ABSTRACT

Analysis of the damaged vehicle that can be automatically claiming insurance that takes human resource, time and effort. Image processing and machine learning techniques are analyzing the vehicle damage in the proposed solution. In Advanced solution helps to speed up the claiming process sufficiently. Consider a situation, if a person is driving a car, they met an accident the vehicle owner can take a few photos of the damaged car from a mobile phone that can be send to the insurance company and can just upload the photos to the system. The system can analyze the damage, severity of the damage as well as location of the damage. In this proposed project the insurance company can machine-driven the car damage analysis process without the need for humans to analyze the damage done to the car. Therefore, it is a very challenging task for quality of computer vision techniques and also Machine learning technologies.

Keywords: - Car Damage Detection, Prediction, Deep Learning, Machine learning, CNN, VGG16

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ABBREVIATIONS

HTML   -   **Hypertext Markup Language**

CSS   -   **Cascading Style Sheets**

SQL   -   **Structured Query Language**

HTTP   -   **Hypertext Transfer Protocol**

DDL   -   **Data Definition Languag**

CNN   -   **Convolutional Neural Networks**

BPNN   -   **Back Propagation in Neural Network**

UAT   -   **User Acceptance Testing**

CHAPTER 1
INTRODUCTION

1.1 PROJECT OVERVIEW

In today's world, it can observe that the number of vehicles we use is quickly expanding; let's agree that there isn't a single street without a car. As a result, an increase in the number of automobiles on the road may lead to an increase in the percentage of accidents occurring nearby; additionally, the number of accidents occurring nearby would be significant; the accidents would not be particularly serious, but the automobile would be damaged, prompting people to file insurance claims.

The whole idea focuses on this question: how can a customer claim insurance more quickly? To keep the procedure quiet, a machine learning model is developed that utilizes image processing to categorize the photographs and calculate the percentage of damage to the car.

The user will be able to get payment based on the model's outcomes. Because the ML model would be exclusively responsible for this procedure, it would be faster than the manual approach. Analyze the damage in a fraction of the time it takes people and with minimal human interaction.

1.2 PURPOSE

Today's world is seeing a substantial increase in automobiles. Because there are more automobiles on the road and more people are driving them at high speeds, accidents happen more frequently. When an accident happens, the parties involved submit a claim with their auto insurance to obtain the money needed to repair the vehicle since, according to false claims, the company acts inappropriately and withholds payments.

CHAPTER 2
LITERATURE SURVEY

2.1 EXISTING PROBLEM

In this literature survey several methods have been proposed for detection of car damage.

Srimal proposed a solution which uses 3D Computer Aided Design for the discernment of car damage from the picture, the system only detect damage at edge portion only. Detection of the car damage through CAD software requires some knowledge about the software.

S Gontscharov, the proposed system designed by using YOLO (you only look once) algorithmto detect the car damage, Here the multi sensor data fusion technique is allows to locate the portion of damage more accurately and performs detection faster compared to other algorithms which is fully automatic and doesn't require much human intervention.

Phyu Mar Kyu, the proposed system uses deep learning-based algorithm are VGG16 and VGG19 damaged car detection in the real world. This algorithm notices the severity of the damaged car based on the location. Finally, the author concludes that L2 regularization work greater.

Girish N, the proposed system uses vehicle damage detection technique depends on transfer learning and mask RCNN, the mask regional convolution neural network determines a damaged car by its position and estimate the depth of the damage.

A Neela Madheswari, the proposed system uses convolution neural network is use to accept that image contains a car damage or not. It takes as great opportunities to attempt by classifying the car damage into different classes.

2.2 REFERENCES

[1]. 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.

[2]. 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.

[3]. 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.

[4]. S. Jayawardena, Image based automatic vehicle damage detection. PhD thesis, College of Engineering and Computer Science (CECS), 12 2013.

[5]. S. Gontscharov, H Baumgartel, A.Kneifel, and K.-L. Krieger, Algorithm development for minor damage identification in vehicle bodies using adaptive sensor data processing," Procedia Technology, vol. 15, pp. 586 594, 2014. 2nd International Conference on System-Integrated Intelligence: Challenges for Product and Production Engineering.

[6]. Y.J. Cha, J. Chen, and O. B''uy''uk''ozt''urk, Output-only computer visionbased damage detection using phase-based optical flow and unscented kalman lters," Engineering Structures, vol. 132, pp. 300, {313, 2017

2.3 PROBLEM STATEMENT DEFINITION

In existing system, the procedure of making an insurance claim for an automobile is laborious, and there is a delay before the first reimbursement is authorised. Insurance firms lose millions of dollars each year due to claim leakage as a result of the expansion of the vehicle sector and the daily rise in the number of accidents. 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.

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Company agent	Check vehicle parts with good price	It is difficult to identify the price of every part	There is no all brands and parts on the site	Uncomfortable to give insurance to the user
PS-2	Insurance Holder	Claim insurance for my accidental car	I'm facing defaulting to give a proper bill to the company	Site has not all the brand and spare part	In problem

Fig No :2.1

CHAPTER 3
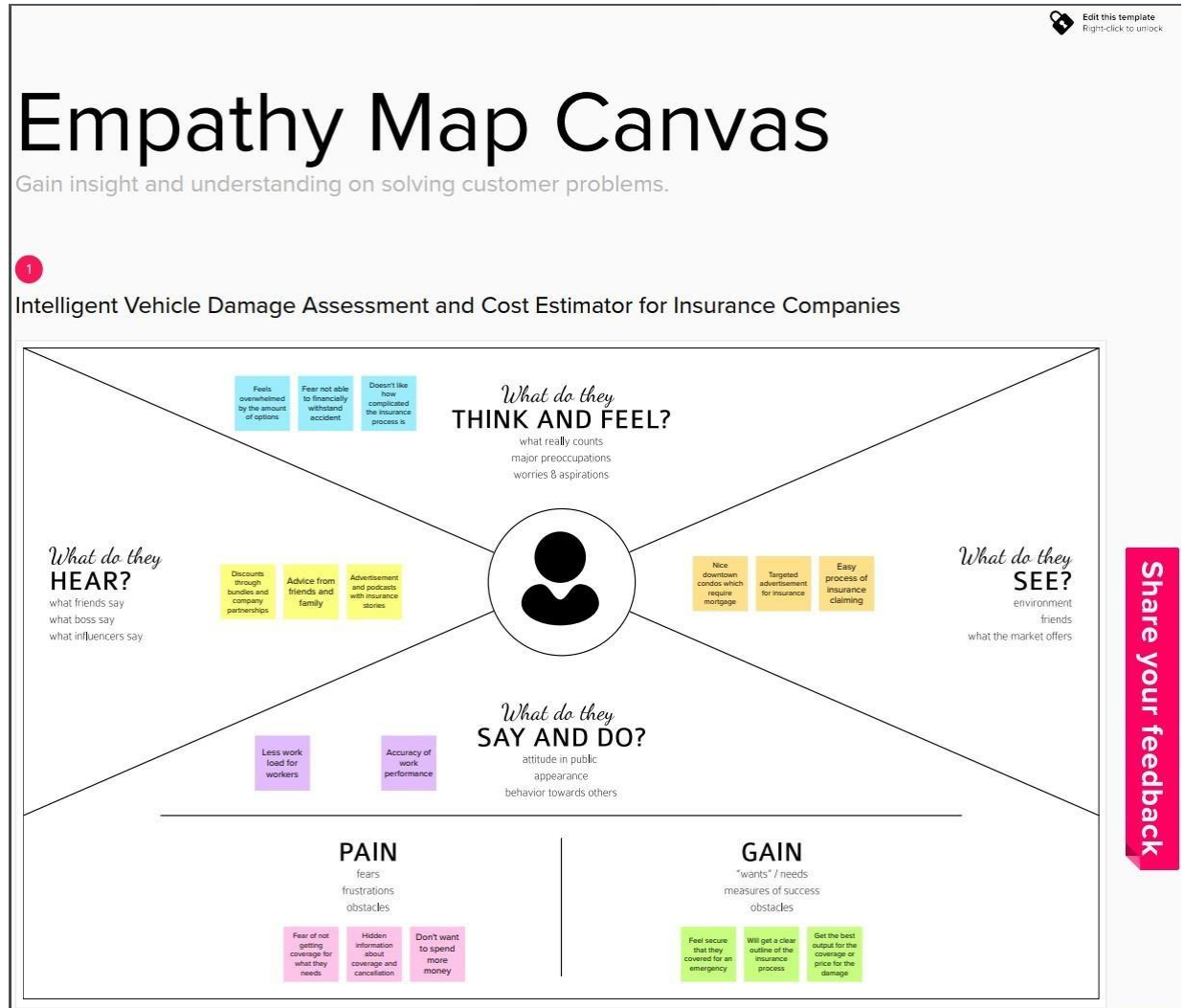# IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS

Fig No: 3.1

3.3 PROPOSED SOLUTION

The proposed approach collects photographs of a person's damaged automobile, then utilizes those images as input for a deep learning model that use image processing to recognize the elements of the image and determine the percentage of the vehicles'' damage. After then, the images are separated into two groups: replace and repair. When the damage percentage is less than 80, the damaged part must be replaced; however, in the other case, the compensation amount is set depending on the damage percentage. Finally, it generates a comprehensive analysis report on the vehicle that is used to ask the insurance company for payment.

S.no	Parameter	Description
1	Problem Statement (Problem to be solved)	Insurance firms frequently losses because they are unable to accurately estimate the cost of damaged automobiles and they are unable to calculate the cost of damaged cars precisely. insurance companies regularly incurred losses.
2	Idea/Solution description	Car damage is automatically identified and classified using Deep Learning and pattern recognition technology.
3	Novelty/Uniqueness	Automated calculator for the cost of filing an insurance claim.
4	Social Impact/Customer Satisfaction	Vehicle's damage analysis used to get compensation, submit the created report and Process that saves time and money.
5	Business Model (Revenue Model)	The Proposed method was implemented using the Convolutional Neural Network feature extraction and damage detection/localization than pre-trained model VGG16.
6	Scalability of the Solution	It can be used by insurance companies for faster processing of claims and can also be used to underwriting a car loan, especially for a used car.

3.4 PROBLEM SOLUTION FIT

There is no systematic approach to receive a rapid answer from an insurance company. A week of waiting is required. The proposed solution should enable consumers to contact with the insurance provider and receive payments both online and offline. After uploading the damaged image and determining the extent of the damage, the user may obtain insurance only if the company approves the damaged image and the condition is more than 80%.
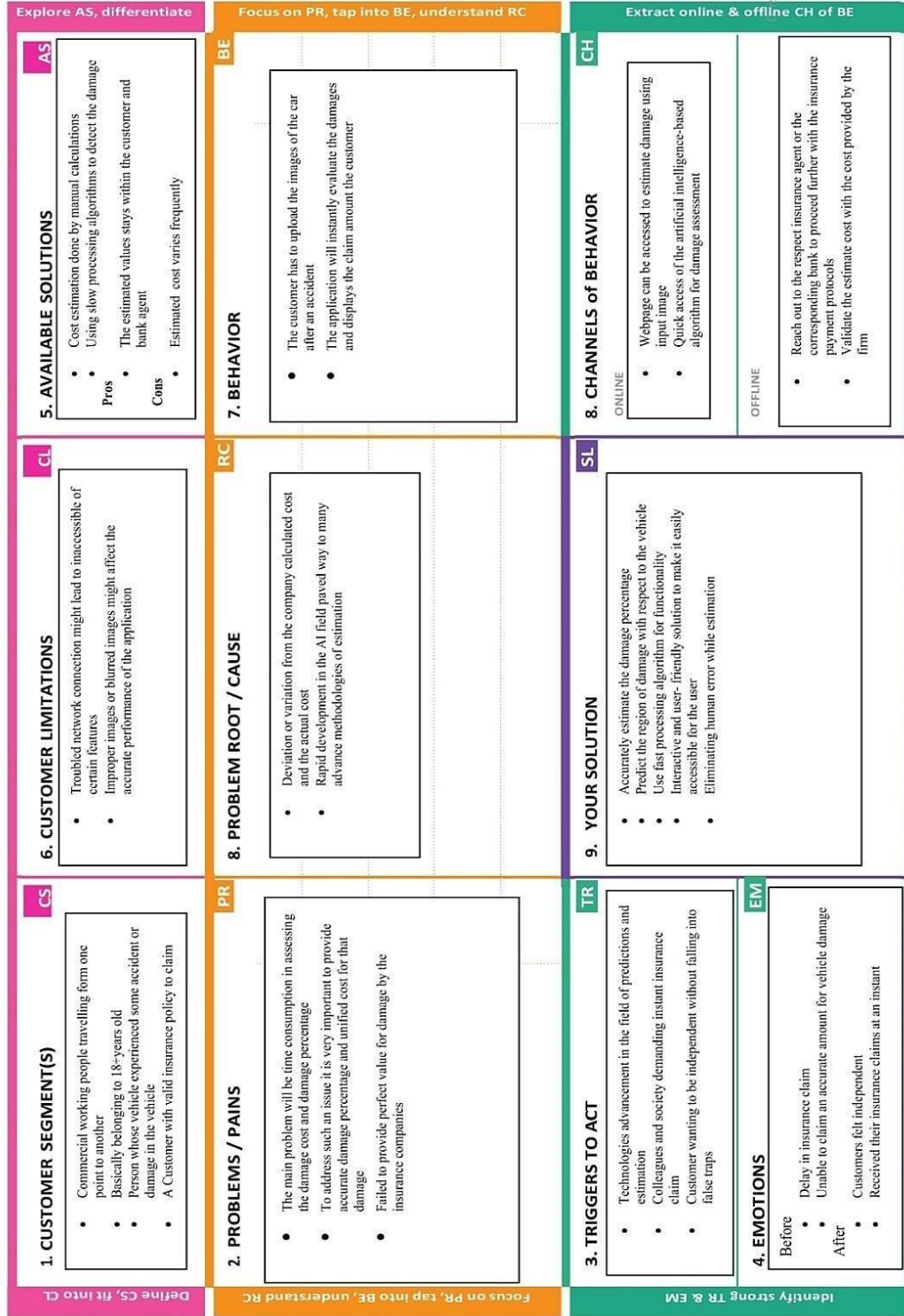
Project Design Phase – I Solution Fit Template   Team ID: PNT2022TMID26786

Project Title: Intelligent vehicle damage assessment and Cost Estimator for Insurance Companies

1. CUSTOMER SEGMENT(S) — CS
- Commercial working people travelling form one point to another
- Basically belonging to 18+years old
- Person whose vehicle experienced some accident or damage in the vehicle
- A Customer with valid insurance policy to claim

6. CUSTOMER LIMITATIONS — CL
- Troubled network connection might lead to inaccessible of certain features
- Improper images or blurred images might affect the accurate performance of the application

5. AVAILABLE SOLUTIONS — AS
- Cost estimation done by manual calculations
- Using slow processing algorithms to detect the damage

Pros
- The estimated values stays within the customer and bank agent

Cons
- Estimated cost varies frequently

2. PROBLEMS / PAINS — PR
- The main problem will be time consumption in assessing the damage cost and damage percentage
- To address such an issue it is very important to provide accurate damage percentage and unified cost for that damage
- Failed to provide perfect value for damage by the insurance companies

8. PROBLEM ROOT / CAUSE — RC
- Deviation or variation from the company calculated cost and the actual cost
- Rapid development in the AI field paved way to many advance methodologies of estimation

7. BEHAVIOR — BE
- The customer has to upload the images of the car after an accident
- The application will instantly evaluate the damages and displays the claim amount the customer

3. TRIGGERS TO ACT — TR
- Technologies advancement in the field of predictions and estimation
- Colleagues and society demanding instant insurance claim
- Customer wanting to be independent without falling into false traps

9. YOUR SOLUTION — SL
- Accurately estimate the damage percentage
- Predict the region of damage with respect to the vehicle
- Use fast processing algorithm for functionality
- Interactive and user-friendly solution to make it easily accessible for the user
- Eliminating human error while estimation

8. CHANNELS of BEHAVIOR — CH

ONLINE
- Webpage can be accessed to estimate damage using input image
- Quick access of the artificial intelligence-based algorithm for damage assessment

OFFLINE
- Reach out to the respect insurance agent or the corresponding bank to proceed further with the insurance payment protocols
- Validate the estimate cost with the cost provided by the firm

4. EMOTIONS — EM

Before
- Delay in insurance claim
- Unable to claim an accurate amount for vehicle damage

After
- Customers felt independent
- Received their insurance claims at an instant

Fig No: 3.2

CHAPTER 4
REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT

Fr.no	Functional requirements	Sub Requirements
FR-1	User Registration	Registration through Form Registration through Gmail Registration through Linked IN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User details	Users are required to register their personal details. like name, age, date of birth, driving license, car number etc.
FR-4	User requirements	The user simply inputs vehicle damage images. The software will instantly generate an accurate reading of the based on the image detection analysis in a readable format familiar to the customer. It compares the information already given and states the defect percentage and cost in that vehicle damage image.

4.2 NON-FUNCTIONAL REQUIREMENT

S.no	Non-Functional requirements	Description
1	Usability	More efficient for the frequent users, users can easily understand what the application does and feel satisfied with the system.
2	Security	• Al powered vehicle damage assessment and cost estimator for insurance company should contain more security in which our data which entered or maintained should be more security. • With the help of the username and password it provides more security in which It can access more securable and the data are private.
3	Reliability	This application must perform without failure in 90 percent of use cases during a month ,it is more reliable.
4	Performance	This application supporting 1,050 users per hour must provide 5 seconds or less response time in a desktop browser, including the rendering of text and images, over an LTE connection. The performance of this application is effective and efficient.
5	Availability	The web dashboard must be available to user's 99.9 percent of the time every month during business hours EST. Users can access anytime and anywhere.
6	Scalability	The application must be scalable enough to support 10,000 visits at the same time while maintaining optimal performance and efficient to retrieve image in large scale thus improving scalability.

CHAPTER 5
PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS

A two-dimensional diagram explains how data is processed and transferred in a system. The graphical depiction identifies each source of data and how it interacts with other data sources to reach a common output. Individuals seeking to draft a data flow diagram must identify external inputs and outputs, determine how the inputs and outputs relate to each other, and explain with graphics how these connections relate and what they result in. This type of diagram helps business development and design teams visualize how data is processed and identify or improve certain aspects.

LEVEL 0

The Level 0 DFD shows how the system is divided into 'sub-systems' (processes), each of which deals with one or more of the data flows to or from an external agent, and which together provide all of the functionality of the system as a whole. It also identifies internal data stores that must be present in order for the system to do its job, and shows the flow of data between the various parts of the system.
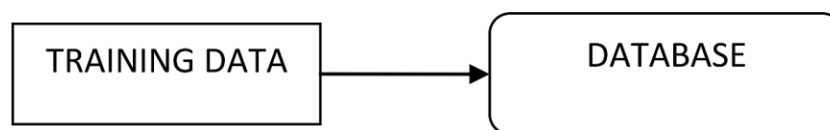
TRAINING DATA → DATABASE

Fig No: 5.1

LEVEL 1

The next stage is to create the Level 1 Data Flow Diagram. This highlights the main functions carried out by the system. As a rule, to describe the system was using between two and seven functions - two being a simple system and seven being a complicated system. This enables us to keep the model manageable on screen or paper.
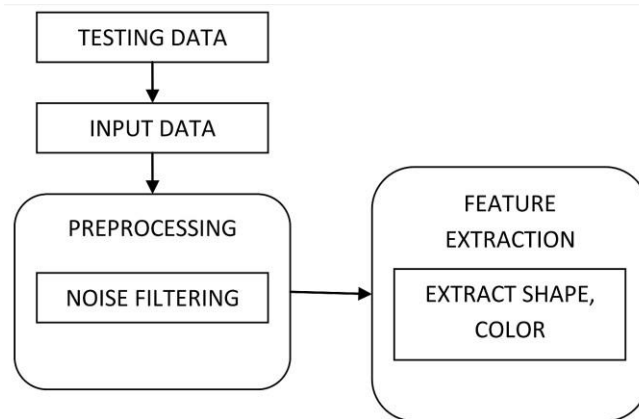
```
┌─────────────────────┐
│    TESTING DATA     │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│     INPUT DATA      │
└─────────────────────┘
          │
          ▼
╭──────────────────────╮        ╭──────────────────────╮
│     PREPROCESSING    │        │       FEATURE        │
│                      │        │      EXTRACTION      │
│ ┌──────────────────┐ │        │ ┌──────────────────┐ │
│ │  NOISE FILTERING │─┼───────▶│ │  EXTRACT SHAPE,  │ │
│ └──────────────────┘ │        │ │      COLOR       │ │
│                      │        │ └──────────────────┘ │
╰──────────────────────╯        ╰──────────────────────╯
```

Fig No: 5.2

LEVEL 2

A Data Flow Diagram (DFD) tracks processes and their data paths within the business or system boundary under investigation. A DFD defines each domain boundary and illustrates the logical movement and transformation of data within the defined boundary. The diagram shows 'what' input data enters the domain, 'what' logical processes the domain applies to that data, and 'what' output data leaves the domain. Essentially, a DFD is a tool for process modelling and one of the oldest.
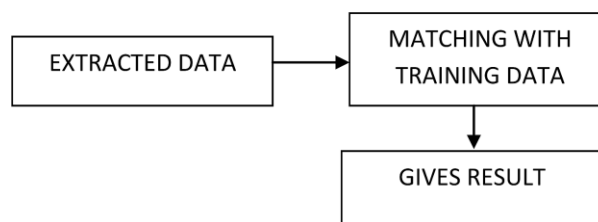
```
┌─────────────────────┐      ┌─────────────────────┐
│   EXTRACTED DATA    │─────▶│   MATCHING WITH     │
│                     │      │   TRAINING DATA     │
└─────────────────────┘      └─────────────────────┘
                                       │
                                       ▼
                             ┌─────────────────────┐
                             │    GIVES RESULT     │
                             └─────────────────────┘
```

Fig No: 5.3

5.2 SOLUTION & TECHNICAL ARCHITECTURE
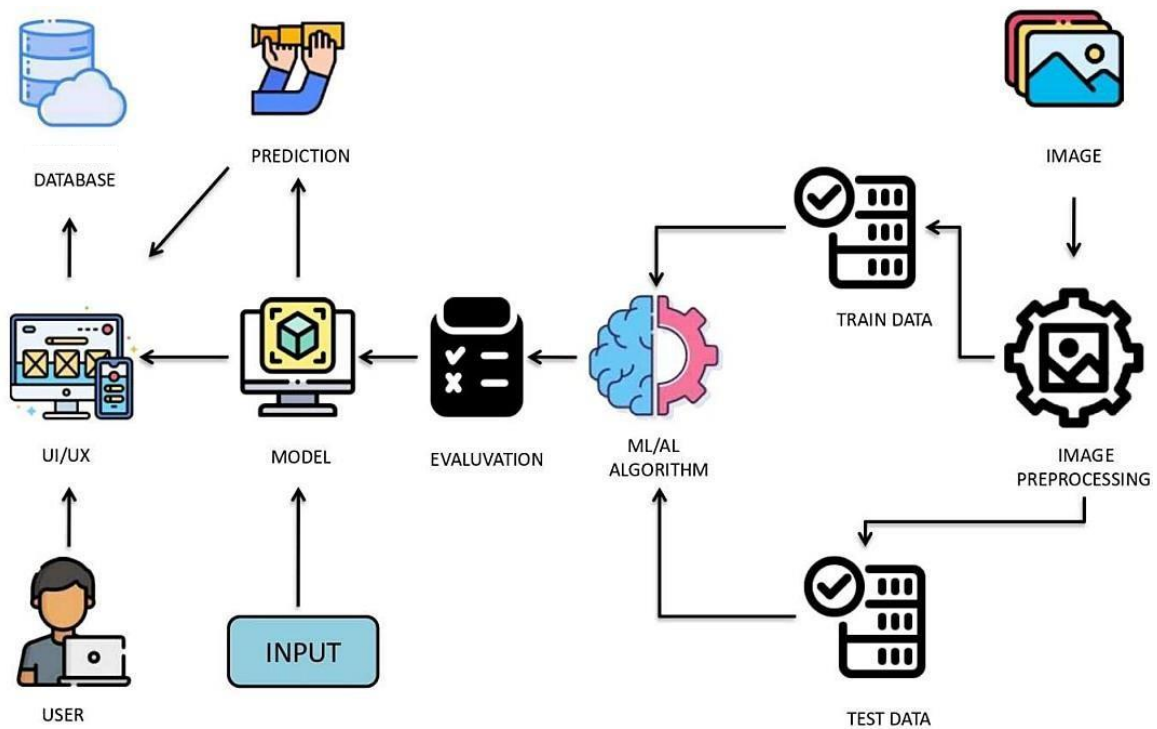

Fig No: 5.4

5.3 FLOW CHART
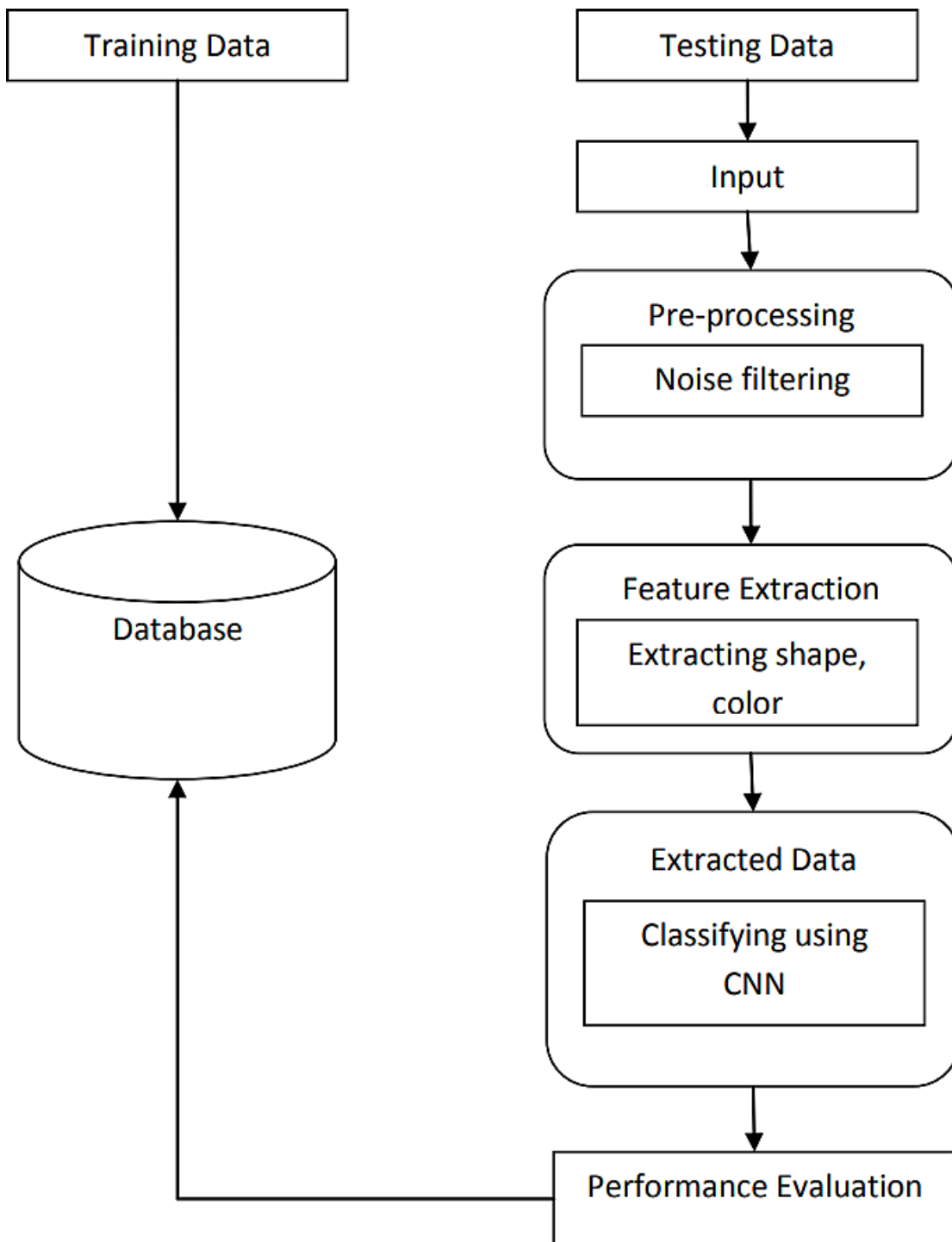

Fig No: 5.5

CHAPTER 6

MODULES

6.1 USER LOGIN

The Login Module is a portal module that allows users to type a user name and password to log in. You can add this module on any module tab to allow users to log in to the system. If you allow users to create accounts and turn on Portal Direct Entry, a Create Account link appears in the Login Module. It is a set of credentials used to authenticate a user. Most often, these consist of a username and password. However, a login may include other information, such as a PIN number, passcode, or passphrase.

6.2 UPLOAD IMAGE

Upload an image in this site using a web hosting service's file-upload program. An upload image module is a software component that allows users to upload images to a website or application. A module where users can upload their vehicle damaged images.

The following steps are used to upload an image :

- Click the upload image button
- Select the damaged car images
- iii. Click the submit button

6.3 DAMAGE ANALYSIS

Damage analysis use machine learning techniques are analyzing the vehicle damage and To keep the procedure quiet, a machine learning model is developed that utilizes image processing to categorize the photographs and calculate the percentage of damage to the car. Car damage is automatically identified and classified using Deep Learning and pattern recognition technology.

6.4 COST ESTIMATION

The user will be able to get payment based on the model's outcomes, it generates a comprehensive analysis report on the vehicle that is used to ask the insurance company for payment. Automated calculator for the cost of filing an insurance claim . Vehicle's damage analysis used to get compensation, submit the created report and Process that saves time and money.

CHAPTER 7
TESTING

7.1 TEST CASES

A test case has components that describe input, action and an expected response, in order to determine if a feature of an application is working correctly. A test case is a set of instructions on "HOW" to validate a particular test objective/target, which when followed will tell us if the expectedbehavior of the system is satisfied or not. Characteristics of a good test case:

- Accurate: Exacts the purpose.

- Economical: No unnecessary steps or words.

- Traceable: Capable of being traced to requirements.

- Repeatable: Can be used to perform the test over and over.

- Reusable: Can be reused if necessary.

S no.	Scenario	Input	Excepted output	Actual output
1	User login	User name and password	Login	Login success.
2	Upload Image	Upload damaged vehicle image as a input	Detecting object and analyze for claim insurance	Details are stored in a database.

7.2 USER ACCEPTANCE TESTING

This sort of testing is carried out by users, clients, or other authorised bodies to identify the requirements and operational procedures of an application or piece of software. The most crucial stage of testing is acceptance testing since it determines whether or not the customer will accept the application or programme. It could entail the application's U.I., performance, usability, and usefulness. It is also referred to as end-user testing, operational acceptance testing, and user acceptance testing (UAT).

7.3 PERFORMANCE METRICS

Algorithm Accuracy Level

Fig No: 7.1

18
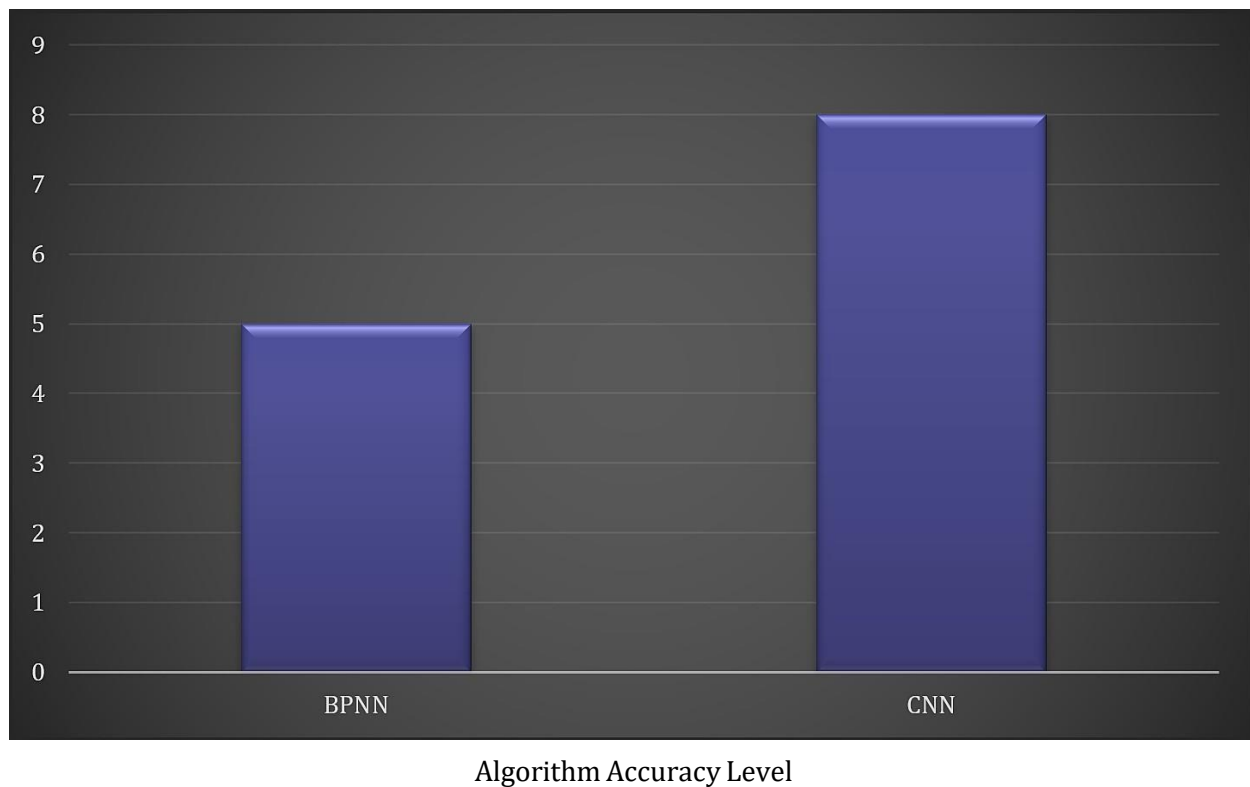
CHAPTER 8

RESULTS & OUTPUT

8.1 Feature 1
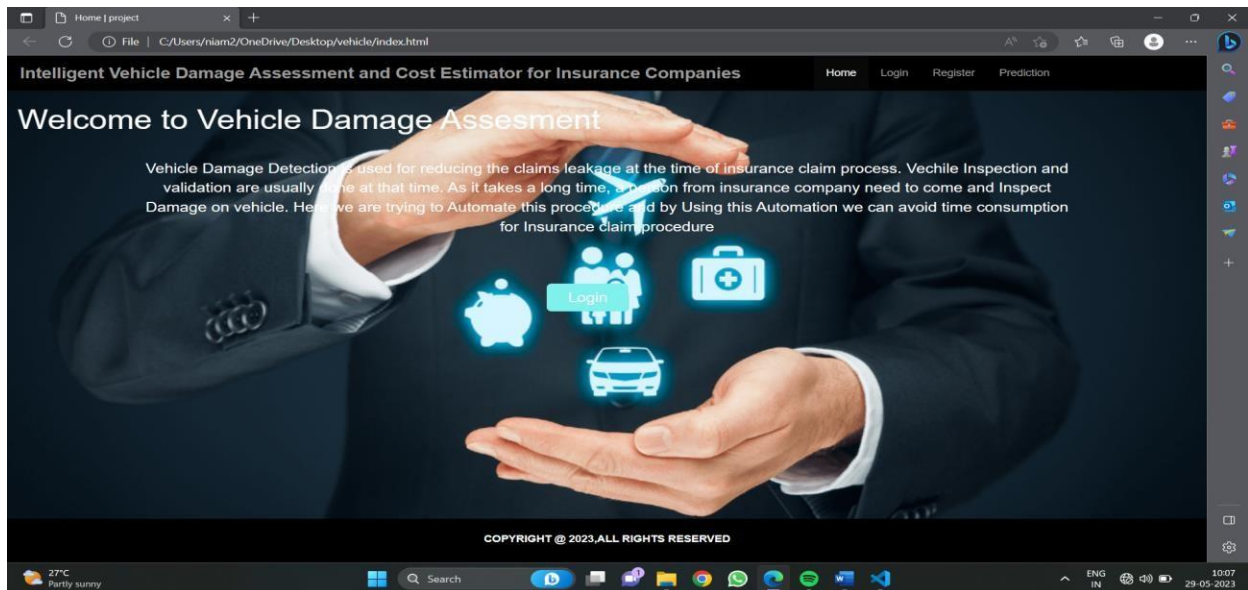
Fig No:8.1 Dashboard

Dashboard is the main page of project. User can login and they can use all the given services.
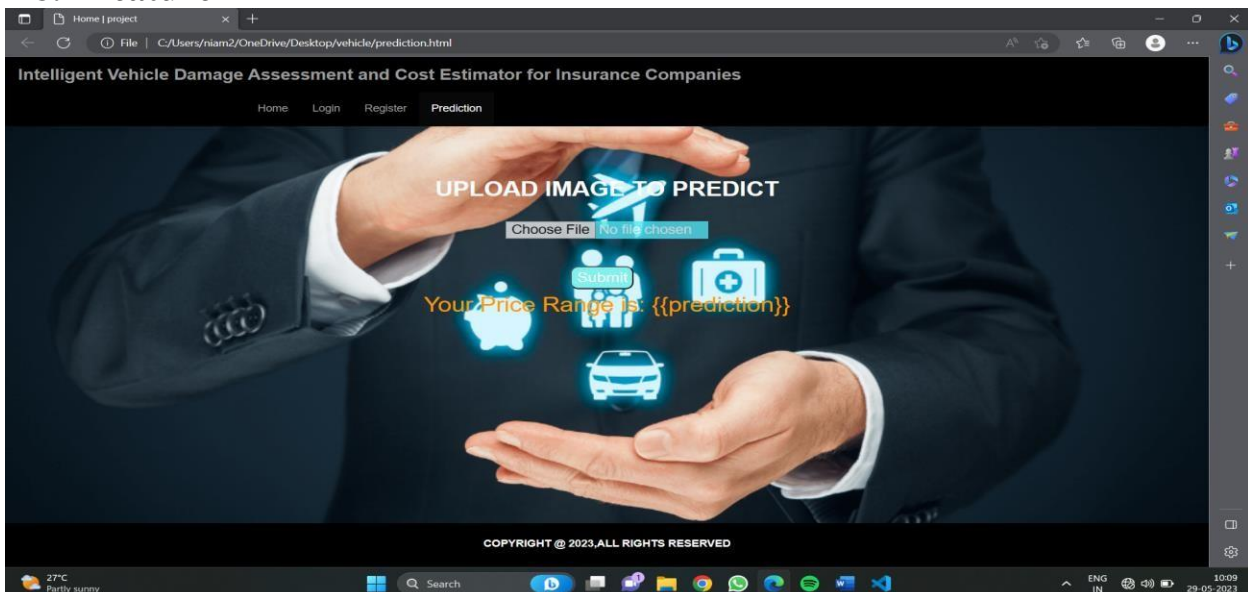
8.2 Feature 2

Fig No :8.2 Prediction page

A user can predict their cost of damage parts in car. Use also can create a bill or invoice formthis page.

8.3 Feature 3

Fig No: 8.3 Detection system

CHAPTER 9
APPENDIX

9.1 Source Code

App.py

```
import re
import numpy as np
import os
from flask import Flask, app, request, render_template
from keras import models
from keras.models import load_model
from tensorflow.keras.preprocessing import image
import PIL.Image
from tensorflow.python.ops.gen_array_ops import concat
from keras.applications.inception_v3 import preprocess_input
import requests
from flask import Flask, request, render_template, redirect, url_for
from werkzeug.utils import secure_filename


model1=load_model('C:/Users/niam2/OneDrive/Desktop/project/Flask/body.h5')
model2=load_model('C:/Users/niam2/OneDrive/Desktop/project/Flask/level.h5')


app = Flask(__name__)


@app.route('/')
def index():
    return render_template('index.html')




@app.route('/login')
def login():
    return render_template('login.html')
```

```python
@app.route('/register')
def register():
    return render_template('register.html')


@app.route('/prediction')
def prediction():
    return render_template('prediction.html')




@app.route('/afterreg', methods=['POST'])
def afterreg():
    x = [x for x in request.form.values()]
    print(x)
    data = {
        '_id': x[1],
        'name': x[0],
        'psw': x[2]
    }
    print(data)

    query = {'_id': {'$eq': data['_id']}}

    docs = my_database.get_query_result(query)
    print(docs)

    print(len(docs.all()))

    if (len(docs.all()) == 0):
        url = my_database.create_document(data)
        response = request.get(url)
        return render_template('login.html', pred="Registration Successful, Please login using your details")
    else:
        return render_template('register.html', pred="You are already a member, Please login using your details")
```

```python
@app.route('/afterlogin', methods=['POST'])
def afterlogin():
    user = request.form['_id']
    passw = request.form['psw']
    print(user, passw)

    query = {'_id': {'$eq': user}}

    docs = my_database.get_query_result(query)
    print(docs)

    print(len(docs.all()))

    if (len(docs.all()) == 0):
        return render_template('login.html', pred="The Username is not found")
    else:
        if ((user == docs[0][0]['_id'] and passw == docs[0][0]['psw'])):
            return redirect(url_for('prediction'))
        else:
            print('Invalid User')
@app.route('/logout')
def logout():
    return render_template('logout.html')
@app.route('/result', methods=['POST'])
def result():
    if request.method == "POST":
        f = request.files['image']
        basepath = os.path.dirname(_file_)
        filepath = os.path.join(basepath, 'uploads', secure_filename(f.filename))
        f.save(filepath)

        img = image.load_img(filepath, target_size=(224, 224))
        x = image.img_to_array(img)
        x = np.expand_dims(x, axis=0)
        print(img)
```

```python
        prediction1 = np.argmax(model1.predict(x))
        prediction2 = np.argmax(model2.predict(x))

        index1 = ['00-front', '01-rear', '02-side']
        index2 = ['01-minor', '02-moderate', '03-severe']

        res1 = index1[prediction1]
        res2 = index2[prediction2]
        result1=format(str(res1))
        result2=format(str(res2))

        if (result1 == "00-front" and result2 == "01-minor"):
            value = "3000 - 5000 INR"
        elif (result1 == "00-front" and result2 == "02-moderate"):
            value = "6000 - 8000 INR"
        elif (result1 == "00-front" and result2 == "03-severe"):
            value = "9000 - 11000 INR"
        elif (result1 == "01-rear" and result2 == "01-minor"):
            value = "4000 - 6000 INR"
        elif (result1 == "01-rear" and result2 == "02-moderate"):
            value = "7000 - 9000 INR"
        elif (result1 == "01-rear" and result2 == "03-severe"):
            value = "11000 - 13000 INR"
        elif (result1 == "02-side" and result2 == "01-minor"):
            value = "6000 - 8000 INR"
        elif (result1 == "02-side" and result2 == "02-moderate"):
            value = "9000 - 11000 INR"
        elif (result1 == "02-side" and result2 == "03-severe"):
            value = "12000 - 15000 INR"
        else:
            value = "16000 - 50000 INR"
        print(value)

        return render_template('prediction.html',prediction=value,image=img)
    if __name__ == "__main_":
app.run(debug=True)
```

```html
<!DOCTYPE html>
<html lang="en">
<head>
 <title>Home | project</title>
 <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/font-awesome/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>
  .container-fluid{
    background-color: #000000;
 }
 .nav.navbar-nav{
 margin-left: 75px;
 }
 .navbar-brand{
  font-size: 22px;
 }
 .footer{
 overflow: hidden;
 background-color: #000000;
 position: fixed;
 bottom: 0;
 height: 65px;
 width: 100%;
 }
 body{
  background-image: url("bg3.png");
  background-color: black;
  background-size: cover;
  background-position: center;
  background-attachment: fixed;
  background-repeat: no-repeat;

 }
 .img1 .name h3{
  font-size: 4rem;
  color: #ffffff;
  position: absolute;
  top: 10%;
  left: 25%;
  transform: translate(-50%,-50%);
  padding-left: 5px;
  font-family: "Amazon Ember",sans-serif;
```

```css
}
.btn{
  text-decoration: none;
  border-radius: 0.6rem;
  color:  #ffffff;
  padding: 5px 25px;
  border: 1px solid transparent;
  transition: 1s ease;
  font-family: "Amazon Ember",sans-serif;


}
.btn:hover{

  border-radius: 0.6rem;
  background-color:rgb(255, 111, 0);;
  color: #000000;


}
.btn:focus {
  border-color: rgb(255, 255, 255);
  box-shadow: rgba(78, 78, 78, 0.5) 0 2px 5px 0;
  outline: 0;
}
.img1 .name .btn{
  position: absolute;
  font-size: 20px;
  background-color: rgb(129, 241, 237);
  color: #ffff;
  top: 45%;
  left:45%;
  font-family: "Amazon Ember",sans-serif;


}
.img1 .name .btn:hover{
  background-color:rgb(139, 249, 245);
  color: #000000;
  transition-duration: 1s ;
}

.img1 .name span{

  color:rgb(255, 255, 255);;
}
.img1 .name p{
 font-size:2rem ;
 align-items: center;
  color: rgb(255, 255, 255);


}
```

```html
    </style>
</head>
<body >

<nav class="navbar navbar-inverse">
  <div class="container-fluid">
    <div class="navbar-header">
      <a class="navbar-brand" href="#"><b>Intelligent Vehicle Damage Assessment and Cost Estimator for
Insurance Companies</b></a>
    </div>
    <ul class="nav navbar-nav">
      <li class="active"><a href="/">Home</a></li>
      <li><a href="/login">Login</a></li>
      <li><a href="/register">Register</a></li>
      <li><a href="/prediction">Prediction</a></li>
    </ul>
  </div>
</nav><br><br><br><br>

<div class="container">
 <center>
    <section id="Home">
     <div class="img1">
      <div class="name">
        <h3>Welcome to <span>Vehicle Damage Assesment</span> </h3>
        <p >Vehicle Damage Detection is used for reducing the claims leakage at the time of insurance claim
process. Vechile Inspection and validation are usually done at that time. As it takes a long time, a person from
insurance company need to come and Inspect Damage on vehicle. Here we are trying to Automate this
procedure and by Using this Automation we can avoid time consumption for Insurance claim procedure</p>
        <a href="/login" class="btn">Login</a>

      </div>
   </div>
 </section>

 </center>
</div>
<div class="footer">

  <p style="color:white;
        margin-top: 20px;
        text-align: center;"><b>
        COPYRIGHT @ 2023,ALL RIGHTS RESERVED</b>
  </p>

 </div>

</body>
</html>
```

```
<!DOCTYPE html>
<html lang="en">
<head>
 <title>Home | project</title>
 <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/font-awesome/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>
  .container-fluid{
     background-color: #000000;
  }
 .nav.navbar-nav{
 margin-left: 180px;
 background-color: black;
 }
 .navbar-brand{
 font-size: 22px;
 }
 .footer{
 overflow: hidden;
 background-color: #000000;
 position: fixed;
 bottom: 0;
 height: 65px;
 width: 100%;
 }
 input[type=text], input[type=password] {
     width:500px;
     padding: 12px 20px;
     margin: 8px 0;
     display: inline-block;
     background-color: black;
     opacity: 65%;
     color: white;
     border: 1px solid #ccc;
     box-sizing: border-box;
     border-radius: 10px;
   }

   button {
   background-color: #04AA6D;
   color: white;
   padding: 14px 20px;
```

```
      margin: 8px 0;
      border: none;
      border-radius: 10px;
      cursor: pointer;
      width: 250px;
    }

    button:hover {
      opacity: 0.8;
    }
    .imgcontainer {
      text-align: center;
    }

    img.avatar {
      border-radius: 50%;
    }

    .ayya {
      padding: 16px;
    }
    label{
      margin-left:-400px;

    }
    .ayya  b{
       color: white;
    }



  </style>
</head>
<body style="">
  <style>
    body{
      background-image: url("bg3.png");
      background-color: black;
      background-size: cover;
      background-position: center;
      background-attachment: fixed;
      background-repeat: no-repeat;

    }
  </style>
<nav class="navbar navbar-inverse">
  <div class="container-fluid">
    <div class="navbar-header">
      <a class="navbar-brand" href="#"><b>Vehicle Damage Detaction</b></a>
```

```html
    </div>
    <ul class="nav navbar-nav">
     <li><a href="/">Home</a></li>
     <li><a href="/login">Login</a></li>
     <li class="active"><a href="/register">Register</a></li>
     <li><a href="/prediction">Prediction</a></li>
    </ul>
  </div>
</nav><br><br><br><br>

<div style="margin-top:-55px;" class="container">
    <form action="/index" method="post">
     <div class="imgcontainer">
       <img src="https://e7.pngegg.com/pngimages/799/987/png-clipart-computer-icons-avatar-icon-design-
avatar-heroes-computer-wallpaper-thumbnail.png" alt="Avatar" class="avatar" width="120px"
height="120px">
     </div>
    <center>
     <div class="ayya">
      <label for="uname"><b>Name :</b></label><br>
      <input type="text" placeholder="Enter Username" name="uname" required><br>

      <label for="psw"><b>Email id :</b></label><br>
      <input type="text" placeholder="usermail@gmail.com" name="mail" required><br>

      <label for="psw"><b>Password :</b></label><br>
      <input type="password" placeholder="Enter Password" name="psw" required><br><br>

      <button type="submit">REGISTER</button><br><br>
     </div>
   </center>
    </form>
</div>
<div class="footer">
   <p style="color:white;
        margin-top: 20px;
        text-align: center;"><b>
        COPYRIGHT @ 2023,ALL RIGHTS RESERVED</b>
   </p>

  </div>


</body>
</html>
```

Login.html

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <link rel="stylesheet" href="login.css">
    <link href='https://unpkg.com/boxicons@2.1.4/css/boxicons.min.css' rel='stylesheet'>

    <title>login</title>

</head>
<body>
    <style>
        @import url('https://fonts.googleapis.com/css2?family=Nunito:wght@400;600;800&display=swap');
*{
    font-family: 'poppins' ,sans-serif;
}
body{
    background-image: url("bg3.png");
    background-color: black;
    background-size: cover;
    background-position: center;
    background-attachment: fixed;
    background-repeat: no-repeat;

}
.box{
    display: flex;
    justify-content: left;
    align-items: center;
    min-height: 90vh;
}
.container{
    width: 300px;
    display: flex;
    flex-direction: column;
    padding: 0 15px 0 15px;

}
span{
    color: #fff;
    font-size: small;
    display: flex;
    justify-content: center;
    padding: 10px 0 10px 0;
}
header{
    color: #74f2f8;
```

```css
    font-size: 30px;
    display: flex;
    justify-content: center;
    padding: 10px 0 10px 0;
}

.input-field .input{
    height: 45px;
    width: 87%;
    border: none;
    border-radius: 30px;
    color: #ffffff;
    font-size: 15px;
    padding: 0 0 0 45px;
    background: rgba(255,255,255,0.1);
    outline: none;
}
i{
    position: relative;
    top: -33px;
    left: 17px;
    color: #fff;
}
::-webkit-input-placeholder{
    color: #fff;
}
.submit{
    border: none;
    border-radius: 30px;
    font-size: 15px;
    height: 45px;
    outline:  none;
    width: 100%;
    color: black;
    background: rgba(255,255,255,0.7);
    cursor: pointer;
    transition: .3s ;
}
.submit:hover{
    box-shadow: 1px 5px 7px 1px rgba(0, 0, 0, 0.2);
}
.two-col{
    display: flex;
    flex-direction: row;
    justify-content: space-between;
    color: #fff;
    font-size: small;
    margin-top: 10px;
}
.one{
    display: flex;
```

```
}
label a{
    text-decoration: none;
    color: #fff;
}

  </style>
 <div class="box">
 <div class="container">

    <div class="top">
       <span>Have an account?</span>
       <header>Login</header>
    </div>

    <div class="input-field">
       <input type="text" class="input" placeholder="Username" id="">
       <i class='bx bx-user' ></i>
    </div>

    <div class="input-field">
       <input type="Password" class="input" placeholder="Password" id="">
       <i class='bx bx-lock-alt'></i>
    </div>

    <div class="input-field">
       <input type="submit" class="submit" value="Login" id="">
    </div>

    <div class="two-col">
       <div class="one">
         <input type="checkbox" name="" id="check">
         <label for="check"> Remember Me</label>
       </div>
       <div class="two">
          <label><a href="#">Forgot password?</a></label>
       </div>
    </div>
  </div>
</div>
</body>
</html>
```

```html
<!DOCTYPE html>
<html lang="en">
<head>
 <title>Home | project</title>
 <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/font-awesome/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>
  .container-fluid{
    background-color: #000000;
 }
 .nav.navbar-nav{
 margin-left: 280px;
 }
 .navbar-brand{
  font-size: 22px;
 }
 .footer{
overflow: hidden;
background-color: #000000;
position: fixed;
bottom: 0;
height: 65px;
width: 100%;
 }
 body{
  background-image: url("bg3.png");
  background-color: black;
  background-size: cover;
  background-position: center;
  background-attachment: fixed;
  background-repeat: no-repeat;

 }
 </style>
</head>

<nav class="navbar navbar-inverse">
 <div class="container-fluid">
   <div class="navbar-header">
    <a class="navbar-brand" href="#"><b>Intelligent Vehicle Damage Assessment and Cost Estimator for Insurance
Companies</b></a>
   </div>
   <ul class="nav navbar-nav">
    <li><a href="/">Home</a></li>
```

```html
    <li><a href="/login">Login</a></li>
    <li><a href="/register">Register</a></li>
    <li class="active"><a href="/prediction">Prediction</a></li>
  </ul>
 </div>
</nav><br><br><br><br>

<div style="margin-top: -45px;" class="container">
   <center>
      <h2 style="color:white;"><b>UPLOAD IMAGE TO PREDICT</b></h2><br>
    <form action="/result" method="POST" enctype="multipart/form-data">
      <input style="background-color:rgb(83, 231, 247);
               opacity: 78%;
               color: rgb(255, 255, 255);
               font-size: 18px;
               width: 250px;"
               type="file" id="myFile" name="image">
      <br><br>
      <input style=" position: absolute;
      font-size: 20px;
      background-color: rgb(129, 241, 237);
      color: #ffff;
      left:47%;
      border-radius:10px;

      font-family: "Amazon Ember,sans-serif; type="submit">
    </form>
    <br>
    <h2 style="color:rgb(255, 153, 0);" >Your Price Range is: {{prediction}}</h2>
   </center>
</div>
<div class="footer">
   <p style="color:white;
        margin-top: 20px;
        text-align: center;"><b>
        COPYRIGHT @ 2023,ALL RIGHTS RESERVED</b>
   </p>

 </div>




</body>
</html>
```

Logout.html

```html
<!DOCTYPE html>
<html lang="en">
<head>
 <title>Home | project</title>
 <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/font-awesome/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>
 <link rel="stylesheet" href="logout.css">
 <style>
 .nav.navbar-nav{
  margin-left: 180px;
  }
  .navbar-brand{
   font-size: 22px;
   }
   .footer{
 overflow: hidden;
 background-color: #000000;
 position: fixed;
 bottom: 0;
 height: 65px;
 width: 100%;
  }
  @import url('https://fonts.googleapis.com/css2?family=Nunito:wght@400;600;800&display=swap');
*{
   font-family: 'poppins' ,sans-serif;
}
body{
   background-image: url("bg3.png");
   background-color: rgb(255, 255, 255);
   background-size: cover;
   background-position: center;
   background-attachment: fixed;
   background-repeat: no-repeat;

}
.cont h3{
   font-size: 40px;
   color: white;
}
.cont p{
   font-size: 25px;
   color: white;
}
.btn{
   color: rgb(0, 0, 0);
   background-color: rgb(255, 255, 255);
```

```html
      border-radius: 5px;


    }
.btn :hover{
    background-color: rgb(255, 255, 255);
    color: rgb(0, 0, 0);
}


  </style>
</head>

<nav class="navbar navbar-inverse">
  <div class="container-fluid">
    <div class="navbar-header">
      <a class="navbar-brand" href="#"><b>Intelligent Vehicle Damage Assessment and Cost Estimator for Insurance
Companies</b></a>
    </div>
    <ul class="nav navbar-nav">
      <li class="active"><a href="/">Home</a></li>
      <li><a href="/login">Login</a></li>
      <li><a href="/register">Register</a></li>
      <li><a href="/prediction">Prediction</a></li>
    </ul>
  </div>
</nav><br><br>

<div  class="cont">
    <center>
    <h3 >Successfully Logged Out !</h3><br>
      <p>Login for More Information</p>   <br><br><br><br>
    <div class="btn"><a  href="login.html">LOGIN</a></div>

    </center>
</div>
<div class="footer">
    <p style="color:white;
        margin-top: 20px;
        text-align: center;"><b>
        COPYRIGHT @ 2023,ALL RIGHTS RESERVED</b>
    </p>

  </div>



</body>
</html>
```

CHAPTER 10

CONCLUSION & FUTURE SCOPE

10.1 CONCLUSION

In this proposed project a neural network-based solution for car detection; manage the problem of car damage analysis, prediction of car damage location and severity of the damage. This project carries out lot of functions in a one package. The system will definitely help the insurance companies to analyze the car damage a lot more successful and well organized. Simply by send the image of the car, the system will analyze the given image and show if there is any kind of damage to the car along with the location of the damage and also the severity of the damage.

10.2 FUTURE SCOPE

In future work, need to use several regularization methods with a big dataset in our next work. Anticipate the cost of a car damaged component more accurately and reliably if we have higher quality datasets that include the attributes of a car (make, model, and year of production), location data, kind of damaged part, and repair cost. This study makes it possible to work together on picture recognition projects in the future, with a focus on the auto insurance industry. The study was able to accurately validate the presence of damage, its location, and its degree while eliminating human bias. These can be further enhanced by adding the on-the-fly data augmentation approaches.We will add more features like car selling, insurance claim, old car collection and car modification. It will help customer to find all the services on the same application.

CHAPTER 11

REFERENCES

[1]. 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.

[2]. 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.

[3]. 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.

[4]. S. Jayawardena, Image based automatic vehicle damage detection. PhD
thesis, College of Engineering and Computer Science (CECS), 12 2013.

[5]. S. Gontscharov, H Baumgartel, A.Kneifel, and K.-L. Krieger,
Algorithm development for minor damage identification in vehicle bodies using
adaptive sensor data processing," Procedia Technology, vol. 15, pp. 586 594,
2014. 2nd International Conference on System-Integrated Intelligence:
Challenges for Product and Production Engineering.

[6]. Y.J. Cha, J. Chen, and O. B''uy''uk''ozt''urk, Output-only computer
visionbased damage detection using phase-based optical flow and unscented
kalman lters," Engineering Structures, vol. 132, pp. 300, {313, 2017}