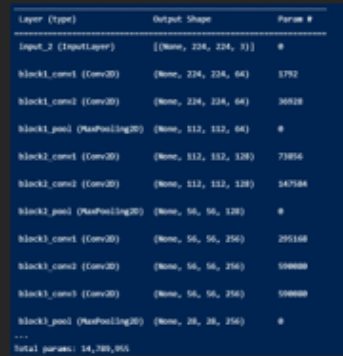
3. Test Case Analysis

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

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	10	1	0	10
Security	0	0	0	0
Outsource Shipping	6	0	0	6
Exception Reporting	6	0	0	6
Final Report Output	5	0	0	5

9. RESULTS

9.1 PERFORMANCE METRICS

S.No.	Parameter	Values	Screenshot
1.	Model Summary	Model Value - 989	 <pre> Layer (type) Output Shape Param # ----- input_2 (InputLayer) [(None, 224, 224, 3)] 0 block1_conv1 (Conv2D) (None, 224, 224, 64) 1792 block1_conv1 (Conv2D) (None, 224, 224, 64) 36828 block1_pool (MaxPooling2D) (None, 112, 112, 64) 0 block1_conv2 (Conv2D) (None, 112, 112, 128) 73856 block1_conv2 (Conv2D) (None, 112, 112, 128) 147584 block1_pool (MaxPooling2D) (None, 56, 56, 128) 0 block1_conv3 (Conv2D) (None, 56, 56, 256) 295168 block1_conv3 (Conv2D) (None, 56, 56, 256) 590304 block1_conv4 (Conv2D) (None, 56, 56, 256) 590304 block1_pool (MaxPooling2D) (None, 28, 28, 256) 0 ... Total params: 14,789,955 </pre>
2.	Accuracy	Training Accuracy – 0.9686 Validation <u>Accuracy</u> - 0.6353	acc: 0.9969 val_acc: 0.6353

10. ADVANTAGES & DISADVANTAGE

ADVANTAGE

- Easy way to claim insurance.
- Give the accurate result of the damaged vehicle
- Easy to calculate the damage amount

DISADVANTAGE

- High quality image needed
- High amount of training images for data set is needed

11. CONCLUSION

In this research proposal, a neural network-based solution for automobile detection will be used to address the issues of automotive damage analysis and position and severity prediction. This project does several tasks in one bundle. The method will unquestionably assist the insurance firms in conducting far more thorough and systematic analyses of the vehicle damage. Simply sending the system a photograph of the vehicle, it will evaluate it and determine whether there is damage of any type, where it is located, and how severe it is.

12. FUTURE SCOPE

Increase the accuracy of the model by training for higher epochs and preventing overfitting issue Carrying out multiple functions in one package. A reduction of model training time is a challenge. An advanced model to classify the damage of the exact components and the extend of the damage. Detecting damages to vehicle panels such as dents, deformations in panels and also estimating the degree of damage in terms of repair costs. Making use of the reflections and specular highlights in the process of recovering the 3D pose. Cross-validation between annotators and studies of the effect of different annotation granularities can be carried out.

13. APPENDIX

SOURCE CODE

index.html

```
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <meta charset="UTF-8" />
5     <meta http-equiv="X-UA-Compatible" content="IE=edge" />
6     <meta name="viewport" content="width=device-width, initial-
7       scale=1.0" />
8     <link rel="stylesheet" href="../static/style.css" />
9     <title>Intelligent Vehicle Damage Assessment & Cost Estimator
10    for Insurance Companies</title>
11  </head>
12  <body>
13    <nav class="navbar">
14      <div class="logo">Intelligent Vehicle Damage Assessment &
15      Cost Estimator for Insurance Companies</div>
16      <ul class="nav-links">
17        <input type="checkbox" id="checkbox_toggle" />
18        <label for="checkbox_toggle">
```



```

    class="hamburger">&#9776;</label>
16     <div class="menu">
17         <li><a href="/">Home</a></li>
18         <li><a href="/login">Login</a></li>
19         <li><a href="/register">Register</a></li>
20         <li><a href="/prediction">Prediction</a></li>
21     </div>
22 </ul>
23 </nav>
24 <h1>ABOUT PROJECT</h1>
25 <p>Vehicle damage detection is used to reduce claims leakage
    during insurance processing.
26     Visual inception and validation are usually done.As it takes
    a long time, because a person needs to come and inspect the
    damage.
27     Here we are trying to automate the procedure. Using this
    automation, we can avoid time conception for the insurance
    claims.
28 </p>
29 <footer>
30     <div class="footer-content">
31         <p>Copyright &copy; 2022.All Rights Reserved</p>
32         <ul class="social"> <li><a href="#"></a></li>
33         <li><a href="#"></a></li>
34     </ul>
35     </div>
36 </footer>
37 </body>
38 </html>

```

login.html

```

1 <!DOCTYPE html>
2 <html lang="en" >
3 <head>
4     <meta charset="UTF-8">
5     <title>Login Page</title>
6     <link rel="stylesheet" href="../static/login.css">

```

```
7
8 </head>
9 <body>
10   <nav class="navbar">
11     <div class="logo">Login Page</div>
12     <ul class="nav-links">
13       <input type="checkbox" id="checkbox_toggle" />
14       <label for="checkbox_toggle"
15         class="hamburger">&#9776;</label>
16       <div class="menu">
17         <li><a href="/">Home</a></li>
18         <li><a href="/login">Login</a></li>
19         <li><a href="/register">Register</a></li>
20       </div>
21     </ul>
22   </nav>
23   <div id="login-form-wrap">
24     
26     <p>{{errors}}</p>
27     <form id="login-form" action="/afterlogin/"
28       enctype="multipart/form-data" method="POST">
29       <p>
30         <input type="email" id="email" name="_id" placeholder="Enter
31         Registered Email ID" required>
32       </p>
33       <p>
34         <input type="password" id="password" name="psw"
35         placeholder="Enter Password" required>
36       </p>
37       <p>
38         <input type="submit" id="Login" value="Login">
39       </p>
40     </form>
41   </div>
42   <footer>
43     <div class="footer-content">
44       <p>Copyright &copy; 2022.All Rights Reserved</p>
45     </div>
46   </footer>
```

```
42
43 </body>
44 </html>
```

logout.html

```
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <meta charset="UTF-8" />
5     <meta http-equiv="X-UA-Compatible" content="IE=edge" />
6     <meta name="viewport" content="width=device-width, initial-
    scale=1.0" />
7     <link rel="stylesheet" href="../static/style.css" />
8     <title>Vehicle Damage Detection</title>
9   </head>
10  <body>
11    <nav class="navbar">
12      <div class="logo">Vehicle Damage Detection</div>
13      <ul class="nav-links">
14        <input type="checkbox" id="checkbox_toggle" />
15        <label for="checkbox_toggle"
    class="hamburger">&#9776;</label>
16        <div class="menu">
17          <li><a href="/">Home</a></li>
18          <li><a href="/login">Login</a></li>
19          <li><a href="/register">Register</a></li>
20        </div>
21      </ul>
22    </nav>
23    <div class="Logout">
24      <h2>Successfully Logged Out!</h2>
25      <h3>Login for more information</h3>
26      <a href="/login">Login</a>
27    </div>
28    <footer>
29      <div class="footer-content">
30        <p>Copyright &copy; 2022.All Rights Reserved</p>
31        <ul class="social"> <li><a href="#"></a></li>
```

```

32     <li><a href="#"></a></li>
33     </ul>
34 </div>
35 </footer>
36 </body>
37 </html>

```

Prediction.html

```

1 <!DOCTYPE html>
2 <html lang="en" >
3 <head>
4   <meta charset="UTF-8">
5   <title>Prediction</title>
6 <link rel="stylesheet" href="../static/login.css">
7 <style>
8   label {
9     display: block;
10    width: 100%;
11    margin-top: 5%;
12    height: 55px;
13    line-height: 50px;
14    text-align: center;
15    background: #1172c2;
16    color: #fff;
17    font-size: 15px;
18    font-family: "Open Sans", sans-serif;
19    text-transform: Uppercase;
20    font-weight: 600;
21    border-radius: 5px;
22    cursor: pointer;
23 }
24 </style>
25 <script>
26   function showPreview(event){
27     if(event.target.files.length > 0){
28       var src = URL.createObjectURL(event.target.files[0]);
29       var preview = document.getElementById("file-ip-1-preview");
30       preview.src = src;

```

```

31     preview.style.display = "block";
32 }
33 }
34 </script>
35 </head>
36 <body>
37     <nav class="navbar">
38         <div class="logo">Vehicle Damage Detection</div>
39         <ul class="nav-links">
40             <input type="checkbox" id="checkbox_toggle" />
41             <label for="checkbox_toggle"
class="hamburger">&#9776;</label>
42             <div class="menu">
43                 <li><a href="/">Home</a></li>
44                 <li><a href="/logout">Logout</a></li>
45             </div>
46         </ul>
47     </nav>
48 <div class="prediction" id="prediction-form-wrap">
49     <form action="/result" method="POST" enctype="multipart/form-
data" id="prediction-form">
50         <p>
51             <label for="file">Upload Image</label>
52             <input type="file" style="display: none;" accept="image/*"
id="file" name="file" onchange="showPreview(event);" required>
53         </p>
54         <div class="preview">
55             <img id="file-ip-1-preview">
56         </div>
57
58         <p>
59             <input type="submit" id="submit" value="Submit">
60         </p>
61     </form>
62 </div>
63 <h1>Your Car Damaged ( {{damage}} ) in ({{area}})<br> The
Estimated Cost For The Damage Is : {{prediction}}</h1>
64 <footer>
65     <div class="footer-content">
66         <p>Copyright &copy; 2022.All Rights Reserved</p>

```

```
67 </div>
68 </footer>
69
70 </body>
71 </html>
```

Register.html

```
1 <!DOCTYPE html>
2 <html lang="en" >
3 <head>
4   <meta charset="UTF-8">
5   <title>Register</title>
6   <link rel="stylesheet" href="../static/login.css">
7
8 </head>
9 <body>
10   <nav class="navbar">
11     <div class="logo">Vehicle Damage Detection</div>
12     <ul class="nav-links">
13       <input type="checkbox" id="checkbox_toggle" />
14       <label for="checkbox_toggle"
15         class="hamburger">&#9776;</label>
16       <div class="menu">
17         <li><a href="/">Home</a></li>
18         <li><a href="/login">Login</a></li>
19         <li><a href="/register">Register</a></li>
20       </div>
21     </ul>
22   </nav>
23   <div id="register-form-wrap">
24     
26     <p>{{errors}}</p>
27     <form id="register-form" action="/afterreg"
28       enctype="multipart/form-data" method="POST">
29       <p>
30         <input type="text" id="name" name="name" placeholder="Enter
31           Name" required>
32       </p>
```

```

29     <p>
30     <input type="email" id="email" name="_id" placeholder="Enter
    Email ID" required>
31     </p>
32     <p>
33     <input type="password" id="password" minlength="6"
    name="psw" placeholder="Enter Password" required>
34     </p>
35     <p>
36     <input type="submit" id="Register" value="Register">
37     </p>
38 </form>
39 <div id="already">
40     <p>Already have an account? <a href="/login">Login</a><p>
41 </div><!--already-->
42 </div>
43 <footer>
44     <div class="footer-content">
45         <p>Copyright &copy; 2022.All Rights Reserved</p>
46     </div>
47 </footer>
48
49 </body>
50 </html>

```

Login.css

```

1  * {
2    margin: 0;
3    padding: 0;
4    box-sizing: border-box;
5  }
6  body {
7    font-family: Verdana;
8  }
9  .navbar {
10   display: flex;
11   align-items: center;
12   justify-content: space-between;
13   padding: 10px;

```

```
14 height: 15vh;
15 background-color: #333333;
16 color: #fff;
17 }
18 #file-ip-1-preview{
19     width:100%;
20     margin-top: 5%;
21     display:none;
22     margin-bottom:30px;
23 }
24 .nav-links a {
25     color: #edefec;
26 }
27 a {
28     text-decoration: none;
29 }
30 li {
31     list-style: none;
32 }
33 /* LOGO */
34 .logo {
35     font-size: 22px;
36     font-weight: 600;
37 }
38 /* NAVBAR MENU */
39 .menu {
40     display: flex;
41     gap: .1em;
42     font-size: 15px;
43 }
44 .menu li:hover {
45     background-color: #4c9e9e;
46     border-radius: 5px;
47     transition: 0.3s ease;
48 }
49 .menu li {
50     padding: 3px 10px;
51 }
52 input[type=checkbox]{
53     display: none;
```



```
54 }
55 /*HAMBURGER MENU*/
56 .hamburger {
57     display: none;
58     font-size: 24px;
59     user-select: none;
60 }
61 /* APPLYING MEDIA QUERIES */
62 @media (max-width: 768px) {
63     .menu {
64         display:none;
65         position: absolute;
66         background-color:#333333;
67         right: 0;
68         left: 0;
69         text-align: center;
70         padding: 16px 0;
71     }
72     .menu li:hover {
73         display: inline-block;
74         background-color:#4c9e9e;
75         transition: 0.3s ease;
76     }
77     .menu li + li {
78         margin-top: 12px;
79     }
80     input[type=checkbox]:checked ~ .menu{
81         display: block;
82     }
83     .hamburger {
84         display: block;
85     }
86 }
87
88
89 p {
90     text-align: center;
91 }
92
93 #already a,
```

```
94 #already a:link,
95 #already a:visited,
96 #already a:active {
97   color: #3ca9e2;
98   -webkit-transition: all 0.2s ease;
99   transition: all 0.2s ease;
100 }
101 #already a:focus,#already a:hover,
102 #already a:link:focus,
103 #already a:link:hover,
104 #already a:visited:focus,
105 #already a:visited:hover,
106 #already a:active:focus,
107 #already a:active:hover {
108   color: #329dd5;
109   -webkit-transition: all 0.2s ease;
110   transition: all 0.2s ease;
111 }
112
113 #register-form-wrap,#login-form-wrap,#prediction-form-wrap {
114   background-color: #fff;
115   width: 500px;
116   min-width: 400px;
117   margin: 30px auto;
118   text-align: center;
119   padding: 20px 0 0 0;
120   border-radius: 4px;
121   box-shadow: 0px 30px 50px 0px rgba(0, 0, 0, 0.2);
122 }
123 #prediction-form-wrap{
124   margin-top: 10vh;
125   margin-bottom: 10vh;
126   width: 300px;
127 }
128 h1{
129   color: #888b86;
130   text-decoration: underline;
131   text-decoration-color: #d3c611;
132   text-align: center;
133   line-height: 10vh;
```

```
134     margin-top: 1vh;
135     margin-bottom: 21.5vh;
136     text-underline-offset: 10px;
137 }
138 footer{
139     position: relative;
140     background-color: #333333;
141     color: #ffff;
142     width: 100%;
143     bottom: 0;
144     left:0;
145     right:0;
146     height: 10vh;
147     padding-top:1vh;
148 }
149 .footer-content p{
150     font-size:15px;
151     color: #f5f7fa;
152     margin-top: 2vh;
153 }
154 .footer-content ul{
155     list-style: none;
156     display: flex;
157     align-items: center;
158     justify-content: center;
159     margin: 1rem 0 3rem 0;
160 }
161 .footer-content li{
162     margin: 0 10px;
163 }
164
165 #register-form,#login-form,#prediction-form {
166     padding: 0 60px;
167 }
168
169 input {
170     display: block;
171     box-sizing: border-box;
172     width: 100%;
173     outline: none;
```

```
174     margin-top: 2vh;
175     margin-bottom: 1vh;
176     height: 60px;
177     line-height: 60px;
178     border-radius: 4px;
179 }
180
181 input[type="text"],
182 input[type="password"],
183 input[type="email"] {
184     width: 100%;
185     padding: 0 0 0 10px;
186     margin: 1vh;
187     color: #8a8b8e;
188     border: 1px solid #c2c0ca;
189     font-style: normal;
190     font-size: 16px;
191     -webkit-appearance: none;
192     -moz-appearance: none;
193     appearance: none;
194     position: relative;
195     display: inline-block;
196     background: none;
197 }
198 input[type="text"]:focus,
199 input[type="password"]:focus,
200 input[type="email"]:focus {
201     border-color: #3ca9e2;
202 }
203 input[type="text"]:focus:invalid,
204 input[type="password"]:focus:invalid,
205 input[type="email"]:focus:invalid {
206     color: #cc1e2b;
207     border-color: #cc1e2b;
208 }
209 input[type="text"]:valid ~ .validation,
210 input[type="password"]:valid ~ .validation,
211 input[type="email"]:valid ~ .validation {
212     display: block;
213     border-color: #0c0;
```

```
214 }
215 input[type="text"]:valid ~ .validation span,
216 input[type="password"]:valid ~ .validation span,
217 input[type="email"]:valid ~ .validation span {
218     background: #0C0;
219     position: absolute;
220     border-radius: 6px;
221 }
222 input[type="text"]:valid ~ .validation span:first-child,
223 input[type="password"]:valid ~ .validation span:first-child,
224 input[type="email"]:valid ~ .validation span:first-child {
225     top: 30px;
226     left: 14px;
227     width: 20px;
228     height: 3px;
229     -webkit-transform: rotate(-45deg);
230     transform: rotate(-45deg);
231 }
232 input[type="text"]:valid ~ .validation span:last-child,
233 input[type="email"]:valid ~ .validation span:last-child,
234 input[type="password"]:valid ~ .validation span:last-child {
235     top: 35px;
236     left: 8px;
237     width: 11px;
238     height: 3px;
239     -webkit-transform: rotate(45deg);
240     transform: rotate(45deg);
241 }
242
243 .validation {
244     display: none;
245     position: absolute;
246     content: " ";
247     height: 60px;
248     width: 30px;
249     right: 15px;
250     top: 0px;
251 }
252
253 input[type="submit"] {
```

```

254 border: none;
255 display: block;
256 background-color: #0A0A0A;
257 color: #fff;
258 font-weight: bold;
259 text-transform: uppercase;
260 cursor: pointer;
261 -webkit-transition: all 0.2s ease;
262 transition: all 0.2s ease;
263 font-size: 18px;
264 position: relative;
265 display: inline-block;
266 cursor: pointer;
267 text-align: center;
268 }
269 input[type="submit"]:hover {
270 background-color: #329dd5;
271 -webkit-transition: all 0.2s ease;
272 transition: all 0.2s ease;
273 }
274
275 #already {
276 background-color: #eedf1;
277 color: #8a8b8e;
278 font-size: 14px;
279 margin-top: 2vh;
280 width: 100%;
281 padding: 10px 0;
282 border-radius: 0 0 4px 4px;
283 }

```

Style.css

```

1 * {
2 margin: 0;
3 padding: 0;
4 box-sizing: border-box;
5 }
6 body {
7 font-family: Verdana;

```

```
8 }
9 a {
10 text-decoration: none;
11 }
12 li {
13 list-style: none;
14 }
15 h1{
16     color: #888b86;
17     text-decoration: underline;
18     text-decoration-color: #d3c611;
19     text-align: center;
20     margin-top: 4vh;
21     text-underline-offset: 10px;
22 }
23 p{
24     margin: 10vh 5vh 2vh 5vh;
25     text-align:center;
26     font-size: 20px;
27     line-height: 5vh;
28 }
29 footer{
30     position: absolute;
31     background-color: #333333;
32     color: #ffff;
33     width: 100vw;
34     bottom: 0;
35     left:0;
36     right:0;
37     height: 10vh;
38     padding-top:1vh;
39 }
40 .footer-content p{
41     float: left;
42     font-size:15px;
43     margin:0 0 0 10vw;
44     color: #f5f7fa;
45 }
46 .footer-content ul{
47     list-style: none;
```

```
48     display: flex;
49     align-items: center;
50     justify-content: center;
51     margin: 1rem 0 3rem 0;
52 }
53 .footer-content li{
54     margin: 0 10px;
55 }
56
57 .navbar {
58     display: flex;
59     align-items: center;
60     justify-content: space-between;
61     padding: 10px;
62     height: 15vh;
63     background-color: #333333;
64     color: #fff;
65 }
66 .nav-links a {
67     color: #edefec;
68 }
69 /* LOGO */
70 .logo {
71     font-size: 22px;
72     font-weight: 600;
73 }
74 /* NAVBAR MENU */
75 .menu {
76     display: flex;
77     gap: .1em;
78     font-size: 15px;
79 }
80 .menu li:hover {
81     background-color: #4c9e9e;
82     border-radius: 5px;
83     transition: 0.3s ease;
84 }
85 .menu li {
86     padding: 3px 10px;
87 }
```



```
88 input[type=checkbox]{
89   display: none;
90 }
91 /*HAMBURGER MENU*/
92 .hamburger {
93   display: none;
94   font-size: 24px;
95   user-select: none;
96 }
97 /* APPLYING MEDIA QUERIES */
98 @media (max-width: 768px) {
99   .menu {
100     display:none;
101     position: absolute;
102     background-color:#333333;
103     right: 0;
104     left: 0;
105     text-align: center;
106     padding: 16px 0;
107   }
108   .menu li:hover {
109     display: inline-block;
110     background-color:#4c9e9e;
111     transition: 0.3s ease;
112   }
113   .menu li + li {
114     margin-top: 12px;
115   }
116   input[type=checkbox]:checked ~ .menu{
117     display: block;
118   }
119   .hamburger {
120     display: block;
121   }
122 }
123 .Logout h2,h3{
124     text-align: center;
125     margin-top: 5vh;
126 }
127 .Logout h3{
```

```

128     color: green;
129 }
130 .Logout a{
131     background: #0A0A0A;
132     background-image: -webkit-linear-gradient(top, #0A0A0A,
133         #2D3036);
134     background-image: -moz-linear-gradient(top, #0A0A0A,
135         #2D3036);
136     background-image: -ms-linear-gradient(top, #0A0A0A,
137         #2D3036);
138     background-image: -o-linear-gradient(top, #0A0A0A,
139         #2D3036);
140     background-image: -webkit-gradient(to bottom, #0A0A0A,
141         #2D3036);
142     -webkit-border-radius: 20px;
143     -moz-border-radius: 20px;
144     border-radius: 20px;
145     color: #FFFFFF;
146     font-family: Times New Roman;
147     font-size: 39px;
148     margin:5vh 35vw;
149     font-weight: 100;
150     padding: 10px;
151     -webkit-box-shadow: 1px 1px 20px 0 #000000;
152     -moz-box-shadow: 1px 1px 20px 0 #000000;
153     box-shadow: 1px 1px 20px 0 #000000;
154     text-decoration: none;
155     display: block;
156     cursor: pointer;
157     text-align: center;
158 }

```

App.py

```

1 import re
2 import numpy as np
3 import os
4 from flask import Flask,
5     app,request,render_template,redirect,url_for,session
6 from tensorflow.keras import models

```

```

6 from tensorflow.keras.models import load_model
7 from tensorflow.keras.preprocessing import image
8 from tensorflow.python.ops.gen_array_ops import concat
9 from tensorflow.keras.applications.inception_v3 import
  preprocess_input
10 import requests
11 from cloudant.client import Cloudant
12
13 model1=load_model('./Model/body.h5')
14 model2 = load_model('./Model/level.h5')
15 app=Flask(__name__)
16 client = Cloudant.iam("c059a4ef-8c13-4d65-bc33-da592b41838a-
  bluemix", "511lW2p85eY0cZqJRC5srXUULERV69Ru9z9UxM4lwngE",
  connect=True)
17 my_database=client.create_database('my_database')
18 app.secret_key = 'Nothing'
19
20 @app.route('/')
21 def index():
22     return render_template('index.html')
23 @app.route('/index.html/')
24 def home():
25     return render_template('index.html')
26
27 @app.route('/register/', methods=["GET","POST"])
28 def register():
29     return render_template('register.html')
30
31 @app.route('/afterreg/', methods=["GET","POST"])
32 def afterreg():
33     x=[x for x in request.form.values()]
34     print(x)
35     data={
36         '_id':x[1],
37         'name':x[0],
38         'psw':x[2]
39     }
40     print(data)
41     query={'_id':{'$eq': data['_id']}}
42     docs= my_database.get_query_result(query)

```

```

43     print(docs)
44     print(len(docs.all()))
45     if(len(docs.all())==0):
46         url=my_database.create_document(data)
47         return render_template('register.html',
48             errors="Registration Successful, Please Login")
49     else:
50         return render_template('register.html', errors="Your
51             Account already exist, Please Login Using that")
52
53 @app.route('/login/',methods=["GET","POST"])
54 def login():
55     if('user' in session):
56         return render_template('prediction.html')
57     else:
58         return render_template('login.html')
59
60 @app.route('/afterlogin/', methods=["GET", "POST"])
61 def afterlogin():
62     user=request.form['_id']
63     passw=request.form['psw']
64     print(user,passw)
65     query={'_id':{'$eq':user}}
66     docs=my_database.get_query_result(query)
67     print(docs)
68     print(len(docs.all()))
69     if(len(docs.all())==0):
70         return render_template('login.html', errors="Username not
71             found")
72     else:
73         if((user==docs[0][0]['_id'] and
74             passw==docs[0][0]['psw'])):
75             session['user'] = user
76             return redirect(url_for('prediction'))
77         else:
78             return render_template('login.html', errors="Wrong
79                 Credentials.")
80
81 @app.route('/logout/')

```

```

78 def logout():
79     session.pop('user')
80     return render_template('logout.html')
81
82 @app.route('/prediction/')
83 def prediction():
84     if('user' in session):
85         return render_template('prediction.html')
86     else:
87         return render_template('login.html')
88
89 @app.route('/result/', methods=["GET", "POST"])
90 def res():
91     if request.method=="POST":
92         f=request.files['file']
93         basepath=os.path.dirname(__file__)
94         filepath=os.path.join(basepath,"hello.jpg")
95         f.save(filepath)
96
97         img=image.load_img(filepath,target_size=(224,224))
98         x=image.img_to_array(img)
99         x=np.expand_dims(x,axis=0)
100         img_data=preprocess_input(x)
101         prediction1=np.argmax(model1.predict(img_data))
102         prediction2=np.argmax(model2.predict(img_data))
103         index1=['Front','Rear','Side']
104         index2=['Minor','Moderate','Severe']
105         result1=index1[prediction1]
106         result2=index2[prediction2]
107         if(result1=="Front" and result2=="Minor"):
108             value="3000 - 5000 INR"
109         elif(result1 == "Front" and result2 == "Moderate"):
110             value = "6000 - 8000 INR"
111         elif(result1 == "Front" and result2 == "Severe"):
112             value = "9000 - 11000 INR"
113         elif(result1 == "Rear" and result2 == "Minor"):
114             value = "4000 - 6000 INR"
115         elif(result1 == "Rear" and result2 == "Moderate"):
116             value = "7000 - 9000 INR"
117         elif(result1 == "Rear" and result2 == "Severe"):

```

```

118         value = "11000 - 13000 INR"
119     elif(result1 == "Side" and result2 == "Minor"):
120         value = "6000 - 8000 INR"
121     elif(result1 == "Side" and result2 == "Moderate"):
122         value = "9000 - 11000 INR"
123     elif(result1 == "Side" and result2 == "Severe"):
124         value = "12000 - 15000 INR"
125     else:
126         value="16000 - 50000 INR"
127     return
    render_template('prediction.html',prediction=value,damage=result2
,area=result1)
128
129
130 if __name__ == "__main__":
131     app.run()

```

GITHUB & PROJECT DEMO LINK

GITHUB LINK:<https://github.com/IBM-EPBL/IBM-Project-12627-1659455519>

DEMO VIDEO LINK : <https://drive.google.com/file/d/1drgty-pPPMCTYYGO29dd6rdqQc8d6S0I/view?usp=sharing>