NAALAIYA THIRAN PROJECT - 2022
19ECI01-PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP

INTELLIGENT VEHICLE DAMAGE ASSESSMENT & COSTESTIMATOR FOR INSURANCE COMPANIES

A PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

Certified that this Report **"INTELLIGENT VEHICLE DAMAGE ASSESSMENT & COST ESTIMATOR FOR INSURANCE COMPANIES"** is the bonafide work of **RANJITHA R, SAMADHARSINI D, VINOTHINI M ,MATHESH KUMAR S** who carried out **19ECI01 Professional Readiness for Innovation, Employability and Entrepreneurship** project offered by IBM and Anna University, Chennai.

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PROJECT CALENDER

Phase	Phase Description	Week	Dates	Activity Details
1	Preparation Phase (Pre-requisites, Registrations, Environment Set-up, etc.)	2	22 - 27 Aug 2022	Creation GitHub account & collaborate with Project repository in project workspace
2	Ideation Phase (Literature Survey, Empathize, DefiningProblem Statement,Ideation)	2	29 Aug – 3rd Sept 2022	Literature survey (Aim, objective, problem statement and need for the project)
		3	5 - 10th Sept 2022	Preparing Empathy Map Canvas to capture the user Pains & Gains
		4	12 - 17 Sept 2022	Listing of the ideas using brainstorming session
3	Project Design Phase -I (Proposed Solution, Problem- Solution Fit, Solution Architecture)	5	19 - 24 Sept 2022	Preparing the proposed solution document
		6	26 Sept - 01 Oct 2022	Preparing problem - solution fit document &Solution Architecture
4	Project Design Phase -II (Requirement Analysis, Customer Journey, Data Flow Diagrams, Technology Architecture)	7	3 - 8 Oct 2022	Preparing the customer journey maps
		8	10 - 15 Oct 2022	Preparing the Functional Requirement Document & Data- Flow Diagrams and Technology Architecture
5	Project Planning Phase (Milestones & Tasks, Sprint Schedules)	9	17 - 22 Oct 2022	Preparing Milestone & Activity List, Sprint Delivery Plan
6	Project Development Phase (Coding & Solution, acceptance Testing, Performance Testing)	10	24 - 28 Oct 2022	Preparing Project Development - Delivery ofSprint-1
		11	28 -01 Oct Nov 2022	Preparing Project Development - Delivery ofSprint-2
		12	02- 09 Nov 2022	Preparing Project Development - Delivery ofSprint-3
		13	10- 18 Nov 2022	Preparing Project Development - Delivery ofSprint-4

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INTELLIGENT VEHICLE DAMAGE ASSESSMENT AND COST ESTIMATOR FOR INSURANCE COMPANIES

ABSTRACT

The motor insurance sector loses a lot of money as a result of leakage claims. The gap between the amount actually paid for claims and the amount that would have been paid had all of the best practises in the industry been followed is known as underwriting leakage. These results have been reached using both testing and visual assessment. However, they do delay the processing of claims. By reducing loss adjustment costs, improvements in the First Notice of Loss and the speed with which claims are examined and evaluated might save a lot of money in the automobile insurance claims process. Car damage is automatically identified and classified using advanced picture analysis and pattern recognition technology, a method for automatically locating the damaged area by comparing photos of the automobile from before and after an accident. This project's proposed a CNN model that can recognise a car's damage area. If users upload images, the model can evaluate damage (be it a dent or scratch from an object), and it can also estimate the extent of damage. Insurance firms can handle claims more efficiently as a result. When accepting a car loan, particularly one for a used vehicle, lenders may also consider this model.

1 . INTRODUTION

1.1 PROJECT OVERVIEW

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.

The aim of this project is to build a VGG16 model that can detect the area of damage on a car. The rationale for such a model is that it can be used by insurance companies for faster processing of claims if users can upload pics and the model can assess damage(be it dent scratch from and estimates the cost of damage. This model can also be used by lenders if they are underwriting a car loan, especially for a used car.

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.

2.LITERATURE SURVEY

2.1 Existing Problem

Paper-1

Title	:	Automatic Car Insurance Using Analysis Image.
Author	:	Aniket Gupta, Jitesh Chogale, Shashank Shrivastav, Prof. Rupali Nikhare.
Journal	:	International Research Journal of Engineering and Technology.
Year	:	April 2020.
Methodology	:	In this System, **CNN Model** is used to implement automatic car insurance using **image analysis** and provide an optimistic cost to the user. They used **Django framework** to design the user interface and integrate car damage prediction model to the system.
Scope	:	Initially the policyholder will have to register on the website, then fill in the required information of the customer and car and then upload the image. By using CNN model the cost will be predicted and it will be displayed on the screen.

Paper-2:

Title	:	Car Damage Assessment for Insurance Companies.
Author	:	Mandara G S and PrashantAnkalkoti.
Journal	:	International Journal of Advanced Research in Science, Communication and Technology (IJARSCT).
Year	:	June 2022
Methodology	:	In this model, they used **Convolution Neural Network model** and **VGG16** for detecting the car image and to analyses the damage of the car.
Scope	:	It first takes damaged car image as an input. Detection of the car is done perfectly then analyse the damage of the car by applying the neural network. In this system they carry out some functions including car detection, car damage analysis, predict the location of the damaged car like front, back, side and also car damaged severity like minor, moderate, severe.

Paper-3:

Title	:	Automatic Assessment of Damage and Repair Costs in Vehicles.
Author	:	Vikas Taliwal, Siddhartha Dalal, Kaigang Li, Gaurav harma.
Journal	:	United States Patent Application Publication.
Year	:	Oct 2017.
Methodology	:	In this System, they used **CNN** to detect the pose of the vehicle And damage analysis. Then execute a **Markov Random Field (MRF)** algorithm to internal parts of the vehicle from the damaged external vehicle parts.
Scope	:	Finally it estimate the repair cost based on the external and internal damaged parts.

Paper-4

Title	:	Damage Assessment of a vehicle and Insurance Reclaim.
Author	:	Vaibhav Agarwal, Utsav Khandelwal, Shivam Kumar, Raja Kumar, Shilpa M.
Journal	:	International Journal of Creative Research Thoughts (IJCRT).
Year	:	April 2022.
Methodology	:	In this model they used **CNN** for the auto insurance claiming process then **image analysis and pattern recognition** technologies are used to detect the car damages.
Scope	:	In this system firstly, it takes an damaged car image as input then the image processing analyses the percentage of damage and divides it into two factors as repair and replace. Then at last it generates a detailed report on analysis of the automobile and use this to claim one's reimbursement with the insurance company.

Paper-5

Title	:	Assessing Car Damage with Convolutional Neural Networks.
Author	:	Harit Bandi, Suyash Joshi, Siddhant Bhagat, Amol Deshpande.
Journal	:	Sardar Patel Institute of Technology.
Year	:	April 2020.
Methodology	:	In this System, they used **Convolutional Neural Networks (CNN)** for classification of problems and **RCNN** for detecting the car image and to analyses the damage of the car.
Scope	:	In this Model it takes damaged car image for (logistic or logic classification). Secondly, it extracts the features of car damages. Finally, image classification has been applied on the feature vectors to **determine the severity of the damage to the car.**

Paper-6

Title	:	Car Damage Detection using Deep Learning.
Author	:	Dindayal Bhadrecha, Divyesh Tharakan, Chandrababu Godasu, Hrushikesh Jadhav.
Journal	:	International Research Journal of Engineering and Technology (IRJET).
Year	:	June 2022.
Methodology	:	In this paper, they created their own dataset and experimented with various algorithms such as **Yolo v5** and Faster **CNN**. They observed that the transfer learning combined with Mask **RCNN** performed the best. They are also note that only car specific features may not be effective for damage classification.
Scope	:	It collects damaged car image using VGG annotator and Saved as JSON file. Then applying mask RCNN and train model. The neural network is used for extracting features and transfer learning applied to improve the performance. Finally it predicts damaged car status.

Paper-7

Title	:	Front-View Vehicle Damage Detection using Roadway Surveillance Camera Images.
Author	:	Burak Balci, Yusuf Artan, Bensu Alkan and Alperen Elihos.
Journal	:	VEHITS 2019 -International Conference on Vehicle Technology and Intelligent Transport Systems.
Year	:	2019.
Methodology		First, they detect the vehicle within the raw image using a novel **SSD model**. Second, using the cropped image to generate deep feature representations of vehicle. Finally, by using **image classification for** applying a classification operation on the feature vectors, they have determine the damage status of the vehicle.

Scope	:	This method indicates that the ensemble model that combines the symmetrical analysis feature representation and transfer learning feature representation yields the most accurate result with the accuracy rates.

Paper-8

Title	:	Automated Detection of Multi-class Vehicle Exterior Damages using Deep Learning.
Author	:	Maleika Heenaye - Mamode Khan, Mohammad Zafir Hussein Sk Heerah, Zuhairah Basgeeth.
Journal	:	IEEE.
Year	:	October 2021.
Methodology	:	In this paper, they have adapted the pre-trained **CNN** models namely the MobileNet and VGG19 and applied a transfer learning on large constructed dataset for Vehicle damage analysis application.
Scope	:	They have used Adam optimisation to enhance the model. MobileNet has achieved an overall performance of 70% whereas VGG19 has achieved 50% and it provides promising results for vehicle damage.

2.2 REFERENCES

[1]. R.E. Ruitenbeek, Convolutional Neural Networks for vehicle damage detection,2021

[2]. Ritik Gandhi1Deep Learning Based Car Damage Detection, Classification and Severity, 2021

[3]. Siddhant Gole, Car Damage Assessment to Automate Insurance Claim, 2022

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

[5]. Kitsuchart Pasupa, Evaluation of deep learning algorithms for semantic segmentation of car parts, 2021

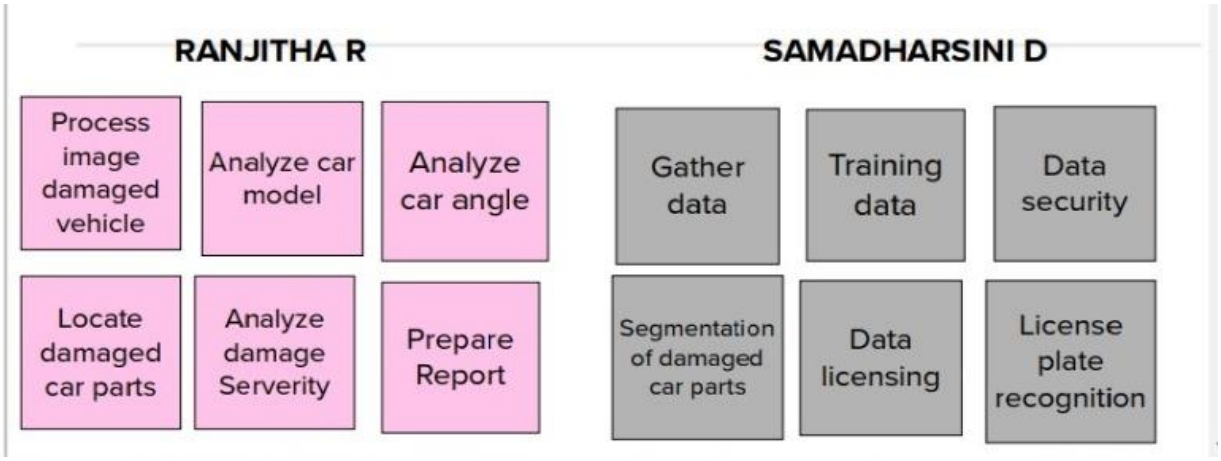
2.3 PROBLEM STATEMENT DEFINITION

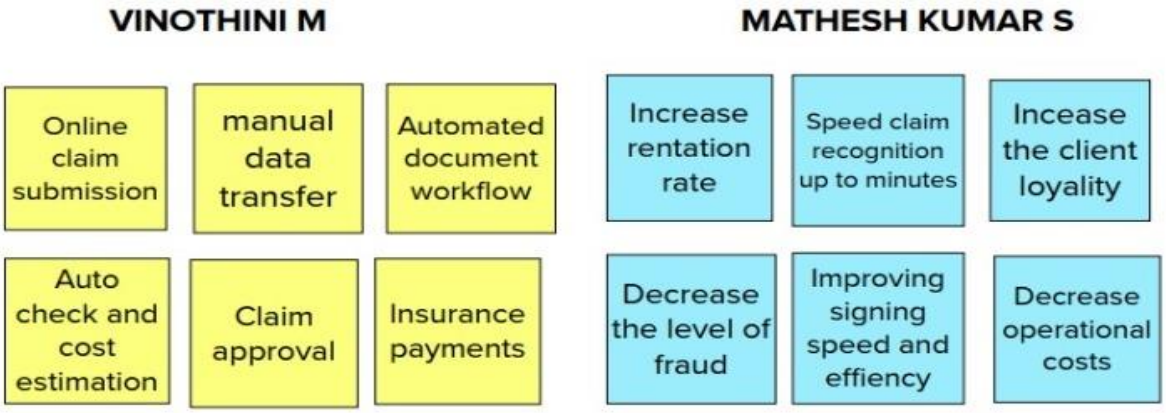
In existing system, the procedure of making an insurance claim for an automobile is laborious, and there is a delay before the first reimbursement is authorized . Insurance firms lose millions of dollars each year due to claim leakage as a result of the expansion of the vehicle sector and the daily rise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

3.IDEATION & PROPOSED SOLUTION

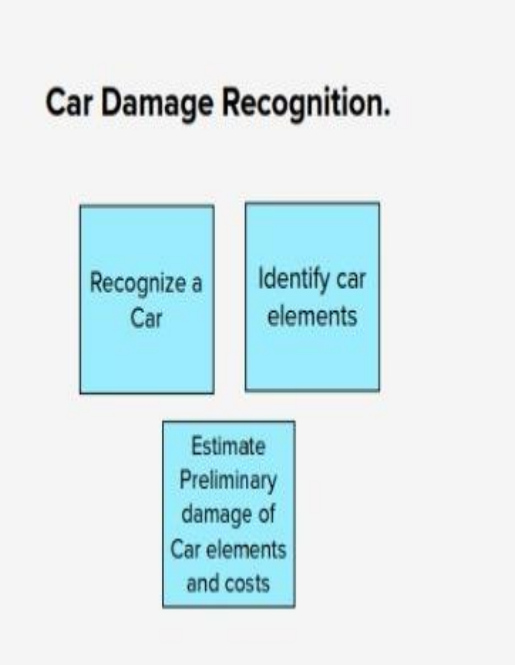
3.1 EMPATHY MAP CANVAS

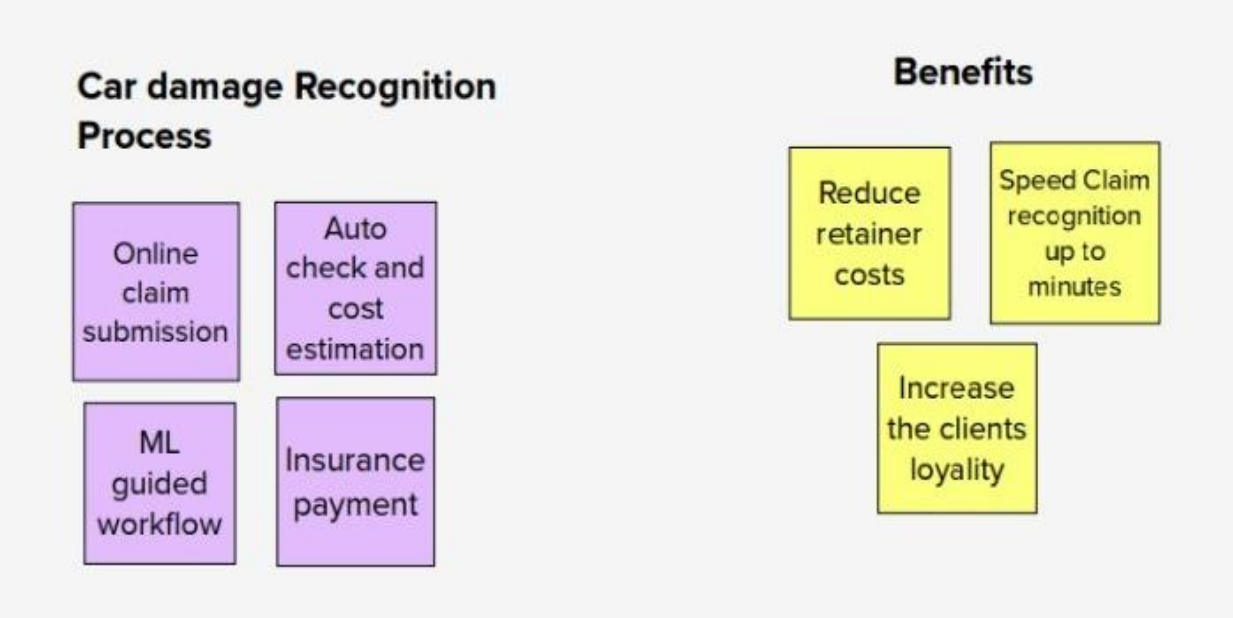
3.2 BRAINSTORMING



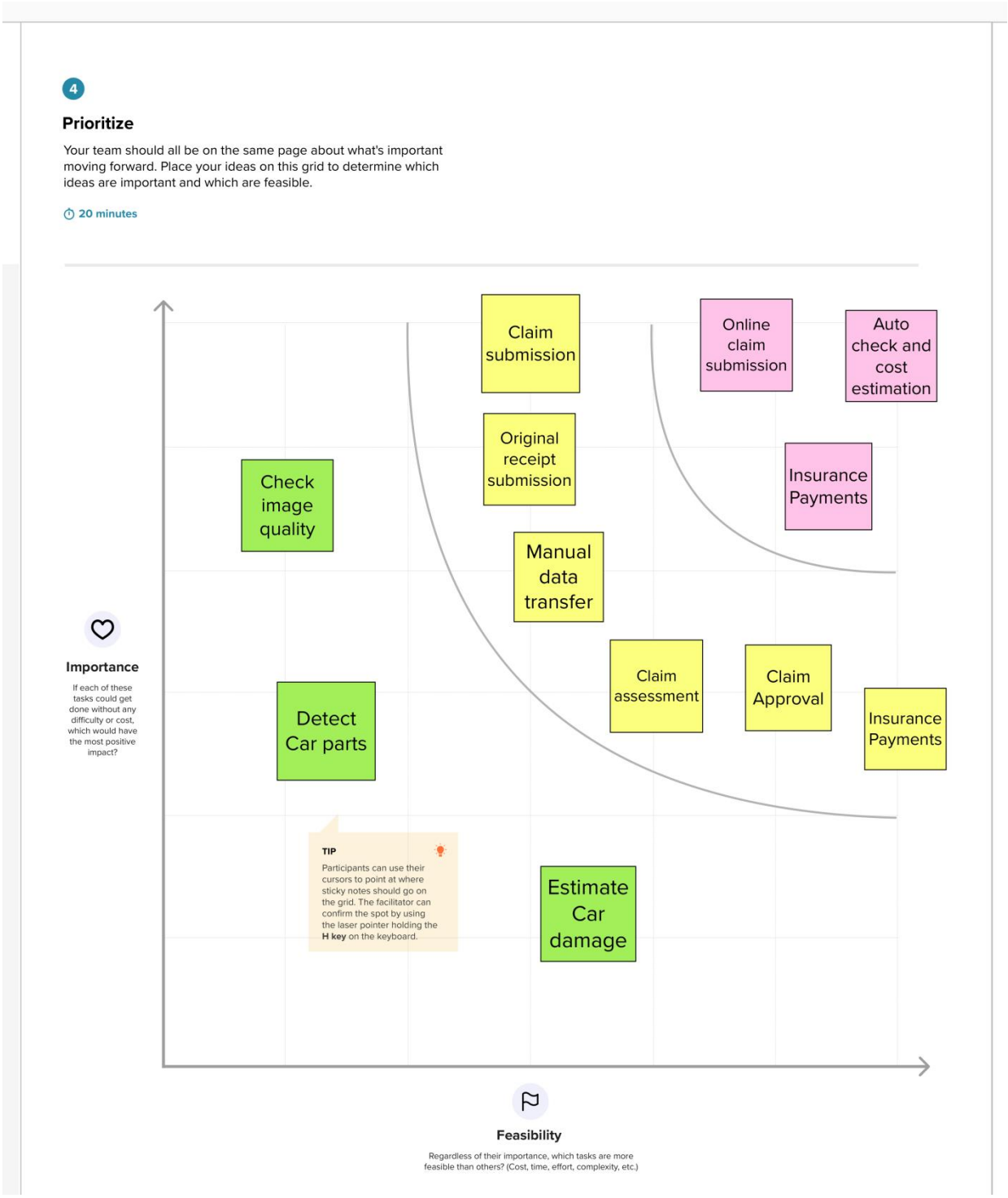


3.2 IDEATION


Car Damage Recognition.
Recognize a Car
Identify car elements
Estimate Preliminary damage of Car elements and costs


Car damage Recognition Process
Online claim submission
Auto check and cost estimation
ML guided workflow
Insurance payment
Benefits
Reduce retainer costs
Speed Claim recognition up to minutes
Increase the clients loyality

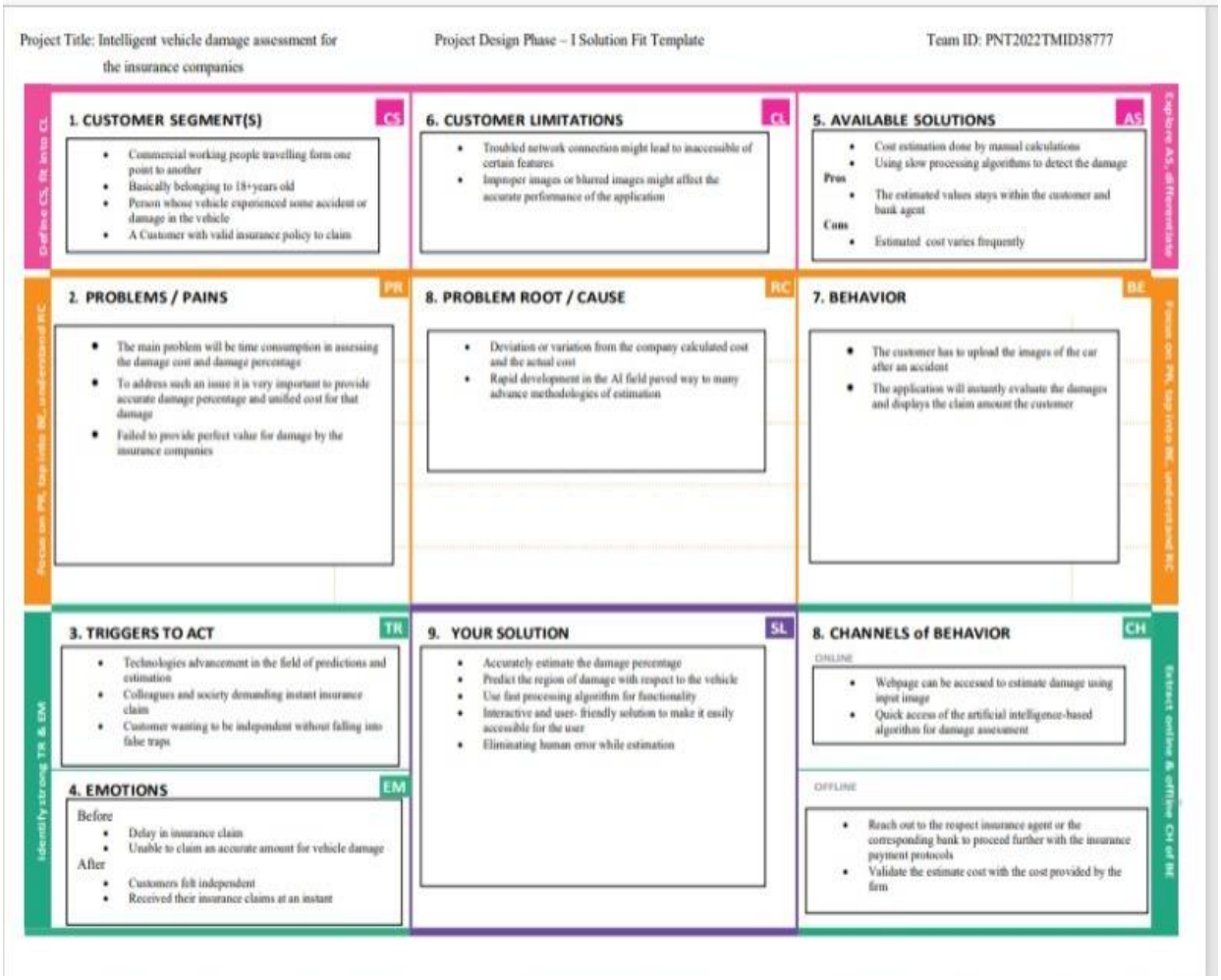
3.2 Idea Prioritation



3.3 Proposed Solution

S. No	Parameter	Description
1.	Problem Statement(Problem to be Solved)	A lot of money is lost today in the car insurance market owing to claims leakage. Visual examination and testing have been used to may these results.
2.	Idea / Solution Description	Car damage is automatically identified and classified using advanced picture analysis and pattern recognition technology.
3.	Novelty / Uniqueness	A technique that compares before and after accident car images to automatically detect the damaged location.
4.	Impact on Society	Vehicle 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



4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	**User Registration**	Registration through FormRegistration through Gmail
FR-2	**User Confirmation**	Confirmation via Email Confirmation via OTP
FR-3	**User details**	Users are required to register their personal details. likename, 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 formatfamiliar to the customer. It compares the information already given and states the defect percentage and cost in that vehicle damage image .

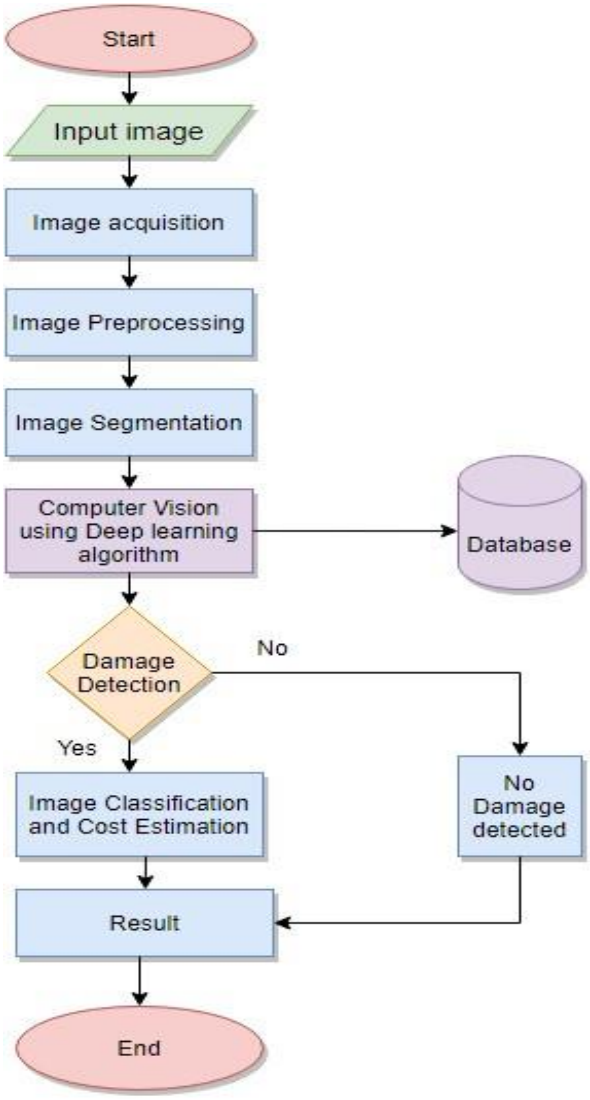
4.2 NON FUNCTIONAL REQUIREMENTS

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	More efficient for the frequent users. userscan easily understand what the application does and feel satisfied with the system.
NFR-2	**Security**	•AI powered vehicle damage assessment and cost estimator for insurance company should contain more security in which our data whichentered or maintained should be more security. •With the help of the username and password it provides more security in which it can access moresecurable and the data are private
NFR-3	**Reliability**	This application must perform without failure in 90 percentage of use cases during a month. It is morereliable.

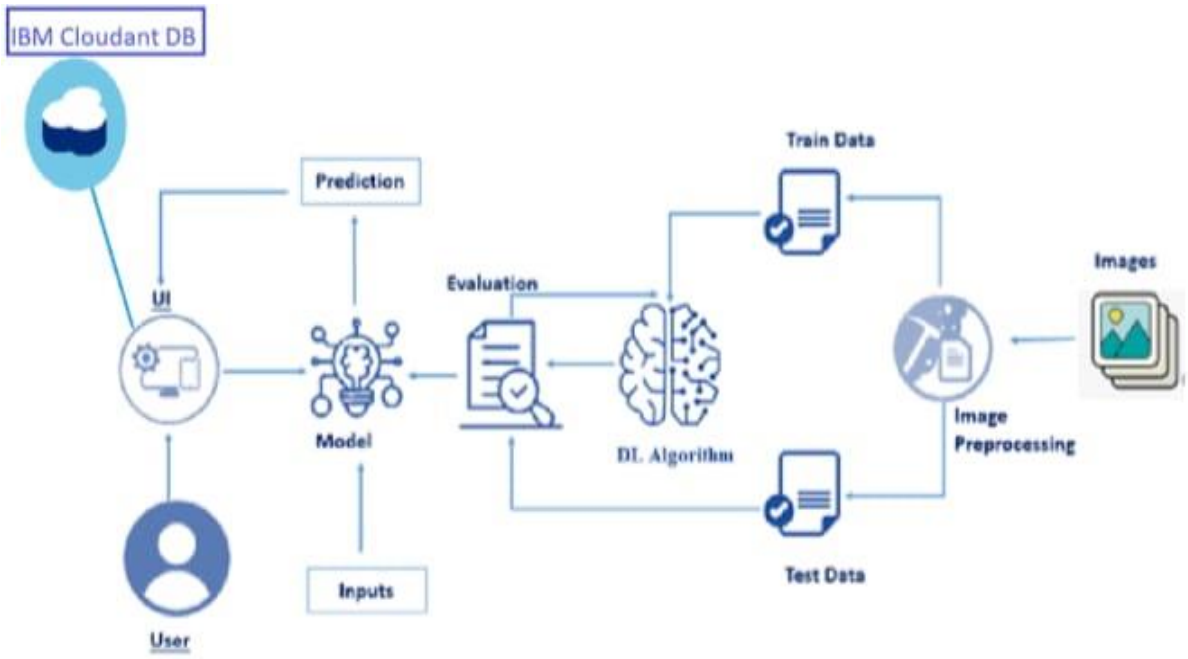
NFR-4	**Performance**	This application supporting 1,050 users per hour must provide 5 seconds or less response time in a desktop browser, including the rendering of text and images, over an LTE connection. The performance of this application is effective and efficient.
NFR-5	**Availability**	The web dashboard must be available to user's 99.9 percent of the time every month during business hours EST. Users can access any time and any where.
NFR-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 inlarge scale thus improving scalability.

5. PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS



5.2 SOLUTION & TECHNICAL ARCHITECTURE



5.3 USER STORIES

Use Type	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	Sprint-1
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	Sprint-4
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	Sprint-1
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

6.1 SPRINT PLANNING & ESTIMATION

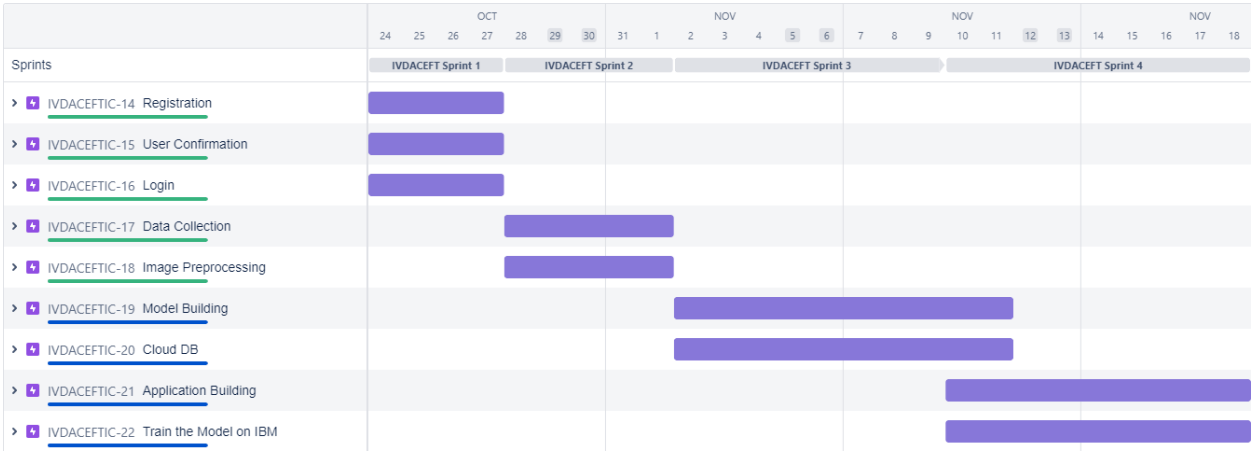
PROJECT PLANNING & SCHEDULING

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As an owner of a particular vehicle, I can log into the application by entering email & password.	2	High	Ranjitha R Samadharsini D Vinothini M Mathesh Kumar S
Sprint-1	User Confirmation	USN-2	As an owner of a particular Vehicle ,I will receive confirmation email once I haveregistered for the application.	1	Medium	Ranjitha R Samadharsini D Vinothini M Mathesh Kumar S
Sprint-1	Login	USN-3	As an owner of a particular vehicle, I can log into the application by entering email &password.	2	High	Ranjitha R Samadharsini D Vinothini M Mathesh Kumar S
Sprint-2	Data Collection	USN-1	Download the dataset used in intelligent vehicle damage assessment & cost estimator for insurance companies.	2	High	Ranjitha R Samadharsini D Vinothini M Mathesh Kumar S
Sprint-2	Image Pre Processing	USN-1	Improve the image data thatsuppresses unwilling distortions orenhances some image features important for further processing, although performing somegeometric transformations ofimages like rotation, scaling, etc.	2	High	Ranjitha R Samadharsini D Vinothini M Mathesh Kumar S
Sprint-3	Model Building	USN-1	Define the model architecture and adding CNN layer and testing , saving the model.	2	High	Ranjitha R Samadharsini D Vinothini M Mathesh Kumar S
Sprint-3	Cloud DB	USN-1	Below are steps that need to follow for creating and using cloud service. • Register & login to IBMcloud • Create service instance • Creating service credentials • Launch cloud DB • Create database	2	High	Ranjitha R Samadharsini D Vinothini M Mathesh Kumar S
Sprint-4	Application Building	USN-1	Building a web application that is integrated into the model we built. A UI is provided to the user where he has uploaded the image.Based on the saved model, theuploaded image will be analyzed and prediction is showcased onthe UI.	2	High	Ranjitha R Samadharsini D Vinothini M Mathesh Kumar S
Sprint-4	Train The Model OnIBM	USN-1	Build Deep learning model and computer vision Using the IBM cloud.	2	High	Ranjitha R Samadharsini D Vinothini M Mathesh Kumar S

6.2 Sprint Delivery Schedule

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date(Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	4 Days	24 Oct 2022	27 Oct 2022	20	29 Oct 2022
Sprint-2	20	5 Days	28 Oct 2022	01 Nov 2022	20	04 Nov 2022
Sprint-3	20	8 Days	02 Nov 2022	09 Nov 2022	20	11 Nov 2022
Sprint-4	20	9 Days	10 Nov 2022	18 Nov 2022	20	19 Nov 2022

6.3 Sprint Delivery Plan



7.CODING & SOLUTIONING

7.1 Feature 1

```
client = Cloudant.iam("1c6f917d-87ac-491b-90a0-6e3ae5b5daca-bluemix","tYJcUyVJYs3WrxF_1absTN4RXrbdQ_RDWBRUy9BX-28c",connect=True)
database = client.create_database("bath4_database")

#load model

model1 = load_model('V:\\WorkSpace\\IBM-Project-23426-1659882722\\Final Deliverables\\model\\body.h5')
model2 = load_model('V:\\WorkSpace\\IBM-Project-23426-
```

The feature 1 gives access to the trained deep learning models for predicting mulitple damages in various areas in the vechile and connected with the IBM Waston Database for storing the user data.

7.2 Feature 2

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

        prediction1 = np.argmax(model1.predict(img_data))
        prediction2 = np.argmax(model2.predict(img_data))


        index1 = ['front','near','side']
        index2 = ['minor','moderate','severe']
```

Feature 2 enables the web application to predict the incomming image from the user into the given labels. The code gets the image, convert into pixcels and load into the model. Based on

the predicted results, the algorithm will returns the value as the estimated cost.

8.TESTING

8.1 Test Cases

1. User Login and Registration test
2. Database Update test
3. Prediction test

8.2 User acceptance Testing

The registeration web page is tested with the already registered user informationand hence it shows a message "You are already a member" by which the repeation of user infromation at database is prevented.

The login web page is tested with the invalid user information to check the invalidlogin testing into the webpage

The Estimated Cost of the Damage:6000 - 8000 Inr

9. RESULTS

PERFORMANCE

The performance of the Cost estimator for insurance companies is tested and assested with the latency check, which is run over the prediction page. The time taken to load the image and predict the cost based on the damages in the vechile is checked. The results show that the web application took less than 10s to provide the estimated cost of the given vechile image. The model is tested with the various damaged car images which is not used during the training and validation of the model which also shows that the model works with the accuracy of about 98% in the overall performance.

10.ADVANTAGES & DISADVANTAGES

1. The Advantage of having an Intelligent Cost Estimator based on the damages can save the time and resource of the user in automatically evaluating the images with the damages using the Deep Learning models trained with the various car images.
2. The Disadvantage of the project is expensive coding and time to develop the front end and back end of the web application

11. CONCLUSION

We conclude by suggesting this web application for damage assessment and cost estimation for the insurance companies. The web application is supported by the Deep Learning and IBM waston cloud which stands for the complex image prediction and user information storage. The web application takes the user registration and login, The user can login into the prediction page using their ID and password. The prediction takes the image input and the model can predict the input based on the perviour knowledge about the damages.

12. **FUTURE SCOPE**

In future, The User Interface of the web application can be improved by updating the HTML and CSS coding. The improvement in UI can gives the better user experience in future, The model's accuracy over various images can increased by training with various damaged images. The Image processing methods can be improved to achieve higher performance of the model in the future.

13. APPENDIX

GITHUB ACCOUNT LINK:

https://github.com/IBM-EPBL/IBM-Project-3883-1658669475

DEMO VIDEO LINK:

https://drive.google.com/file/d/1UqWlBPRgG2QsZTh9H_WCphBpZDuohmsd/view?usp=sharing

App.py

```
1  from cloudant.client import Cloudant
2  import os
3  import tensorflow
4  from keras.utils import load_img, img_to_array
5  from werkzeug.utils import secure_filename
6  import numpy as np
7  from keras.models import load_model
8  from tensorflow.python.ops.gen_array_ops import concat
9  from keras.applications.inception_v3 import preprocess_input10
11 #creating the Cloudant Database
12 client = Cloudant.iam("1c6f917d-87ac-491b-90a0-6e3ae5b5daca-
   bluemix","tYJcUyVJYs3WrxF_1absTN4RXrbdQ_RDWBRUy9BX- 28c",connect=True)
13 database = client.create_database("bath4_database")14
15 #load model
16 model1 = load_model('V:\\WorkSpace\\IBM-Project-23426-
```

```
1659882722\\Final Deliverables\\model\\body.h5')
17 model2 = load_model('V:\\WorkSpace\\IBM-Project-23426-
   1659882722\\Final Deliverables\\model\\level.h5')
18
19 from flask import
   Flask,render_template,request,redirect,url_for
20
21 app = Flask(_____name___)
22
23 @app.route('/')
24 def home():
25     return render_template('index.html')26
27 #login page setting28
29 @app.route('/login')
30 def login():
31     return render_template('login.html')32
33 @app.route('/afterLogin',methods=['POST','GET'])
34 def afterlogin():
35     user = request.form['_id']
36     passw = request.form['psw']
37     print(user,passw)38
39     query = {'_id':{'$eq':user}}40
41     docs = database.get_query_result(query)
42     print(docs)
43     print(len(docs.all()))44
45     if(len(docs.all())==0):
46         return  render_template('login.html',message='Theusername is not
   found')
47     else:
48         if((user==docs[0][0]['_id'] and
   passw==docs[0][0]['psw'])):
```

```
49                      return redirect(url_for('prediction'))
50                  else:
51                                                                  return
    render_template("login.html",message="Invalid User Details")
52
53
54#Register page setting55
56 @app.route('/register')
57 def register():
58          return render_template('register.html')59
60 @app.route('/afterRegister',methods=['POST'])
61 def afterregister():
62          x = [x for x in request.form.values()]
63          print(x)
64          data = {
65                  '_id':x[1],
66                  'name':x[0],
67                  'psw' : x[2]68
            }
69          print(data)70
71          query = {'_id':{'$eq' : data['_id']}}
72          docs = database.get_query_result(query)73
74          if(len(docs.all())==0):
75                  url = database.create_document(data)
76                                      return  render_template('register.html',
    message="Registration is Successfully Completed")
77          else:
78                    return render_template("register.html", message="Youare already a
    member!")
79
80#prediction
81
```

```
@app.route('/prediction')
def prediction():
        return render_template('prediction.html')
#logout  page

@app.route('/logout')
def logout():
        return render_template('logout.html')
#results

@app.route('/result', methods = ['GET', 'POST'])def upload_file():
    if request.method == 'POST':
            f = request.files['_file']
            basepath = os.path.dirname(_____name___)
                                                    filepath        =
  os.path.join(basepath,'uploads',f.filename)
                f.save(filepath)
                img = load_img(filepath,target_size=(224,224))
                x = img_to_array(img)
                x = np.expand_dims(x,axis=0)
                img_data = preprocess_input(x)
                prediction1 = np.argmax(model1.predict(img_data))
                prediction2 = np.argmax(model2.predict(img_data))
                index1 = ['front','near','side']
                index2 = ['minor','moderate','severe']
                result1 = index1[prediction1]
                result2 = index2[prediction2]
                if(result1=="front" and result2=="minor"):
```

```
117                         value= "3000 - 5000 Inr"
118                 elif(result1=="front" and result2=="moderate"):119          value
="6000 - 8000 Inr"
120                 elif(result1=="front" and result2=="severe"):121
                    value="9000 - 11000 Inr"
122                 elif(result1=="near" and result2=="minor"):
                        value="4000 to 6000 Inr"
123
124                 elif(result1=="near" and result2=="moderate"):125
                    value="7000 - 9000 Inr"
126                 elif(result1=="near" and result2=="severe"):127
                    value="11000 - 13000 Inr"
128                 elif(result1=="side" and result2=="minor"):129
                    value="6000 - 8000 Inr"
130                 elif(result1=="side" and result2=="moderate"):131
                    value="9000 - 11000Inr"
132                 elif(result1=="side" and result2=="severe"):133
                    value="12000 - 15000 Inr"
134                 else:
                        value = "16000 - 50000 Inr"
136
137                                                                          return
    render_template("prediction.html",prediction=value)138
139
140
141  if (_____name___== '_____main___'):
142          app.run(debug=True)
```