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.INTRODUCTION

1.1 PROJECT OVERVIEW

Leakage claims cause the car insurance industry to lose a significant amount of money. Underwriting leakage is the difference between the amount actually paid for claims and the amount that would have been paid had all industry best practises been followed.Testing and visual evaluation have both been used to arrive at these conclusions.They do, however, cause a delay in the handling of claims.Improvements in the First Notice of Loss and the speed with which claims are assessed and analysed may be able to save a significant amount of money in the auto insurance claims process by reducing loss adjustment expenses.Advanced picture analysis and pattern recognition technology, a technique for automatically detecting the damaged region by comparing photos of the car from before and after an accident, are used to identify and categorise car damage.In this study, a CNN model that can identify a car's damage area is proposed.The model can assess damage (such as a dent or scratch from an object) and estimate the level of damage if users input photographs.As a result, insurance companies can manage claims more effectively.Lenders could take this model into account when approving a car loan, especially one for a secondhand automobile.

1.2 PURPOSE

In the modern world, the number of automobiles has significantly increased. Accidents occur more frequently because there are more cars on the road and more individuals are driving them fast.When an accident occurs, the parties involved file a claim with their auto insurance to get the money needed to fix the car since, based on fraudulent claims, the insurance provider behaves improperly and withholds payments.

2. LITERATURE REVIEW

2.1 TITLE: Methodology of repair cost estimation in vehicles based on the deformation measurements in real world accidents
AUTHOR: Coral Sevillano; F. Javier Páez Ayuso YEAR: 2016

Mechanized street transport assumes a focal part in European social orders. Yet, its upsides have been accomplished with a significant expense, the human and monetary costs as far as street mishaps and individuals killed and harmed because of them. There are numerous outcomes of auto collisions that create various parts of the worldwide expense, and in this manner every one of them are probably going to be remembered for an assessment model. Be that as it may, just few them are viewed as because of challenges to get information for their assessment. This study has fostered a review procedure to gauge effectively fix expenses of vehicles engaged with street mishaps with the front zone included. Utilizing remaining deformity estimations (C1 to C6) in light of Tumbas and Smith's convention, it is reasonable to gauge V and retained energy for the vehicle associated with a mishap. Both remaking factors show a huge connection with fix costs. It tends to be applied by the insurance agency to remember this boundary for the computation of the protection cost. Additionally, these maintenance expenses could be remembered for the money saving advantage investigation (CBA) adding this variable to mishap information bases.

2.2 TITLE: Research on Intelligent Vehicle Damage Assessment System Based on Computer Vision
AUTHOR: Zhu Qianqian, Guo Weiming, Shen Ying and Zhao Zihao
YEAR: 2020

These information have set off a few reflections on limited scope cases: Right off the bat, for insurance agency, 72.22% of little cases require the presence of harm fixers, which prompts significant expense of hazard examination, and the spillage issue during the time spent harm fixing is challenging to control. Besides, for the mishap party, the significant delay at the mishap site, the sluggish installment process, the preposterous fixed cost and different issues, partially, decrease consumer loyalty with the insurance agency. Furthermore, the expected risks of gridlock and optional mishaps brought about by limited scope cases likewise carry an incredible strain to the traffic light division. In the cases business under the new age of computer based intelligence improvement plan, how could insurance agency move towards another plan of action of 'Man-made brainpower + Scene Application'? Profound convolutional brain networks have prompted a progression of leap forwards for picture characterization . With the advancement of profound learning , the course of PC vision has been enormously sped up. Research on visual acknowledgment is going through a progress from include designing to organize designing .

2.3 TITLE: Damage Assessment of a vehicle and Insurance Reclaim
AUTHOR: Vaibhav Agarwal, Utsav Khandelwal2, Shivam Kumar, Raja Kumar, Shilpa M
YEAR: 2022

CNN Model for the accident coverage claims process, upgrades in the Main Notification of Misfortune and rate in the examination and assessment of cases could drive critical qualities by diminishing misfortune change cost. This paper proposed a clever application where cutting edge innovations in picture examination and example acknowledgment are applied to naturally distinguish and describe auto harm. Progress in this will a llow a few cases to continue without human agents, while others to continue all the more effectively, consequently at last shortening the time between the primary Notification of Misfortune and the Last compensation out. To examine its plausibility, they fabricated a model framework which naturally distinguishes the harmed area(s) in light of the examination of ages.Performance of the when mishap car in of the model framework has been assessed on pictures taken from fortyscaled model vehicles under sensibly controlled conditions, and it were gotten to support results. It is a conviction that, with the progression of picture investigation and example acknowledgment innovations

2.4 TITLE: Car Damage Detection and Classification
AUTHOR: Phyu Mar Kyu, Kuntpong Woraratpanya
YEAR: 2020

The protection business is one of the principal ventures contributed in development, the most recent innovation and man-made consciousness (Artificial intelligence) . In this day and age, when the pace of fender benders is expanding, vehicle insurance agency squander a huge number of dollars yearly, because of cases spillage. The feeling of man-made intelligence innovation in view of AI and profound learning can help issues for example, breaking down and handling information, recognizing fakes, diminishing dangers and computerizing guarantee process in protection businesses . Thus, protection firms have searched for quicker harm appraisal and arrangement of cases. Nonetheless, an improvement of current applications to survive such issues is as yet testing, particularly in applying profound learning for vehicle harm appraisal. Profound learning is an effective approach for tackling complex undertakings, yet it needs more assets for model turn of events, i.e., for preparing a model, profound learning requires a colossal dataset and takes more calculation time. To acknowledge profound learning approach for vehicle harmed evaluation, this paper centers around two difficulties for making a proficient model: (I) vehicle harmed datasets for preparing and (ii) decrease of calculation time.

2.5 TITLE: Assessing Car Damage with Convolutional Neural Networks
AUTHOR: Harit Bandi, Suyash Joshi, Siddhant Bhagat, Amol Deshpande.
YEAR:2020

Computerized Signal Handling is an interesting part of designing, as it makes ready for phenomenal joint effort between Software engineering and Hardware designing. Any sign can be marked as a n-layered signal. A picture is commonly a 2 or 3 layered signal. Picture handling is quite possibly of the most significant use of 2-layered signal handling. With the improvement of various sign handling calculations, AI procedures and the computational ability to execute them, various pictures can now be handled to the best degrees of granularity. In this paper, Convolutional Brain Organization (CNN) based techniques for grouping of vehicle harm seriousness are implemented. Numerous procedures, for example, straightforwardly preparing a CNN what's more, pre-preparing a CNN utilizing move gaining from huge CNNs prepared on ImageNet on top of the arrangement of pre-prepared classifiers were tried. The fact that transfer learning makes it seen joined with extra layers gives the best outcomes, that is building a gathering classifier on the highest point of the arrangement of preprepared classifiers. A strategy was conceived to group the degree of harm. Trial results approve the viability of our proposed arrangement, across various assessment boundaries. The principal center was around the impact of certain hyper-boundaries and on looking for hypothetically established approaches to adjust them, all with the target of advancing to good results as quick as could really be expected.

REFERENCE

[1]. Coral Sevillano; F. Javier Páez Ayuso Methodology of repair cost estimation in vehicles based on the deformation measurements in real world accidents , 2016.

[2]. Phyu Mar Kyu, Kuntpong Woraratpanya
Car Damage Detection and Classification, 2020.

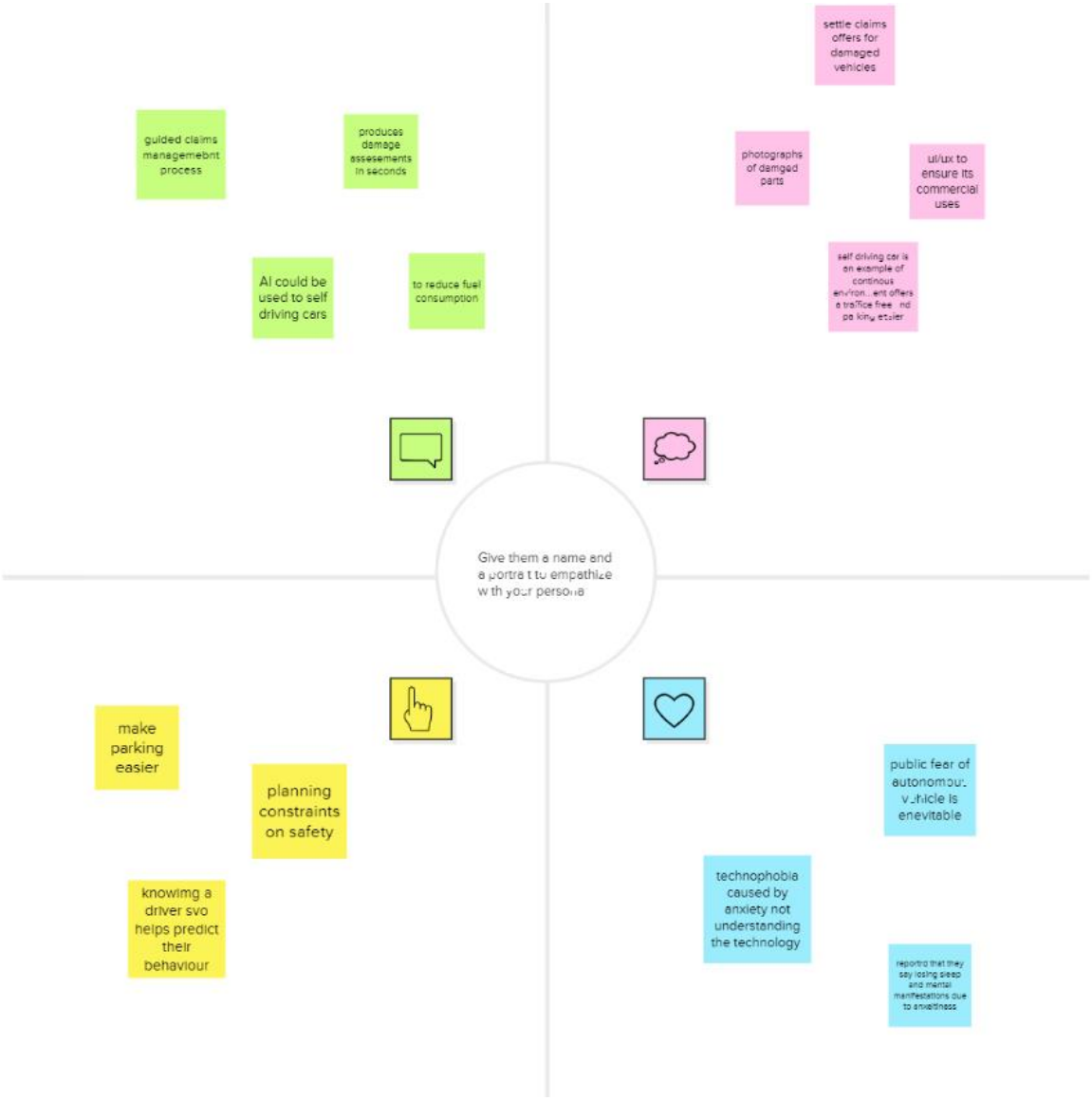
[3]. Harit Bandi, Suyash Joshi, Siddhant Bhagat, Amol Deshpande.
Assessing Car Damage with Convolutional Neural Networks,2020.

1.4 PROBLEM STATEMENT DEFINITION

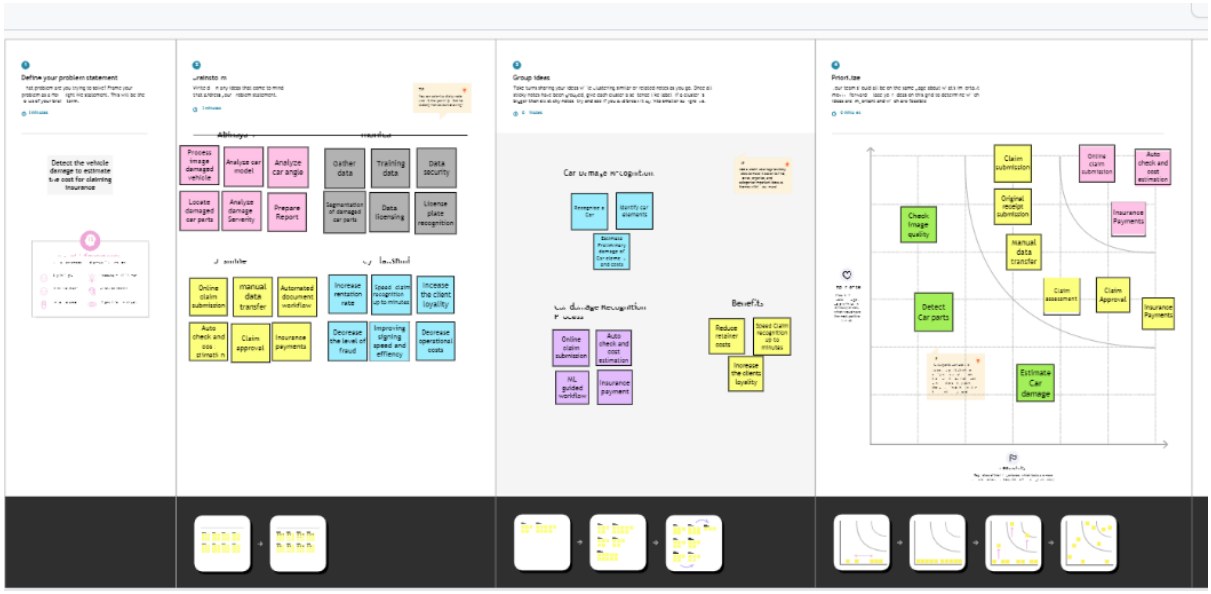
In existing system, the procedure of making an insurance claim for an automobile is laborious, and there is a delay before the first reimbursement is authorized. Insurance firms lose millions of dollars each year due to claim leakage as a result of the expansion of the vehicle sector and the daily rise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

IDEATION& PROPOSED SOLUTION

2.1 EMPATHY MAP CANVAS



2.3 **BRAINSTORM&IDEATION**



2.4 PROPOSED SOLUTION

The proposed solution involves taking pictures of a person's damaged car and using those photos as input for a deep learning model that uses image processing to identify image elements and calculate the degree of damage.

The pictures are then divided into two categories: replacement and repair.

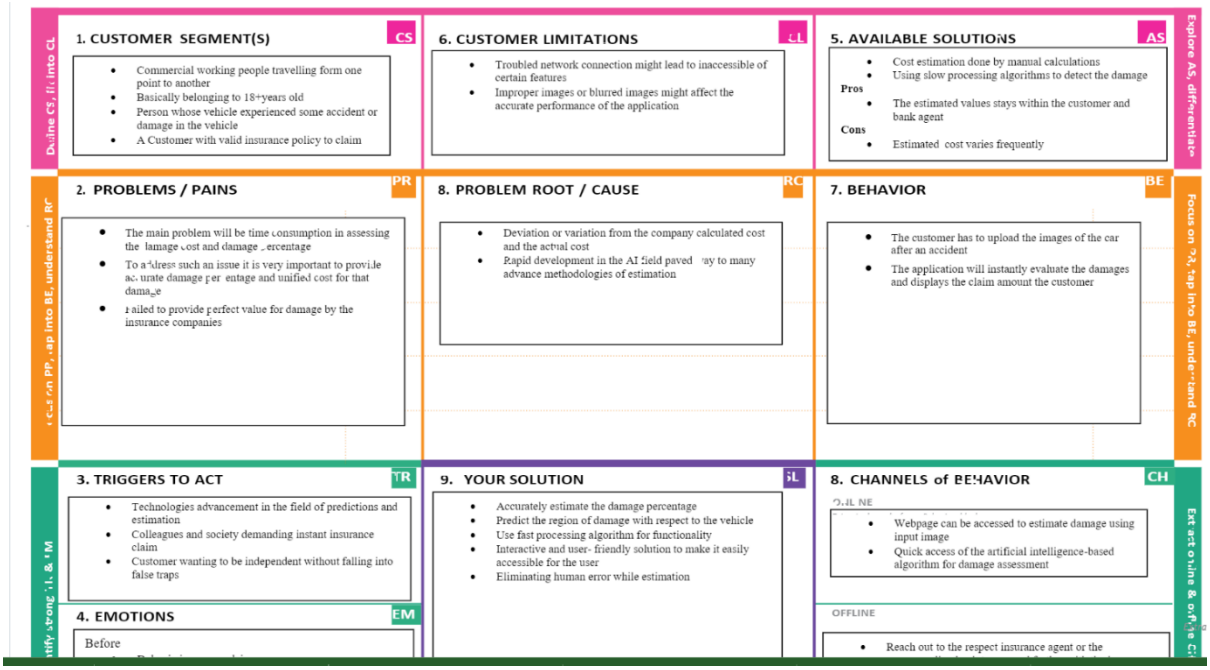
The damaged part must be replaced when the damage percentage is less than 80; in the other situation, the compensation amount is determined by the damage percentage.

Finally, it creates a thorough analysis report on the vehicle used to request payment from the insurance provider**.**

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	After the occurrence of a road accident, an insurance representative is sent to assess the damages caused to the vehicle in question. This process usually takes around 5-10 days
2.	Idea / Solution description	Our project has developed a solution that can help insurance companies to automate damage estimation andrepair cost estimation using AI.
3.	Novelty / Uniqueness	An insurance policyholder can simply snap a photo of their damaged vehicle. Using computer vision,the system analyzes the image to identify model of the vehicle, and recognizes damages such as scratches. dents, breaks etc
4.	Social Impact / Customer Satisfaction	An insurance policyholder can simply snap a photo of their damaged vehicle. Using computer vision,the system analyzes

2.5 PROBLEM SOLUTION FIT

- There is no methodical way to get an immediate response from an insurance company.
- You have to wait for a week.
- Consumers should be able to contact the insurance provider and make payments both online and offline thanks to the suggested method.
- The user may only acquire insurance if the company authorises the damaged image and the condition is greater than 80% after uploading the damaged image and assessing the amount of the damage.
-



3. REQUIREMENT ANALYSIS

3.1 FUNCTIONAL REQUIREMENT

When processing claims, insurance firms may use this methodology to evaluate car damage.This module provided a structure for submitting a vehicle's damaged parts and asking an organization for insurance.The admin has prepared the data set needed to train the Damage Detection.The photographs were manually annotated to make them usable for training; damages were divided into 7 categories, such as Door Dent, Bumper Dent, Body Scratch, Broken Windshield, Broken Glass, Broken Lights, and Smash.

The model was configured to train on user data by altering its settings and loading the learned data set.

Object Detection

Utilize a CNN model that has been appropriately trained using transfer learning to identify the object.This model includes validation sets for many types of damage, such as bumper dents, bumper scratches, door dents, door scratches, broken glass, headlamps, taillamps, and undamaged.Following is a classification of the severity of auto damage:Minor Damage is a term used to describe relatively minor vehicle damage that does not prevent the vehicle from causing serious injuries.It comprises headlamp scratches, dents and digs from gravel or other debris in the hood or windshield, as well as paint scratches.Moderate damage refers to any type of damage that interferes in any manner with the vehicle's functionality.It involves significant dents in a car's hood, fender, or door.In a crash, even if the airbags are deployed, there is still some moderate damage.Severe Damage: structural harm to the car, including broken or bent axels, bent or bent frames, missing parts, and in certain circumstances, airbag deflation.The harm to human life posed by these damages is significant.

Damage Detection:

Object localization, which combines object localization with classification to generate a bounding box and a class for each item for thing detection, is used to locate damaged regions in a photograph and create a bounding box around each object detected.Create a convolutional features map from an image using CNN to predict an item's class and bounding box.If the car is unharmed, it is simply detected; if it is damaged, additional localizations are created for the models.The validation set demonstrates the model's correctness.The simplest way to automate such a system would be to create a Convolution Neural Network model that can take user-provided photos and determine the position and extent of the damage. The model must pass many tests that first verify that the image is of an automobile and then confirm that it is actually damaged.Before the analysis starts, these are the gate checks.The damage check will start as soon as all gate checks have been verified.The model will forecast where the damage will occur—in the front, side, or back—as well as how serious it will be—minor, moderate, or severe.

Claim Insurance

Those that are in need go through the insurance claim process.
User registration and authentication are required in order to access the company's insurance.
Following that, users can view their insurance details and request an insurance claim.
The insurance company can review and approve the request for an insurance claim.
The user may only receive insurance if the company accepts the damaged image

3.2 NON FUNCTIONAL REQUIREMENTS

Usability

- Users must be able to access the system using a web application on a computer.
- The system's user interface is a web application.
- The system is simple because it is user-friendly.

Availability

The system is used around-the-clock, 365 days a year, and is completely accessible to the user.

Scalability

Scalability is the measure of a system's ability to increase or decrease in performance and cost in response to changes in application and system processing demands.

Performance

Depending on whether or not the application has undergone any updates, the information is updated.

Within two seconds of the member's request submission, the system must react to them.When processing big amounts of data, the system should be permitted to take extra time.Responses to information requests must display on the screen within 5 seconds.

Reliability

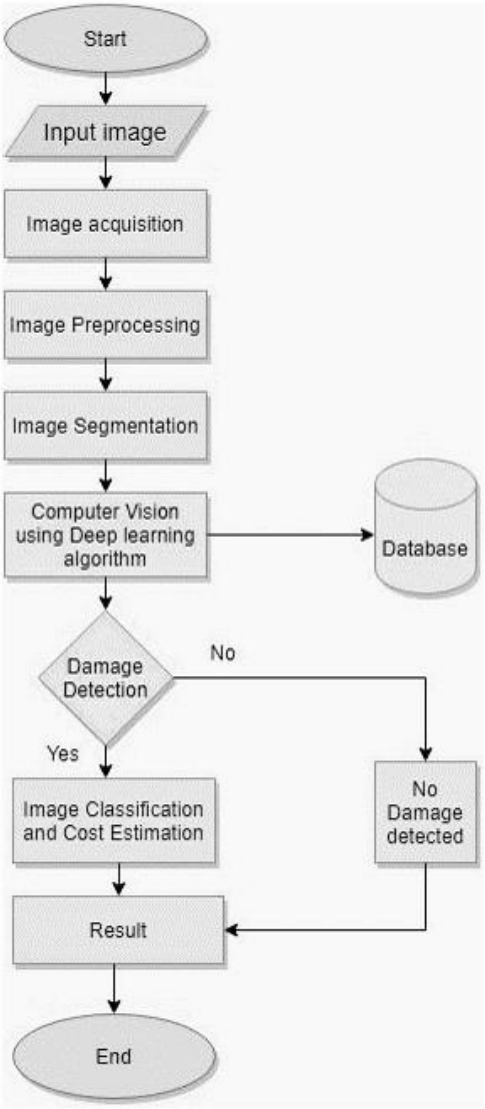
The system has to be 100% reliable due to the importance of data and the damages that can be caused by incorrect or incomplete data. The system will run 7 days a week. 24 hours a

4. PROJECT DESIGN

4.1 DATA FLOW DIAGRAMS

How data is handled and moved within a system is depicted in a two-dimensional figure. Each data source is identified, along with how it interacts with other data sources to produce a common result, in the graphical representation.
To create a data flow diagram, a person has to know what the external inputs and outputs are, how they link to one another, and how to visually depict these connections and the outcomes they produce.
Teams involved in business development and design might use this type of graphic to identify or iprove particular areas of the data processing process.

Data Flow Diagram



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.

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.

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.

4.2 SOLUTION & TECHNICAL ARCHITECTURE

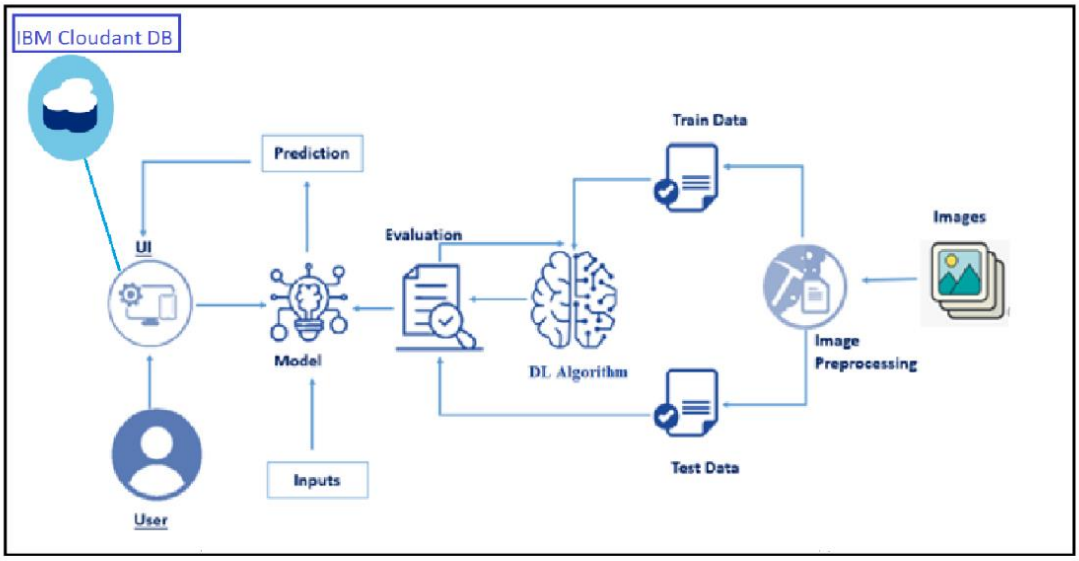
A system architecture, sometimes known as a systems architecture, is a conceptual model that describes a system's behaviour, structure, and other aspects.

A formal description and representation of a system that is set up to facilitate analysis of its structures and behaviours is called an architecture description.

System architecture might include system elements, those elements' externally perceptible characteristics, and the connections (like behaviours) between them.

It can offer a blueprint from which systems and products that will cooperate to implement the whole system can be developed.

Languages that describe system architecture have been formalised in an effort; they are referred to as architecture description languages (ADLs).



5 . PROJECT PLANNING & SCHEDULING

5.1 SPRINT PLANNING & ESTIMATION

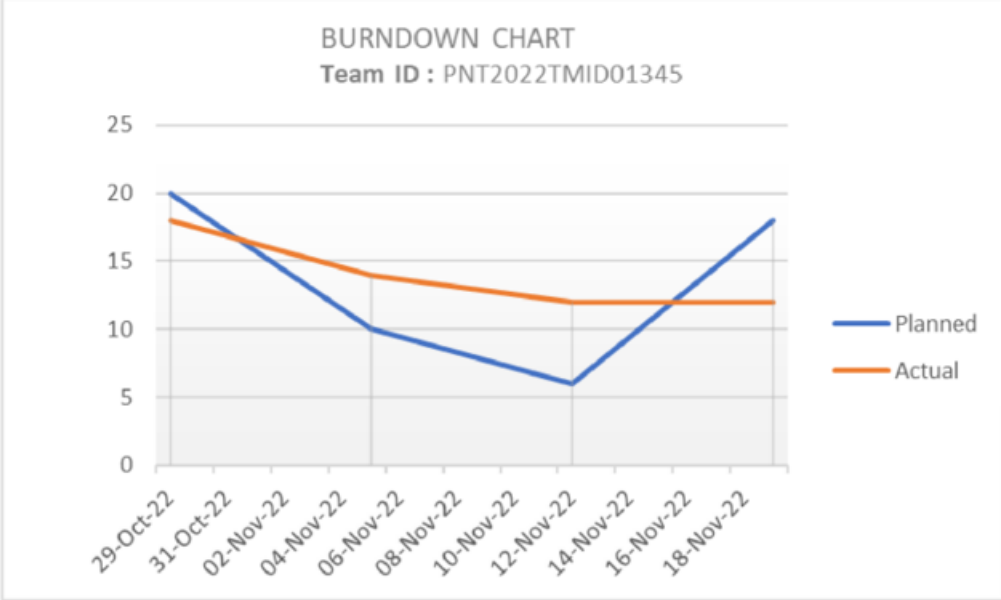
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

The definition of a sprint is a dedicated period of time in which a set amount of work will be completed on a project. It's part of the agile methodology, and an Agile project will be broken down into a number of sprints, each sprint taking the project closer to completion.

In the scrum process, sprint planning marks the beginning of the sprint. Sprint planning's goal is to specify what can be completed in a sprint and how it will be done. The entire scrum team collaborates on sprint planning.

5.2 Sprint Delivery Schedule

A burndown chart, which displays how rapidly a team is progressing through a customer's user stories, is a project management chart. This agile tool records the description of a feature from the viewpoint of the end user and compares the overall effort to the quantity of work for each agile sprint.



6. CODING & SOLUTIONING

6.1 FEATURE 1

```
import datetime

from flask import Flask, render_template, flash, request,session
from cloudant.client import  Cloudant
import cv2
client = Cloudant.iam("eb55a2b7-ae45-4df8-8d1c-69c5229ffdbe-
bluemix","YzG5FZg9Vs_HScOBZaWyVXm7PpNjbPrmPaPMfHx7w3X9",connect=True)
my_database = client.create_database("database-dharan")
app = Flask(__name__)
app.config.from_object(__name__)
app.config['SECRET_KEY'] = '7d441f27d441f27567d441f2b6176a'
@app.route("/")
def homepage():
return render_template('index.html')
@app.route("/userhome")
def userhome():   return render_template('userhome.html')
@app.route("/addamount")
@app.route("/NewUser")
def NewUser():
return render_template('NewUser.html')
```

6.2 FEATURE 2

```
import warnings
warnings.filterwarnings('ignore')

import tensorflow as tf
classifierLoad = tf.keras.models.load_model('level.h5')

import numpy as np
from keras.preprocessing import image

test_image = image.load_img('static/Out/Test1.jpg', target_size=(200, 200))
img1 = cv2.imread('static/Out/Test1.jpg')
# test_image = image.img_to_array(test_image)
test_image = np.expand_dims(test_image, axis=0)
result = classifierLoad.predict(test_image)

result2 = ''
if result[0][0] == 1:

    result2 = "minor"
elif result[0][1] == 1:

    result2 = "moderate"

elif result[0][2] == 1:
    result2 = "severe"
if (result1 == "front" and result2 == "minor"):
    value = "3000 - 5000 INR"
elif (result1 == "front" and result2 == "moderate"):
    value = "6000 8000 INR"
elif (result1 == "front" and result2 == "severe"):
   value = "9000 11000 INR"
elif (result1 == "rear" and result2 == "minor"):
    value = "4000 - 6000 INR"
elif (result1 == "rear" and result2 == "moderate"):
    value = "7000 9000 INR”
elif (result1 == "rear" and result2 == "severe"):
    value = "11000 - 13000 INR"
elif (result1 == "side" and result2 == "minor"):
    value = "6000 - 8000 INR"
elif (result1 == "side" and result2 == "moderate"):
   value = "9000 - 11000 INR”
elif (result1 == "side" and result2 == "severe"):
    value = "12000 - 15000 INR"
else:
    value = "16000 - 50000 INR"
return render_template('userhome.html', prediction=value)
```

7 . TESTING

7.1 TEST CASES

In order to ascertain whether a feature of an application is functioning properly, a test case has components that explain input, action, and an expected result.
A test case is a collection of guidelines that, when followed, will indicate whether or not a specific test objective or target has been successfully validated.

Qualities of an effective 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.

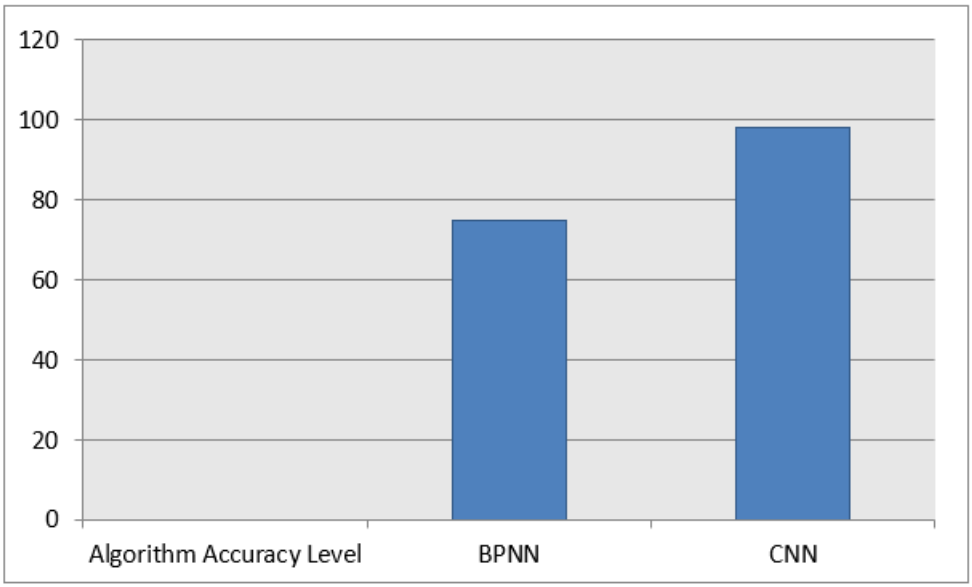
S.NO	Scenario	Input	Excepted output	Actual output
1	User login	User name and password	Login	Login success.
2	Upload Image	Upload damaged vehicle image as a input	Detecting object and analyze for claim insurance	Details are stored in a database.

7.2 USER ACCEPTANCE TESTING

Users, clients, or other authorised organisations conduct this type of testing to determine the specifications and operational practises of an application or piece of software.
Acceptance testing is the most important testing phase since it establishes whether or not the customer will accept the application or software.
It could involve the user interface, functionality, usability, and usefulness of the application.
It is also known as operational acceptance testing, user acceptability testing, and end-user testing

8. **RESULTS**

8.1 PERFORMANCE METRICS



ADVANTAGE

- Digitalized claim process makes easy to use
- Give the accurate result of the damaged vehicle
- Helps the insurance company to analyze the damaged vehicle and also payment process.

DISADVANTAGE

- It will take more time to claim the insurance in manual process
- Because of incorrect claims, the company behaves badly and doesn't make payments currently.
- Poor customer support

10. 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.

11. FUURTE SCOPE

In future work, need to use several regularisation methods with a big dataset in our next work. If we have higher quality datasets that include the characteristics of a car (make, model, and year of production), location data, kind of damaged part, and repair cost, we can predict the cost of a broken automotive component more correctly and reliably.Together with a focus on the vehicle insurance sector, this study paves the way for future photo recognition efforts.By removing human bias, the study was able to accurately validate the existence of damage, its location, and its severity.By including the on-the-fly data augmentation methodologies, they can be further improved.

12. APPENDIX

SOURCE CODE

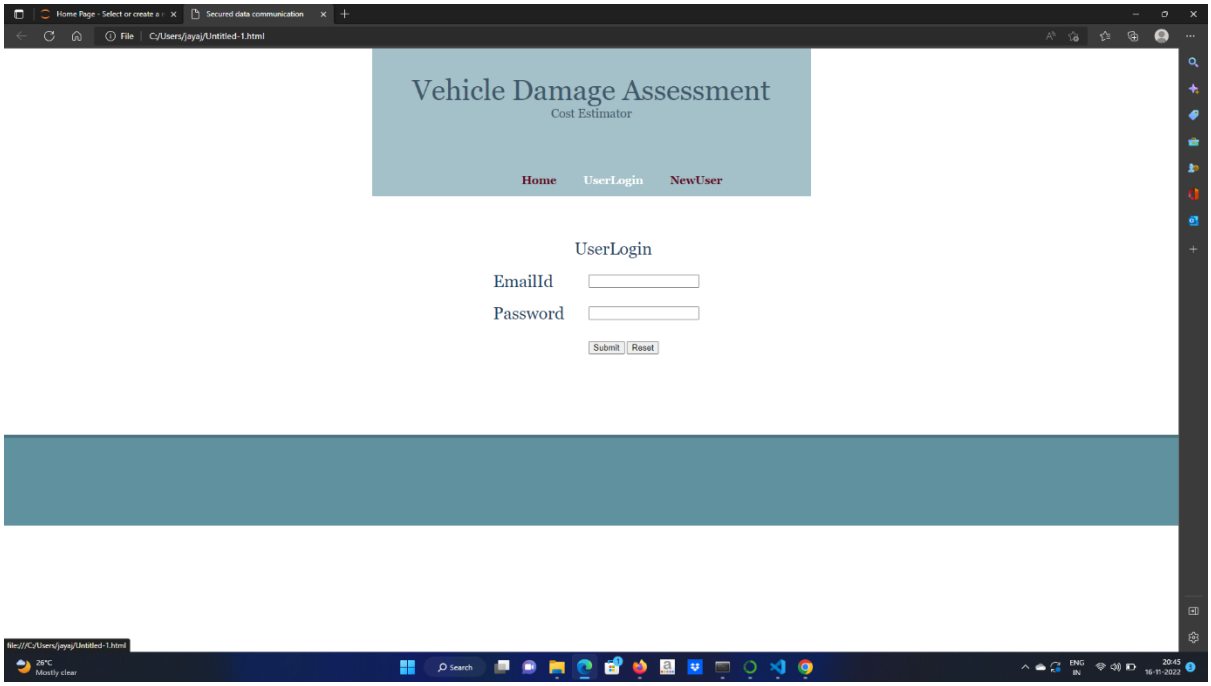
```
import datetime

from flask import Flask, render_template, flash, request,session
from cloudant.client import  Cloudant

import cv2

client = Cloudant.iam("eb55a2b7-ae45-4df8-8d1c-69c5229ffdbe-
bluemix","YzG5FZg9Vs_HScOBZaWyVXm7PpNjbPrmPaPMfHx7w3X9",connect=True)
my_database = client.create_database("database-dharan")


app = Flask(__name__)
app.config.from_object(__name__)
app.config['SECRET_KEY'] = '7d441f27d441f27567d441f2b6176a'



@app.route("/")
def homepage():

    return render_template('index.html')



@app.route("/userhome")
def userhome():

    return render_template('userhome.html')
@app.route("/addamount")

@app.route("/NewUser")
def NewUser():

    return render_template('NewUser.html')







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

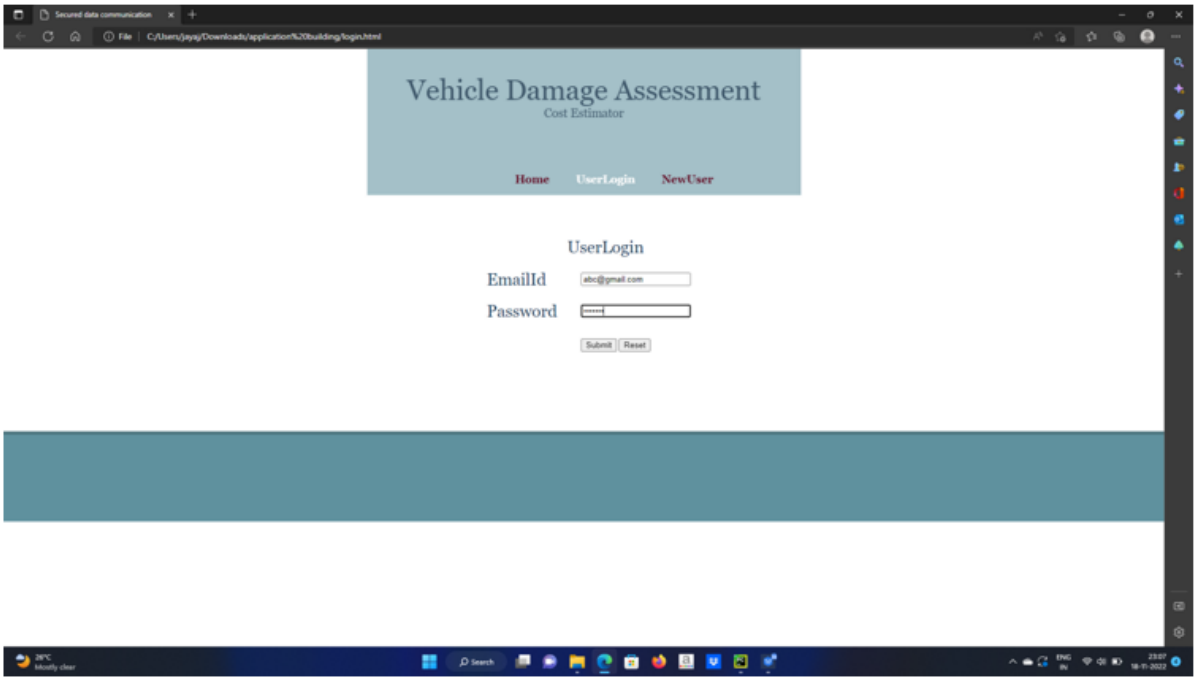
```
@app.route("/newuse",methods=['GET','POST'])
def newuse():
    if request.method == 'POST':#

        x = [x for x in request.form.values()]
        print(x)
        data = {
            '_id': x[1],
            'name': x[0],
            'psw': x[2]
        }
        print(data)
        query = {'_id': {'Seq': 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)
            return render_template('goback.html', data="Register, please login using your
details")
        else:
            return render_template('goback.html', data="You are already a member, please login
using your details")

@app.route("/userlog", methods=['GET', 'POST'])
def userlog():
        if request.method == 'POST':

            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('goback.html', pred="The username is not found.")
            else:
                if ((user == docs[0][0]['_id'] and passw == docs[0][0]['psw'])):

                    return render_template("userhome.html")
                else:
                    return render_template('goback.html',data="user name and password incorrect")
```

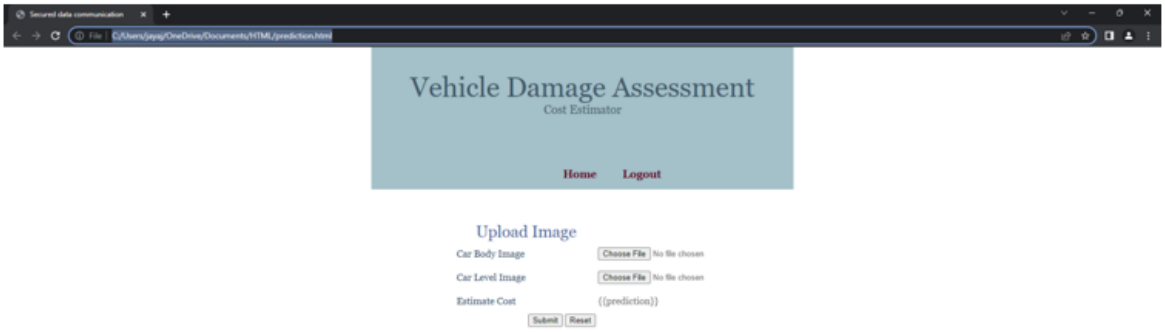
```
@app.route("/predict", methods=['GET', 'POST'])
def predict():
    if request.method == 'POST':


        file = request.files['fileupload']
        file.save('static/Out/Test.jpg')

        import warnings
        warnings.filterwarnings('ignore')

        import tensorflow as tf
        classifierLoad = tf.keras.models.load_model('body.h5')

        import numpy as np
        from keras.preprocessing import image

        test_image = image.load_img('static/Out/Test.jpg', target_size=(200, 200))
        img1 = cv2.imread('static/Out/Test.jpg')
        # test_image = image.img_to_array(test_image)
        test_image = np.expand_dims(test_image, axis=0)
        result = classifierLoad.predict(test_image)

        result1 = ''

        if result[0][0] == 1:

            result1 = "front"


        elif result[0][1] == 1:

            result1 = "rear"

        elif result[0][2] == 1:
            result1 = "side"
        file = request.files['fileupload1']
        file.save('static/Out/Test1.jpg')

        import warnings
        warnings.filterwarnings('ignore')

        import tensorflow as tf
        classifierLoad = tf.keras.models.load_model('level.h5')

        import numpy as np
        from keras.preprocessing import image
```

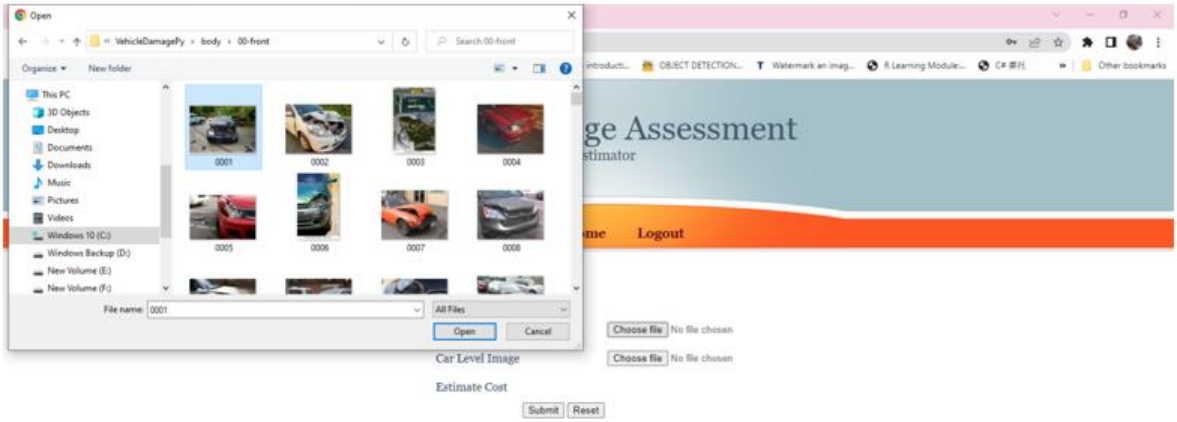
```
        test_image = image.load_img('static/Out/Test1.jpg', target_size=(200, 200))
        img1 = cv2.imread('static/Out/Test1.jpg')
        # test_image = image.img_to_array(test_image)
        test_image = np.expand_dims(test_image, axis=0)
        result = classifierLoad.predict(test_image)

        result2 = ''
      if result[0][0] == 1:

          result2 = "minor"
      elif result[0][1] == 1:

          result2 = "moderate"

        elif result[0][2] == 1:
          result2 = "severe"
      if (result1 == "front" and result2 == "minor"):
          value = "3000 - 5000 INR"
        elif (result1 == "front" and result2 == "moderate"):
          value = "6000 8000 INR"
        elif (result1 == "front" and result2 == "severe"):
          value = "9000 11000 INR"

        elif (result1 == "rear" and result2 == "minor"):
          value = "4000 - 6000 INR"

        elif (result1 == "rear" and result2 == "moderate"):
          value = "7000 9000 INR"

        elif (result1 == "rear" and result2 == "severe"):
          value = "11000 - 13000 INR"

        elif (result1 == "side" and result2 == "minor"):
          value = "6000 - 8000 INR"

        elif (result1 == "side" and result2 == "moderate"):
          value = "9000 - 11000 INR"

        elif (result1 == "side" and result2 == "severe"):
          value = "12000 - 15000 INR"

        else:
          value = "16000 - 50000 INR"


        return render_template('userhome.html', prediction=value)


if __name__ == "__main__":
    app.run(debug=False)
```

OUTPUT


Vehicle Damage Assessment
Cost Estimator
Home
UserLogin
NewUser
UserLogin
EmailId
Password
Submit
Reset


Vehicle Damage Assessment
Cost Estimator
Home
UserLogin
NewUser
UserLogin
EmailId
Password
Submit
Reset


Vehicle Damage Assessment
Cost Estimator
Home
Logout
Upload Image
Car Body Image
Choose File
No file chosen
Car Level Image
Choose File
No file chosen
Estimate Cost
{{prediction}}
Submit
Reset


Open
VehicleDamagePy
body
00-front
Search 00-front
Organize
New folder
This PC
3D Objects
Desktop
Documents
Downloads
Music
Pictures
Videos
Windows 10 (C:)
Windows Backup (D:)
New Volume (E:)
New Volume (F:)
0001
0002
0003
0004
0005
0006
0007
0008
File name: 0001
All Files
Open
Cancel
ge Assessment
stimator
me
Logout
Choose file
No file chosen
Choose file
No file chosen
Car Level Image
Estimate Cost
Submit
Reset


Type here to search
ENG
05:09 PM
11-Nov-2022