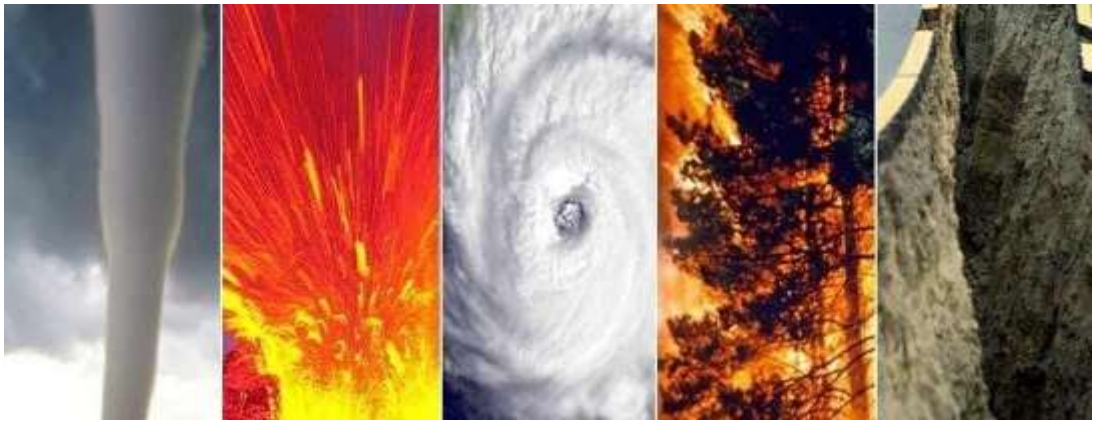
PROJECT REPORT

Natural Disasters Intensity Analysis and Classification using Artificial Intelligence



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IN PARTIAL FULFILLMENT FOR THE AWARD OF THE DEGEREE OF

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

OASYS INSTITUTE OF TECHNOLOGY

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CHAPTER 1
1. INTRODUCTION

1.1 PROJECT OVERVIEW

Natural disasters not only disturb the human ecological system but also destroy the properties and critical infrastructures of human societies and even lead to permanent change in the ecosystem. Disaster can be caused by naturally occurring events such as earthquakes, cyclones, floods, and wildfires. Many deep learning techniques have been applied by various researchers to detect and classify natural disasters to overcome losses in ecosystems, but detection of natural disasters still faces issues due to the complex and imbalanced structures of images. To tackle this problem, we developed a multilayered deep convolutional neural network model that classifies the natural disaster and tells the intensity of disaster of natural The model uses an integrated webcam to capture the video frame and the video frame is compared with the Pretrained model and the type of disaster is identified and showcased on the OpenCV window.

1.2 PURPOSE

Disaster management plays an integral role in **keeping communities safe**. It involves coordinating the resources, such as pollution control systems, and responsibilities, such as following best practice policies, needed to prevent, prepare for, respond to, and recover from emergencies. Natural disasters generally constitute an emergency since they require immediate intervention due to their **high impact on human health and safety**; they affect the normal functioning of working infrastructure, interrupting normal day activities and representing a risk for residents and workers in affected areas.

CHAPTER 2
2. LITERATURE SURVEY

2.1 EXISTING PROBLEM

Natural Disasters Intensity Analysis and Classification Based on Multispectral ImagesUsing Multi-Layered Deep Convolutional Neural Network

Natural hazards pose significant risks throughout the world. They are among the deadliest disasters. These events cause significant economic damage as well, with losses from a large tropical cyclone impacting a developed nation approaching or, at times, exceeding U.S. $100 billion.

Risk analysis is, in broad terms, a systematic process aimed at understanding the nature of risk in a given situation and expressing the risk together with the underlying knowledge base. The primary focus is on artificial intelligence, machine learning, and statistical methods. The proposed model works in two blocks: Block-I convolutional neural network (B-I CNN), for detection and occurrence of disasters,and BlockII convolutional neural network (B-II CNN), for classification of natural disaster intensity types with different filters and parameters.

Tropical Cyclone Intensity Estimation Using Multidimensional Convolutional Neural Network From Multichannel Satellite Imagery

Tropical Cyclone is a severe storm that occurs over the tropical ocean. TC intensity is one of the key parameters for TC prediction and disaster prevention. Accurate estimation of TC intensity is important to theoretical research studies and practical applications. Inspired by the success of deep learning technology in various fields, recent attempts for TC intensity estimation focus on designing effective convolutional neural network (CNN).

We design a deep learning model, called 3DAttentionTCNet, which is inspired by AlexNet. Unlike Alexnet, as the pooling layer compresses some important information resulting in the loss of some intensity features, we remove the pooling layers. In addition, we remove the dropout layer, the reason why we make this adjustment is that dropout regularization technology randomly removes some neurons during the training process. It has been confirmed that removing the dropout layer will cause negative deviations.

Designing Deep-Based Learning Flood Forecast Model With ConvLSTM Hybrid Algorithm

Early detection of natural disasters such as floods can greatly assist humans in reducing the extent of the damage caused by such events. In the Fiji Islands, where this study is focused, recent flood events resulted in major damages amounting to millions of dollars. The loss of at least 225 lives during the 1931 flood event in Fiji was primarily due to the unavailability of efficient flood warning systems.

One simple, yet a robust mathematical tool used to determine the flood state at a particular time for a given area is the Flood Index (*IF*). A model is developed Develop multi-step predictive model using ConvLSTM, as an objective model, with alternative methods of LSTM, CNN-LSTM and SVR that can also determine the flood state.

A Conformal Regressor With Random Forests for Tropical Cyclone Intensity Estimation

Tropical Cyclone is an intense vortex system that originates over the tropical ocean and is one of the most destructive natural disasters. TC intensity usually refers to the maximum wind speed near the TC center. TC intensity is an important indicator to quantify the destruction potential.

The basic idea of using satellite data to estimate the intensity is that the cloud pattern strongly correlates with the TC intensity in the image. It is considered an excellent way to extract features from satellite images to estimate TC intensity. The most common technique is the Dvorak technique. The Dvorak technique tried to estimate the TC intensity using visible or infrared images based on the cloud structure.

Various machine learning models have also been applied to TC intensity estimation. Among them, the most widely used was the linear regression model. A multiple linear regression (MLR) model was constructed based on the extraction of the most significant signals and parameters from satellite infrared images.

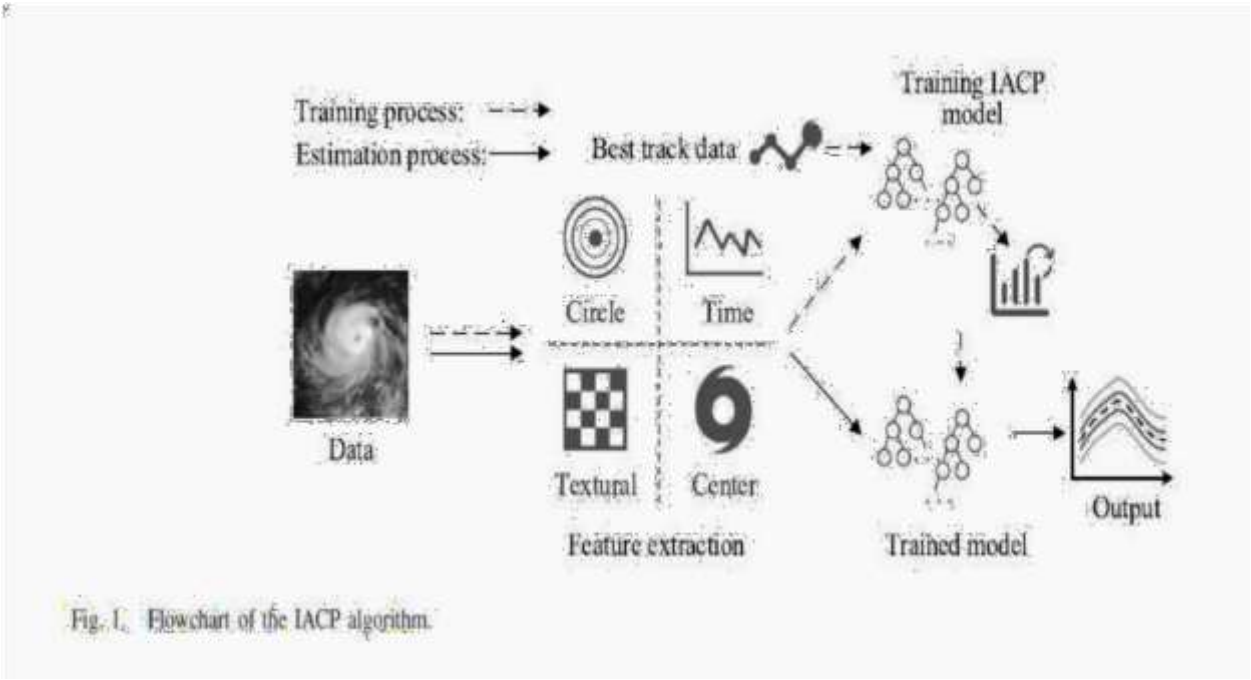

Fig. 1. Flowchart of the IACP algorithm.

5. Rainformer: Features Extraction Balanced Network for Radar-Based Precipitation Nowcasting

Precipitation now casting task is one of the basic challenges in meteorological research. It aims at predicting the rainfall intensity in the future 0–2 h by using specific meteorological information. It has an enormous application range related with human beings. Precipitation now casting methods can be roughly divided into numerical weather prediction (NWP) and extrapolation-based methods. NWP relies on vast complex meteorological data as input data and requires an expensive computing resource. At this point, radar extrapolation-based methods may be a good choice. It does not need other meteorological information and only uses several radar maps/frames to predict future radar maps.

Convolutional long short-term memory (ConvLSTM) is the first ConvRNNbased method applied to the precipitation now casting field to the best of our knowledge. Due to the structure of long short-term memory (LSTM), the ConvRNN-based methods can memorize the past information and effectively capture the movement trend and rainfall intensity variation

of rainfall. Although many prior works are superior to traditional algorithms, several issues remain.

A new framework for precipitation nowcasting named Rainformer is introduced. It can extract global and local features from radar echo maps separately, and fuses balanced these two features to enhance the model's ability to predict heavy rain or rainstorm.

Rainformer consists of an encoder (green box) and decoder (blue box). They both have four stages. When the stage goes deeper, the feature size becomes smaller. Both encoder and decoder include FEBM. FEBM enhances the low to medium and high-intensity rainfall features at every stage.

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   System using Convolution NeuralNetwork; Proceedings of the 2019 International Conference on Communication and Electronics Systems (ICCES);Coimbatore, India.
4. Nguyen D.T., Ofli F., Imran M., Mitra P. Damage assessment from social media imagery data during disasters;Proceedings of the 2017 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining; Sydney,NSW, Australia.

5. D. Han, L. Chan, and N. Zhu, ``Flood forecasting using support vector machines,"

6. X. H. Le, H. V. Ho, G. Lee, and S. Jung, ``Application of long short-term memory (LSTM) neural network for flood forecasting"

7. M. F. Piñeros, E. A. Ritchie, and J. S. Tyo, "Estimating tropical cyclone intensity from infrared image data,"

8. T. L. Olander and C. S. Velden, "Tropical cyclone convection and intensity analysis using differenced infrared and water vapor imagery".

9. X. Shi *et al.*, "Deep learning for precipitation nowcasting: A benchmark and a new model,"

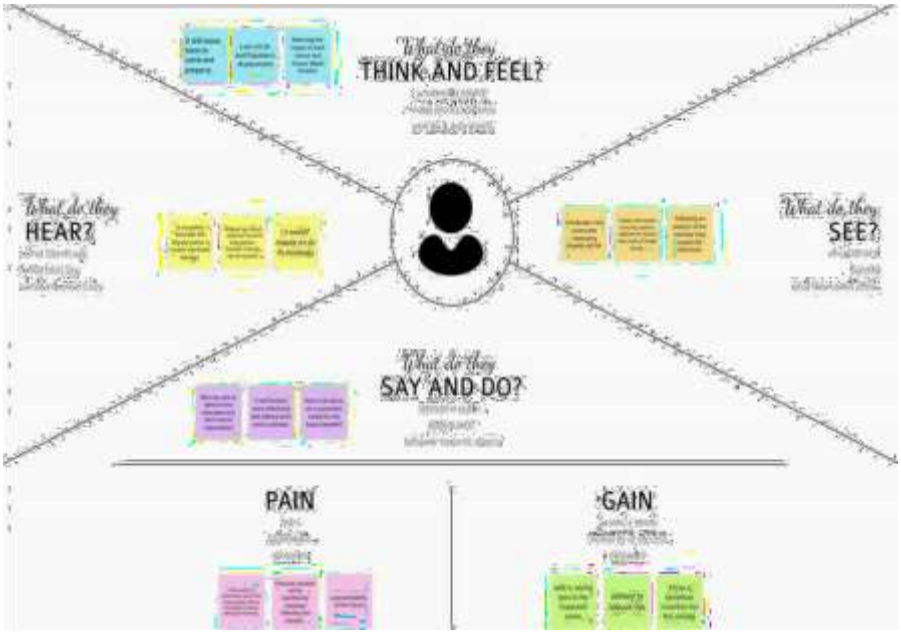
2.3 PROBLEM STATEMENT DEFINITION

"IMD (Indian Meteorology department) is responsible to issue warnings for the rainfall and CWC (Central Water Commission) keeps a record of water reservoirs, however there is a lack of collation of data issued from both these departments. This prevents us from determining the impact/seriousness and due to which there are times where adequate forewarnings are not provided. There are several High rainfall areas, low lying areas or flood prone areas. Currently there are limitations that these areas cannot be alerted before the critical situation because of the data unavailability or unavailability of simulation models which can calculate and predict the data. There is a requirement of data on the area likely to be inundated(depth) by release of water from reservoirs. 3D models may help in calculation of such data.a) Adequate forewarning for the area where floods are likely to occur. b) Low lying areas may be alerted about the release of accurate quantity of water from the reservoirs and thus evacuation/shifting of the people can be planned. c) It will help the Response forces to deploy their resources accordingly d) Prediction of release of water based on rainfall in catchment area and dissemination of an information to the affected public through mobile and other mediums."

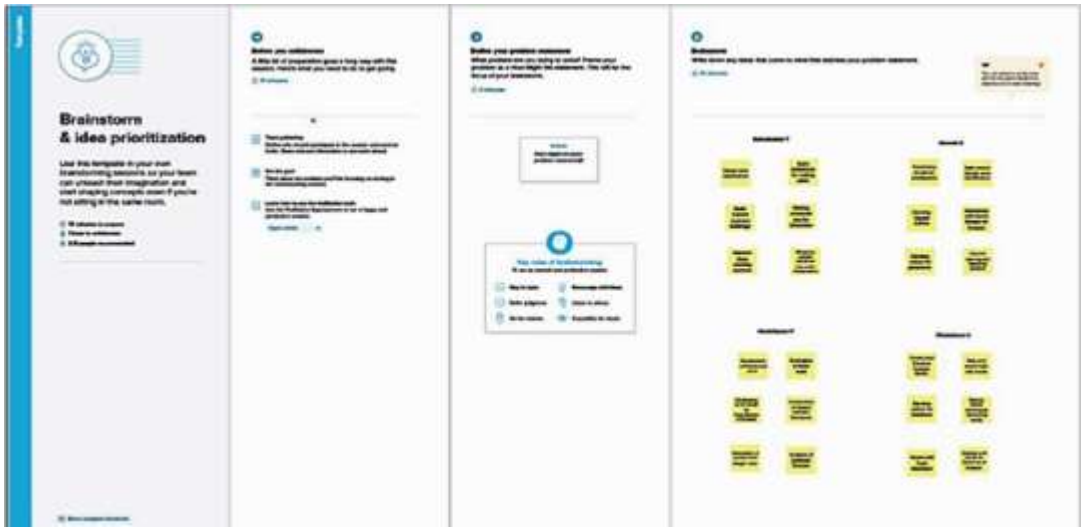
CHAPTER 3

IDEATION AND PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



3.2 IDEATION & BRAINSTORMING



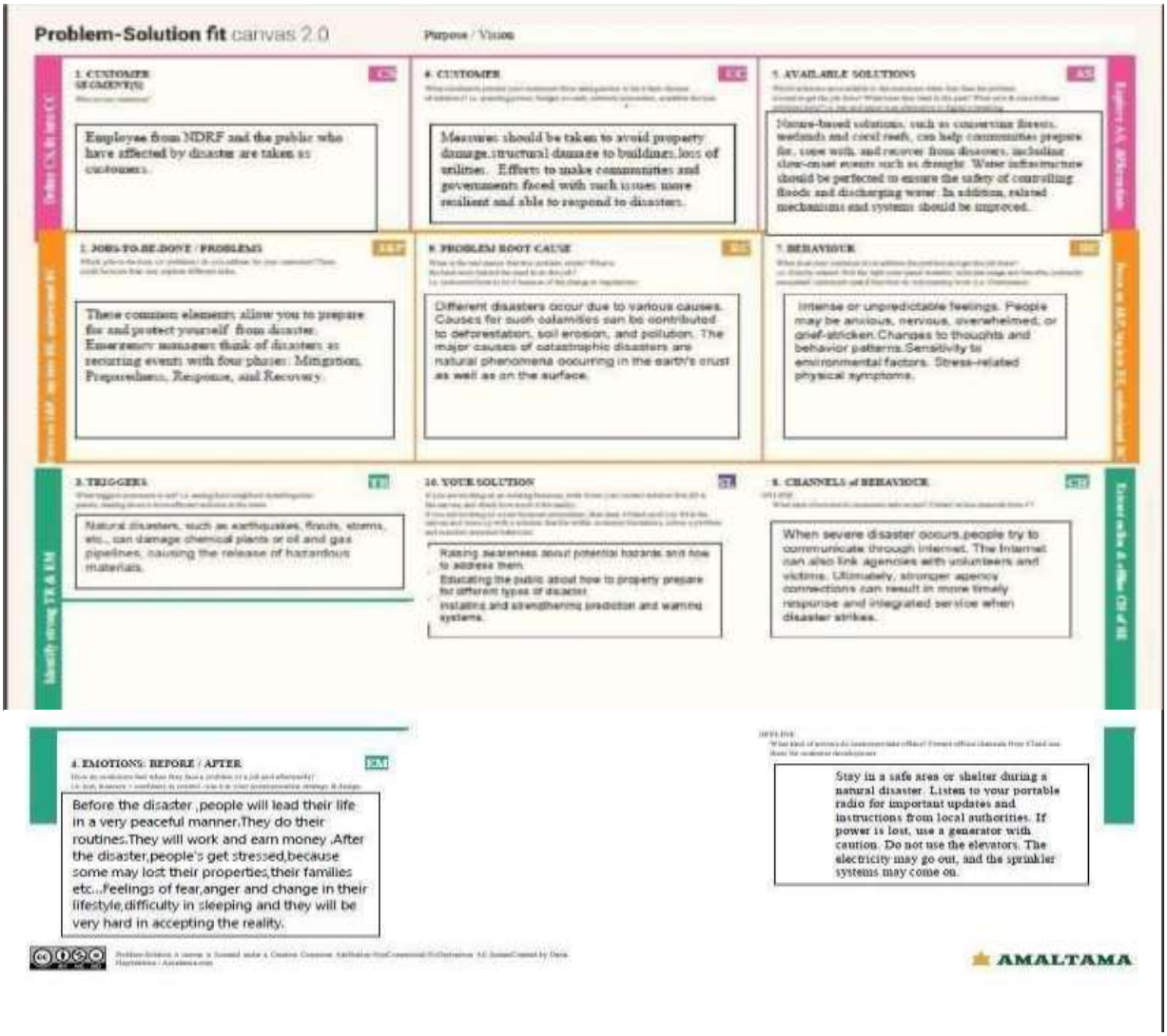
3.3 PROPOSED SOLUTION

S.No	. Parameter	Description
1.	Problem Statement (Problem to be solved)	To classify the natural disaster and the effect based on the webcam image given as input using Artificial Intelligence.
2.	Idea / Solution description	The classification is done by deep learning techniques such as Convolutional Neural Network (CNN) and Machine Learning Techniques.
3.	Novelty / Uniqueness	It is based on the satellite and multispectral image and the classification using Multilayered Deep Convolutional Neural Networks.

4.	Social Impact / Customer Satisfaction	The people can easily identify the type of natural disaster and its effect on the environment which leads to the earlier identification and reduced damage in the ecosystem.
5.	Business Model (Revenue Model)	We build a system that classifies the natural disaster and its intensity and it is believed that the website is useful for all people and also the
		website works for a long time effectively.

6.	Scalability of the Solution	The website will be made available for all the people who needs to classify the type of natural disaster. The machine learning and deep learning algorithms that are being used made it easier for the classification and intensity analysis.

3.4PROBLEM SOLUTION FIT



CHAPTER 4

REQUIREMENT ANALYSIS

4.1 **FUNCTIONAL REQUIREMENTS**

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Request Permission	Access permission from web camera.
FR-2	Disaster Prediction	Based on the webcam image, natural disaster is classified.
FR-3	Accuracy	Since the training and testing images are huge, the accuracy is higher.
FR-4	Speed	The generation of results from the input images are faster.

FR-5	Resolution	The resolution of the integrated web camera should be high enough tocapture the video frames.
FR-6	User Interface	Maximizing the interaction in Web Designing Service.

4.2 NON-FUNCTIONAL REQUIREMENTS

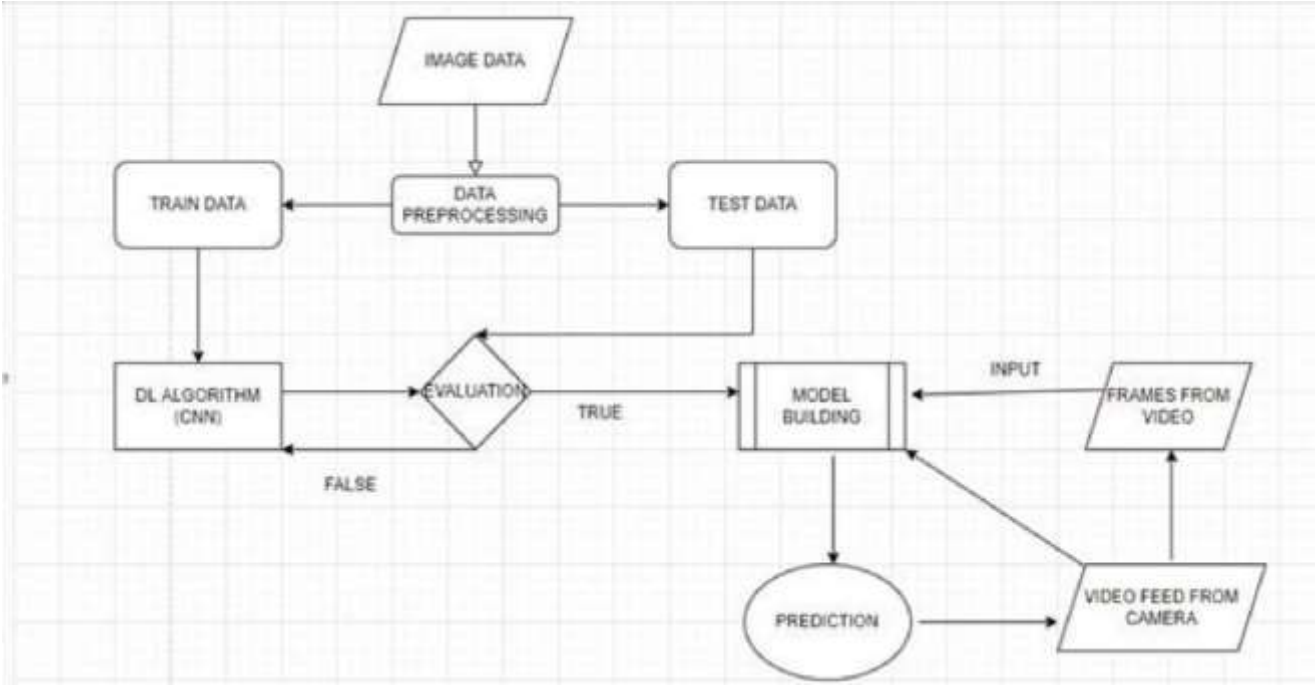
NFR No.	**Non-Functional Requirement**	**Description**
NFR-1	Usability	User friendly and classify the disaster easily.
NFR-2	Security	The model is secure due to the cloud deployment models and also there is no login issue.

NFR-3	Reliability	Accurate prediction of the natural disaster and the website can also be fault tolerant.
NFR-4	Performance	It is shown that the model gives almost 90 percent accuracy after continuous training.
NFR-5	Availability	The website will be made available for 24 hours.
NFR-6	Scalability	The website can run on web browsers like Google chrome, Microsoft edge and also it can be extended to the NDRF and customers.

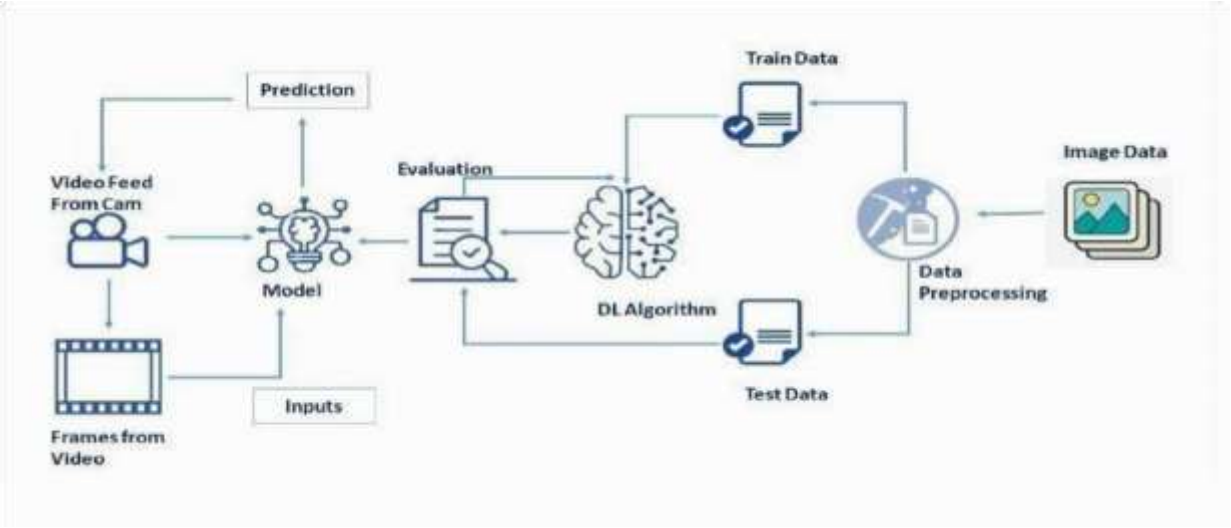
CHAPTER 5
PROJECT DESIGN

5.1 DATA FLOW DIAGRAM

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.



5.2 Solution & Technical Architecture



5.3 USER STORIES

User Type	Functional Requirement (Epic)	User StoryNumber (USN)	User Story / Task	Acceptancecriteria	Priority	Release
End user (Customer)	Registration	USN - 1	As a user, I am able to register with theProduct using my valid emailaddress	I should be able to register with my account credentials	High	Sprint - 1
End User (Customer)	Authentication	USN - 2	As a user, I am able to login into the system with my credentials	It should ensure smooth login capabilities withoutdelay	High	Sprint - 1
End User (Customer)	Designation ofRegion	USN - 3	I can select the regionof interest to be monitored and analyzed	I mustbe able to choose certain specific places without error	High	Sprint - 1

End User (Customer)	Analysis of Required Phenomenon	USN - 4	I am able to monitor certain factors that influence the actions ofthe phenomenon	It should consider and monitormostof the factors involved in the action	High	Sprint - 2
End User (Customer)	Accumulation of required Data	USN - 5	I am able to gather data regarding past events and a detailed report on past analysis	It shouldallow the storage of data ofpast events for certain extent	Medi um	Sprint - 2
End User (Customer)	Organizing Unstructured data	USN - 6	I am able to organizeand restructure the raw data into refineddata	It should ensureeasy and efficient processing methods	Low	Sprint - 3

End User (Customer)	Algorithmselecti on	USN - 7	I am ableto choose the required Algorithmfor a specific analysis	It mustprovide various options for the algorithm to be used	High	Sprint - 2
End User (Customer)	Prediction and analysis of data	USN - 8	I am able to easily predict and visualize thedata	It shouldallow easy to use prediction and visualization techniques	High	Sprint - 3
End User (Customer)	Report generation	USN - 9	I am able to generatea clear and detailed report on the analysis	Report generation must be fast and efficient andshouldnot be complex	Medi um	Sprint - 4

CHAPTER 6
6.PROJECT PLANNING AND SCHEDULING

6.1 SPRINT PLANNING AND ESTIMATION

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	ands on with IBM cloud	USN-1	Setting up of IBM with Cloud service	5	High	M.P.JEEVA,R.NIVETHA
Sprint-1	Dataset Gathering	USN-2	Acquisition of the Natural disasters dataset, Loading into the Cloud, and perform the required Preprocessing	15	High	JEEVA,POOVARASI
Sprint-2	Building the CNN Model	USN-3	Build a CNN Model for Classifying the Disasters by using the appropriate layers, and Split the preprocessed dataset	4	High	JEEVA,SUJITHA
Sprint-2	Train, Test, and Validate	USN -4	Trai n themodel, Validate i t using the Metrics an d test the model on a n anonymou s image/video, usin g the partitioned dataset	8	High	JEEVA,SABARI

Sprint-2	zation and Intensity detection	USN-5	Improv e on the Accuracy and time complexity o f the model, an d include features fo r predicting th e intensity of classified disaster	8	High	NIVETHA,SABARI,
Sprint-3	User Interface Dashboard and Login	USN-6	As a user, I can register for the application by entering my email, password, and verifying account via mail	10	Medium	SUJITHA,POOVARASI
Sprint-3	ootage and Location retrieval service	USN-7	As a web user, I must capture and upload any image or video footage of NaturalDisaster Occurrences with better clarity, and can also provide on the location of Occurrence	10	High	JEEVA,SABARI
Sprint-4	Models Outputs through UI and alerts	USN-8	Ensure accurate classification of disaster, and provide the necessary alerts based on intensity to the user through the Web App	10	High	JEEVA,NIVETHA
Sprint-4	ogin using Third party Service Accounts	USN-9	As a user, I can use the feature of OAuth to login using Gmail or Facebook	5	Low	JEEVA,POOVARASI

Sprint-4	Web Page Optimization and customer support	USN-10	As a user, I must have a smooth interface for which the server should withstand huge loads, and get my queries solved and site failures rectified	5	Medium	SUJITHA,SABARI

6.2 SPRINT DELIVERY schedule:

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

6.3 Reports from JIRA

A Roadmap for the Sprint Delivery using Scrum

CHAPTER 7

7.CODING & SOLUTIONING

Feature 1:

A convolutional neural network is a class of artificial neural networks. It is a Deep Learning algorithm that can take in an input image, assign importance to various objects in the image and be able to differentiate one from the other. The pre-processing required in a ConvNet is much lower as compared to other classification algorithms.
The advantage of CNNs is to provide an efficient dense network which performs the prediction or identification efficiently.

Code is attached below.

Feature 2:

We developed a multilayered deep convolutional neural network model that classifies the natural disaster and tells the intensity of disaster of natural The model uses an integrated webcam to capture the video frame and the video frame is compared with the Pre-trained model and the type of disaster is identified and showcased on the

OpenCV window. A multilayer neural network with appropriate weights has been shown to be able to approximate any input-output function making it an attractive tool for modeling and forecasting.
Code is attached below.

Model Building:

```
from tensorflow.keras.preprocessing.image import ImageDataGenerator

#Configuring image Data Generator Class


#Setting Parameter for Image Augmentation for training data

train_datagen = ImageDataGenerator(rescale = 1./255, shear_range = 0.2, zoom_range = 0.2, horizontal_flip = True) #Image Data
Augmentation for testing data

test_datagen = ImageDataGenerator(rescale = 1./255)
#Performing data augmentation to train data

x_train = train_datagen.flow_from_directory('/content/drive/MyDrive/dataset/test_set', target_size = (64,64), batch_size = 5,
color_mode = 'rgb', class_mode = 'categorical')

#performing data augmentation to test data

x_test = test_datagen.flow_from_directory('/content/drive/MyDrive/dataset/train_set', target_size = (64,64), batch_size = 5,
color_mode = 'rgb', class_mode = 'categorical')

#importing neccessary libraries

import numpy as np import tensorflow from

tensorflow.keras.models import Sequential from

tensorflow.keras.layers import

Dense,Conv2D,MaxPooling2D,Flatten

# initialising the model and adding CNN layers

model = Sequential()
```

```
# First convolution layer and pooling model.add(Conv2D(32,(3,3),input_shape=(64,64,3),activation='relu'))
model.add(MaxPooling2D(pool_size=(2,2)))

#Second convolution layer and pooling model.add(Conv2D(32,(3,3),activation='relu'))
model.add(MaxPooling2D(pool_size=(2,2)))

#Flattening the layers model.add(Flatten())

#Adding Dense Layers model.add(Dense(units=128,activation='relu'))
model.add(Dense(units=4,activation='softmax'))

# Summary of our model

model.summary()

# Compiling the model

model.compile(optimizer='adam', loss='categorical_crossentropy',
metrics=['accuracy']) # Fitting the model

model.fit_generator(generator=x_train,steps_per_epoch=len(x_train),epochs=20,validation_data=x_test,validat
ion_steps=len(x_test)) # Save the model

model.save('disaster.h5') model_json =

model.to_json() with open("model-

bw.json", "w") as json_file:

json_file.write(model_json)
```

CHAPTER 8

8. TESTING

8. TESTING: 8.1 Test Cases **:**

Test Case ID	**Component**	**Test Scenario**	**Expected Result**	**Actual Result**	**Status**
TC_001	Home Page	Verify user is able to see the Home page	Home page should Display	Working as expected	Pass
TC_002	Home Page	Verify the UI elementsin Home page	Application should show below UI elements: Home page button Intro page buttonOpen webcam button	Working as expected	Pass
TC_003	Home Page	Verify user is able to see the cards about Disaster	Application should show the cards about Disaster.	Working as expected	Pass
TC_004	Home Page	Verify user is able to navigate to the required page	Application should navigate to the Intro page	Working as expected	Pass
TC_005	Intro Page	Verify user is able to see the Intro page	Intro page should display	Working as expected	Pass

TC_006	Intro Page	Verify the UI Elements in Intropage	Application should show below UI elements: Home page Intro page Open webcam button	Working as expected	Pass
TC_007	Intro Page	Verify the user is able to see the introduction of the Disaster	Application should show the sentences about the Disaster	Working as expected	Pass

Test-Case Analysis

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

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	9	0	0	9
Client Application	40	0	0	40
Security	3	0	0	3
Out-source Shipping	3	0	0	3
Exception Reporting	8	0	0	8
Final Report Output	4	0	0	4
Version Control	2	0	0	2

8.2 User Acceptance Testing :

This document serves as a quick reference for the Deep Learning Fundus Image Analysis for Early Detection of Diabetic Retinopathy project's test coverage and open issues as of the project's release for user acceptance testing.

Defect Analysis:-

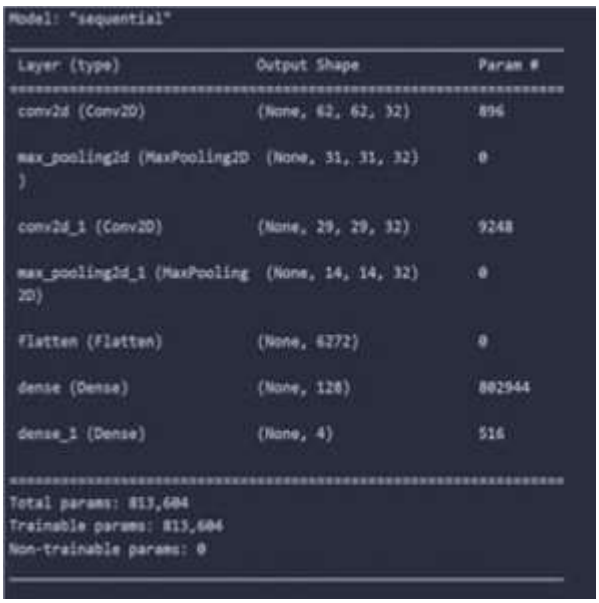
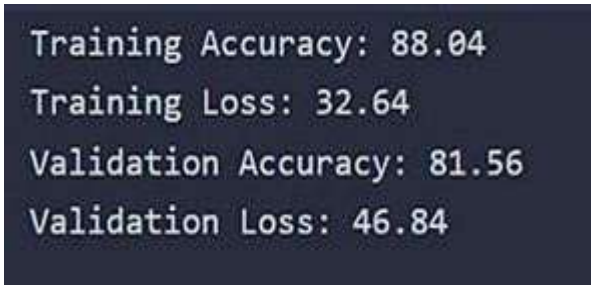
This shows how many bugs were fixed or closed at each severity level and how they were fixed.

CHAPTER 9

9.RESULTS

9.1 PERFORMANCE METRICS

S.No.	Parameter	Values	Screenshot
1.			

	Model Summary	-	
2.	Accuracy	Training Accuracy – 88.04% Valida on Accuracy - 81.56%	

CHAPTER -10
10.ADVANTAGES & DISADVANTAGES

ADVANTAGES:

1. breaks and time offs to balance their work life and personal life. But AI can work endlessly without breaks.
2. With the use of various AI-based techniques, we can also anticipate today's weather and the days ahead.
3. Helpful in getting life back on track..
4. Their Alert nature able to respond effectively and efficiently which defend the society from large scale damages.

DISADVANTAGES:-

1. It involves huge money to be equipped.
2. Problems faced in life basic needs.
3. One application of artificial intelligence is a robot, which is displacing occupations and increasing unemployment .
4. Machines can perform only those tasks which they are designed or programmed to do, anything out of that they tend to crash or give irrelevant outputs which could be a major backdrop.

CHAPTER 11
11.CONCLUSION

Many researchers have attempted to use different deep learning methods for detection of natural disasters. However, the detection of naturaldisasters by using deep learning techniques still faces various issues dueto noise and serious class imbalance problems.To address these problems, we proposed a multilayered deep convolutional neural network for detection and intensity classification of natural disasters. The proposed method works in two blocks—one for detection of natural disaster occurrence and the second block is used to remove imbalanced class issues.The results were calculated as average statistical values: sensitivity, 97.54%; specificity, 98.22%; accuracy rate, 99.92%; precision, 97.79%; and F1-score, 97.97% for the proposed model. The proposed model achieved the highest accuracy as compared to other state-of-the-art methods due to its multilayered structure. The proposed model performs significantly better for natural disaster detection and classification, but in the future the model can be used for various natural disaster detection processes.

CHAPTER 12
12.FUTURE SCOPE

AI -smart technology, which has enabled accurate and speedy solutions. If harnessed properly, the technology has the potential of predicting, preventing and providing response faster than ever.

AI data setups are trained to predict seismic data to analyze the patterns of earthquake occurrences, rainfall records and monitor flooding, measure the intensity of hurricanes and read the geological data to understand volcanic eruptions, such systems can reduce the catastrophic impact of natural disasters.

Last year, Google's Pilot project to monitor flood in India with the help of AI, was a successful one – it was a Patna project. They were able to predict floods and the regions that it would be affected due to the natural disaster with an accuracy of over 90%. It was possible owing to the combination of data from government agencies that provide onground information – from measuring devices placed on the spot and satellite captured images of flood-prone areas. They ran hundreds of thousands of simulations on its machine learning (ML) models to predict the flow of water.In the future, leveraging AI can help disaster management bodies install drones, sensors and robots to provide accurate information about damaged buildings and landscapes, potential floods, making rescue missions safer and less time-consuming.

There is a need for smart technology to be integrated within our local communities. Immediate response and tech-based solutions can help reduce the extent of damage. However, since AI is based on machine codes, there is a scope of limitations and errors. However, the amalgamation of human, empathy and alertness, could do wonders in the field of crisis management.

APPENDIX

SOURCE CODE:

home.html:

```
<html>

<script>


</script>


<style>

.header {       position: relative;

                        top:0;

                        margin:0px;
        z-index: 1;                             left: 0px;
                right: 0px;                             position:

fixed;                          background-color:

#FCAD98 ;                       color: white;


                        box-shadow: 0px 8px 2px grey;

                        overflow: hidden;
        padding-left:20px;


        font-family: 'Josefin Sans';        font-size:

2vw;


        width: 100%;

        height:8%;


                        text-align: center;
                }
```

```
                .topnav {
  overflow: hidden;   backgroundcolor:
#FCAD98;

}

.topnav-right a {    float:
left;  color: black;  text-
align: center;   padding:
14px   16px;         text-
decoration: none;   font-
size: 18px;

}

.topnav-right a:hover {   backgroundcolor:
#FCAD98;

  color: black; }


.topnav-right a.active {   backgroundcolor:
#FCAD98;

  color: white; }

.topnav-right {     float:
right;
paddingright:100px;
```

```
}

body { background-image: -webkit-linear-gradient(90deg, skyblue 0%, steelblue
100%); background-image: url(""); background-size: cover;
backgroundattachment: fixed; background-size: 100% 100%; background-
color: ; background-repeat: no-repeat; background-size:cover; background-
position:

0px 0px;

 }
 .button { background-color:
#091425; border: none;
color: white; padding: 15px
32px; text-align: center; text-
decoration: none; display:
inline-block; fontsize: 12px;
border-radius:

16px;

}
.button:hover { box-shadow: 0 12px 16px 0 rgba(0,0,0,0.24), 0 17px 50px 0 rgba(0,0,0,0.19);

} form {border: 3px solid #f1f1f1; margin-left:400px;marginright:400px;}

input[type=text], input[type=password] {
width: 100%; padding: 12px 20px;
display: inline-block;
marginbottom:18px; border: 1px solid
#ccc; box-sizing: border-box;
```

```
}

button {  background-color:
#091425;  color:  white;
padding:  14px  20px;
margin-bottom:10px;
border:  none;  cursor:
pointer;  width:  17%;
border-radius:4px;
fontfamily:Montserrat;

}

button:hover {  opacity:
0.8; }


.cancelbtn {  width: auto;  padding:
10px 18px;  background-color:
#f44336;

}

.imgcontainer {  textalign:
center;  margin:

24px 0 12px 0;

}
```

```
img.avatar {    width:

30%;   border-radius:

50%;


}


.container {    padding:

16px;


}


span.psw {

  float: right;
  padding-top: 16px;

}


/* Change styles for span and cancel button on extra small screens */

@media screen and (max-width: 300px) {

span.psw {      display: block;      float: none;

}


  .cancelbtn {

width: 100%;
  }

}


.home{

        margin:80px;
```

```
  width: 84%;   height:
500px;   paddingtop:10px;
padding-

left: 30px;

    }

.login{

       margin:80px;

  box-sizing: content-box;    width:
  84%;   height:
420px;   padding: 30px;     border:
10px solid blue; }


.left,.right{     box-sizing:
content-box;         height:
400px;        margin:20px;
border: 10px solid blue;


}


.mySlides {display: none;} img
{vertical-align: middle;}

/* Slideshow container */
.slideshow-container {    max-width:
1000px;

position: relative;
margin: auto; }
```

```
/* Caption text */
.text {  color:
#f2f2f2;  fontsize:
15px; padding:
8px 12px;
position: absolute;
bottom: 8px;
width: 100%;

text-align: center;

}
/* The dots/bullets/indicators */  .dot
{  height: 15px;  width: 15px;
margin: 0 2px;  background-color:
#bbb;  border-radius: 50%;  display:
inline-block;  transition:
backgroundcolor 0.6s ease;

}

.active {  background-color:
#FCAD98;

}

/* Fading animation */
.fade {
  -webkit-animation-name: fade;
```

```
 -webkit-animation-duration: 1.5s; animation-name: fade;
 animation-duration: 1.5s;

}

@-webkit-keyframes fade {   from
{opacity: .4}   to
{opacity: 1}
}

@keyframes fade {
from {opacity: .4}   to
{opacity: 1}

}

/* On smaller screens, decrease text size */
@media only screen and (max-width: 300px) {
  .text {font-size: 11px}
}
```

```
@import url('https://fonts.googleapis.com/css2?family=Poppins&display=swap');

* {   box-sizing: borderbox;

}

body {   min-height: 100vh;
margin: 0;   color: #fff;
fontfamily: 'Poppins',sans-serif;
display: flex;   align-items: center;
justify-content: center;
background-color: #f5f5f5;

}

.container {   maxwidth:
1376px;   margin: auto;
padding:

2rem 1.5rem;

}

.cards { display: flex;
  flex-
```

```
  wrap: wrap;
  align-items:
  center;
  justifycontent:
  center;

}

.card  {        cursor:  pointer;
background-color:  transparent;
height:  300px;      perspective:
1000px;          margin:  1rem;
alignitems:  center;      justify-
content: center;

}

.card h3 {  border-bottom: 1px #fff
solid;  padding-bottom:

10px;  margin-bottom: 10px;  text-align: center;  font-size:
1.6rem;  word-spacing: 3px;

}

.card p{ opacity:
  0.75; font-size: 0.8rem;
       line-

  height: 1.4;
```

```
}

.card img {   width:
360px;       height:
300px;   object-fit:
cover;
borderradius: 3px;

}

.card-inner  {       position:
relative;      width:  360px;
height:  100%;    transition:
transform                0.9s;
transformstyle:    preserve-
3d;

}

.card:hover .card-inner {   transform:
rotateY(180deg);

}

.card-front,
.card-back { position:
  absolute; width:
  360px; height: 100%;
  -webkitbackface-
```

```
  visibility: hidden;
  backfacevisibility:
  hidden;

}

.card-back {   background-
color: #222;   color: #fff;   padding:
1.5rem;   transform:
rotateY(180deg);

} .text-block {   position:
absolute;   bottom: 20px;
right: 20px;
backgroundcolor: black;
color: white;

  padding-left: 20px;   paddingright:
20px;

}
</style>

<body>
<div class="header">
<div style="width:50%;float:left;font-size:2vw;text-align:left;color:black; padding-top:1%;padding-
left:5%;">AI based
Natural disaster analysis</div>
  <div class="topnav-right"style="padding-top:0.5%;">
```

```
    <a class="active" href="/home">Home</a>
    <a href="/intro">Introduction</a>
    <a href="/upload">Open Web Cam</a>
  </div>
</div>



<div class="container">


      <div class="cards">


          <div class="card">
             <div class="card-inner">
                <div class="card-front">
                    <img src="https://images.unsplash.com/photo-1454789476662-
53eb23ba5907?ixid=MXwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHw%3D&ixlib=rb-
1.2.1&auto=format&fit=crop&w=689&q=80"
                       alt="">
<div class="text-block">
    <h2>Cyclone</h2>
    <p>violent winds, torrential rain, high waves and, very destructive storm</p>
</div>
```

```
            </div>

            <div class="card-back">

               <h3>Cyclone</h3>

               <p>The effects of tropical cyclones include heavy rain, strong wind, large storm surges near landfall, and tornadoes. The destruction from a tropical cyclone, such as a hurricane or tropical storm, depends mainly on its intensity, its size, and its location.</p>

            </div>

          </div>

        </div>
```

```
<div class="container">


      <div class="cards">


         <div class="card">

            <div class="card-inner">

               <div class="card-front">

                  <img src="https://images.unsplash.com/photo-1603869311144-
66
b03d340b32?ixid=MXwxMjA3fDB8MHxzZWFyY2h8M3x8ZWFydGhxdWFrZXxlbnwwfHwwfA%3D%
3D&ixlib=r b-1.2.1&auto=format&fit=crop&w=500&q=60"

                     alt="">

<div class="text-block">


 </div>


            </div>
```

```
            <div class="card-back">


    <h2>Earth Quake</h2>
    <p>Sudden release of stored energy in the Earth's crust that creates seismic waves.</p>


                <h3>Earth Quake</h3>

                <p>Earthquakes are usually caused when rock underground suddenly breaks along a fault.
                This sudden
release of energy causes the seismic waves that make the ground shake. ... During the earthquake and
afterward, the plates
or blocks of rock start moving, and they continue to move until they get stuck again.</p>

            </div>

          </div>

        </div>




<div class="container">


    <div class="cards">


        <div class="card">

          <div class="card-inner">

            <div class="card-front">

              <img src="https://images.unsplash.com/photo-1547683905-
f686c993aae5?ixid=MXwxMjA3fDB8MHxzZWFyY2h8MXx8Zmxvb2R8ZW58MHx8MHw%3D&ixlib=rb-
1.2.1&auto=format&fit=crop&w=500&q=60"


  </div>


            </div>
```

alt="">

<h2>Flood</h2>

A flood is an overflow of water on normally dry ground

<h3>Flood</h3>

During heavy rain, the storm drains can become overwhelmed or plugged by debris and flood the roads and buildings nearby. Low spots, such as underpasses, underground parking garages, basements, and low water crossings can become death traps. Areas near rivers are at risk from floods.

<img src="https://images.unsplash.com/photo-1473260079709-83c808703435?ixid=MXwxMjA3fDB8MHxzZWFyY2h8NHx8d2lsZGZpcmV8ZW58MHx8MHw%3D&ixlib=rb-

1.2.1&auto=format&fit=crop&w=500&q=60"

alt="">

<h2>WildFire</h2>

Uncontrolled fire in a forest, grassland, brushland

back">
<div class="card-

<h3>Wildfire</h3>

Wildfires can be caused by an accumulation of dead matter (leaves, twigs, and trees) that can create enough heat in some instances to spontaneously combust and ignite the surrounding area. Lightning strikes the earth over 100,000 times a day. 10 to 20% of these lightning strikes can cause fire.

</body>

<html> **intro.html:**

<html>

<script>

</script>

<style>

.header { position: relative;

top:0;

margin:0px;

z-index: 1;

left: 0px;

right: 0px;
position: fixed;

```
  background-color: rgba(100, 100, 100, 0.5) ;
                              color: white;
          box-shadow: 0px 8px 4px grey;
    overflow: hidden;
          padding-left:20px;
                              font-family: 'Josefin Sans';
                              font-size: 2vw;
          width: 100%;
          height:8%;
                              text-align: center;
                    }
                    .topnav {
  overflow: hidden;   backgroundcolor:
#FCAD98;

}

.topnav-right a {    float:
left;   color: black;   text-
align: center;   padding:
14px   16px;          text-
decoration: none;   font-
size: 18px;

}
```

```
.topnav-right a:hover {   backgroundcolor:
#FCAD98;

  color: black; }

.topnav-right a.active {   backgroundcolor:
#FCAD98;

  color: white; }

.topnav-right {   float:
right;   paddingright:100px;

}

body {

  background-color: ;   backgroundrepeat:
no-repeat;   backgroundsize:cover;

    background-size: cover;   background-position: 0px 0px;
  }
  .button {   background-color:
#091425;          border:   none;
color:  white;     padding:  15px
32px;   text-align: center;   text-
```

```
decoration: none; display:
inline-block; fontsize: 12px;
border-radius:

16px;

}
.button:hover { box-shadow: 0 12px 16px 0 rgba(0,0,0,0.24), 0 17px 50px 0
rgba(0,0,0,0.19);

} form {border: 3px solid #f1f1f1; margin-left:400px;marginright:400px;}



input[type=text], input[type=password] {
width: 100%; padding: 12px 20px;
display: inline-block;
marginbottom:18px; border: 1px solid
#ccc; box-sizing: border-box;

}

button { background-color:
#091425; color: white; padding:
14px 20px; margin-bottom:10px;
border: none; cursor: pointer;
width: 17%; border-radius:4px;
fontfamily:Montserrat;

}
```

```
button:hover {
opacity: 0.8; }


.cancelbtn {  width: auto;
padding: 10px 18px;  background-
color: #f44336;

}

.imgcontainer {  textalign:
center;  margin:
24px 0 12px 0;

}

img.avatar {  width:
30%;  border-radius:
50%;

}

.container {
padding: 16px;

}
```

```
span.psw {     float:
right;   paddingtop:
16px;


}


/* Change styles for span and cancel button on extra small screens */
@media screen and (max-width: 300px) {
span.psw {      display: block;       float:
none;

}

  .cancelbtn {
width: 100%;


  }
}


.home{
            margin:80px;


  width: 84%;    height:
500px;
paddingtop:10px;
paddingleft: 30px;



}
```

```
.login{
        margin:80px;
 box-sizing: content-box;
width: 84%;   height: 420px;
padding: 30px;     border:
10px solid blue;

}      .left,.right{      box-
sizing:        content-box;
height:              400px;
margin:20px;       border:
10px solid blue;

}

.mySlides {display: none;} img
{vertical-align: middle;}


/* Slideshow container */
.slideshow-container {
max-width: 1000px;
position: relative;
margin: auto; }


/* Caption text */
.text {   color:
```

```
#f2f2f2;   font-size:
15px;   padding: 8px
12px; position:
absolute; bottom:
8px;    width: 100%;
textalign: center;

}
/* The dots/bullets/indicators */  .dot
{   height: 15px;   width: 15px;
margin: 0 2px;   background-color:
#bbb;   border-radius: 50%;   display: inline-block;   transition: backgroundcolor 0.6s ease;

}

.active {   background-color:
#FCAD98;

}

/* Fading animation */
.fade {
  -webkit-animation-name: fade;   -webkitanimation-duration:
1.5s;   animation-name:
fade; animation-duration: 1.5s;
}
```

```
@-webkit-keyframes fade {    from

{opacity: .4}    to

{opacity: 1}

}

@keyframes fade {

from {opacity: .4}    to

{opacity: 1}

}

/* On smaller screens, decrease text size */

@media only screen and (max-width: 300px) {

  .text {font-size: 11px}

}

@import url("https://fonts.googleapis.com/css?family=Montserrat&display=swap");

* { padding:

  0; margin:

  0;

}

body {     height: 100vh;

display:                  flex;
```

```
flexdirection:     column;

justify-content:    center;

align-items: center;


}

h1 {   font-family: "Montserrat Medium";   max-width:

90ch;   text-align: center;   transform: scale(0.94);

animation: scale 3s forwards cubic-bezier(0.5, 1, 0.89, 1);


}

@keyframes scale {

100% {     transform:

scale(1);


  }

}


span {
```

```
  display:    inline-block;
opacity:    0;          filter:
blur(4px);

}

span:nth-child(1) {    animation: fade-in 1s 0.1s forwards
cubicbezier(0.11, 0, 0.5, 0);

}

span:nth-child(2) {    animation: fade-in 0.8s 0.2s forwards
cubicbezier(0.11, 0, 0.5, 0);

}

span:nth-child(3) {    animation: fade-in 0.8s 0.3s forwards
cubicbezier(0.11, 0, 0.5, 0);

}

span:nth-child(4) {    animation: fade-in 0.8s 0.4s forwards
cubicbezier(0.11, 0, 0.5, 0);

span:nth   animation: fade-

}
```

```
span:nth   animation: fade bezier(0.11, 0, 0.5, 0);


}
}









            child(5) { in 0.8s 0.5s forwards cubic-bezier(0.11, 0, 0.5,

                    0); child(6)

            {

                    -in 0.8s 0.6s forwards cubic-




span:nth-child(7) {   animation: fade-in 0.8s 0.7s forwards

cubicbezier(0.11, 0, 0.5, 0);


}




span:nth   animation: fade-


}
```

```
span:nth   animation: fade bezier(0.11, 0, 0.5, 0);


}
}
span:nth-child(8) {   animation: fade-in 0.8s 0.8s forwards

cubicbezier(0.11, 0, 0.5, 0);


}


span:nth-child(9) {   animation: fade-in 0.8s 0.9s forwards cubic-

bezier(0.11, 0, 0.5, 0);









span:nth-child(10) {   animation: fade-in 0.8s 1s forwards

cubicbezier(0.11, 0, 0.5, 0);


}


        child(11) { in 0.8s 1.1s forwards cubic-bezier(0.11, 0, 0.5,

                0); child(12) {


span:nth   animation: fade-


}
```

```
span:nth   animation: fade bezier(0.11, 0, 0.5, 0);


}
}
                    -in 0.8s 1.2s forwards cubic-



span:nth-child(13) {   animation: fade-in 0.8s 1.3s forwards

cubicbezier(0.11, 0, 0.5, 0);


}


span:nth-child(14) {   animation: fade-in 0.8s 1.4s forwards

cubicbezier(0.11, 0, 0.5, 0);









span:nth-child(15) {   animation: fade-in 0.8s 1.5s forwards

cubicbezier(0.11, 0, 0.5, 0);


span:nth   animation: fade-


}
```

```
span:nth   animation: fade bezier(0.11, 0, 0.5, 0);


}
}
}


span:nth-child(16) {   animation: fade-in 0.8s 1.6s forwards

cubicbezier(0.11, 0, 0.5, 0);


}


        child(17) { in 0.8s 1.7s forwards cubic-bezier(0.11, 0, 0.5,

                0);









span:nth   animation: fade-

}
```

```
span:nth   animation: fade bezier(0.11, 0, 0.5, 0);

}




        child(18) {

                                                -in 0.8s 1.8s forwards cubic-



span:nth-child(19) {   animation: fade-in 0.8s 1.9s forwards cubicbezier(0.11,

0, 0.5, 0);

} span:nth-child(20) {   animation: fade-in 0.8s 2.0s forwards cubicbezier(0.11,

0, 0.5, 0);

} span:nth-child(21) {   animation: fade-in 0.8s 2.1s forwards cubicbezier(0.11,

0, 0.5, 0);

} span:nth-child(22) {   animation: fade-in 0.8s 2.2s forwards cubicbezier(0.11,

0, 0.5, 0);

} span:nth-child(23) {   animation: fade-in 0.8s 2.3s forwards cubicbezier(0.11,

0, 0.5, 0);

}span:nth-child(24) {   animation: fade-in 0.8s 2.4s forwards cubicbezier(0.11,

0, 0.5, 0);
```

```
}span:nth-child(25) {    animation: fade-in 0.8s 2.5s forwards cubicbezier(0.11,
0, 0.5, 0);

}span:nth-child(26) {    animation: fade-in 0.8s 2.6s forwards cubicbezier(0.11,
0, 0.5, 0); }span:nth-child(27) {    animation: fade-in
0.8s 2.7s forwards cubic-bezier(0.11, 0, 0.5, 0);
}span:nth-child(28) {    animation: fade-in 0.8s 2.8s forwards cubicbezier(0.11,
0, 0.5, 0); }

@keyframes fade-in {
  100% {
    opacity: 1;     filter:
blur(0);

  }
}

</style>

<body>
<h1>
```

 China, India and the United States   are among the countries of the world most   affected by natural disasters.   Natural disasters have the potential to wreck and even end the lives of those people, who stand in their way. However, whether or not you are likely to be   affected by a natural disaster greatly depends on where in the world you live,

 The objective of   the project is to human build a   web application   to detect the   type of disaster . The input   is taken from the in built web cam,

 which in turn   is   given to the pre trained model . The model predicts the   type of disaster   and displayed on UI.
</h1>

<!--Brian Tracy-->

AI based Natural disaster analysis

<div class="topnav-right"style="padding-top:0.5%;">

Home

Introduction

Open Web Cam

</body>

</html>

upload.html:

<html lang="en">

<head>
<title>Register</title>
<link href="https://cdn.bootcss.com/bootstrap/4.0.0/css/bootstrap.min.css" rel="stylesheet"> <style>

```
.header {           position: relative;
          top:0;    margin:0px;      zindex:
1;        left: 0px;          right: 0px;
          position: fixed;   background-
color: #F36262 ;          color: white;
          box-shadow: 0px 8px 4px grey;
          overflow: hidden;          paddingleft:20px;
          font-family: 'Josefin Sans';
          font-size: 2vw;   width:
100%;
          height:8%;
          text-align: center;



 }
 .topnav {   overflow:
hidden;
  background-color: #FCAD98;
}

.topnav-right a {   float:
left;  color: black;  text-
align: center;   padding:
14px   16px;         text-
decoration: none;   font-
size: 18px;
}

.topnav-right a:hover {    background-
color: #FCAD98;
color: black;
}

.topnav-right a.active {   backgroundcolor:
#FCAD98;   color: white;
}

.topnav-right {
float: right;
  padding-right:100px;
}

body {

  background-color: ;   background-
repeat: no-repeat;   backgroundsize:cover;
  background-image: url("https://i.pinimg.com/originals/b2/1d/c6/b21dc69346915015bc4e19bd502f401b.gif");
background-size: cover;
  background-position: 0px 0px;
```

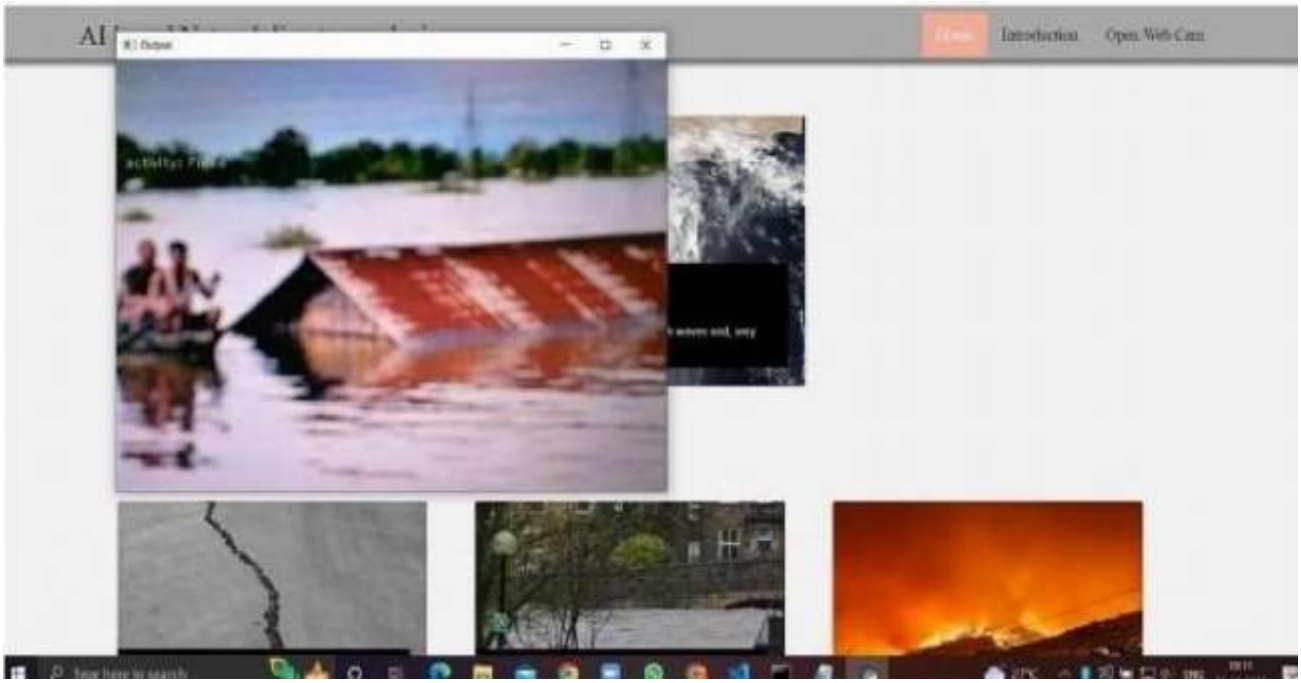
```
  }
.button {    background-color:
#091425;     border: none;
color: white;   padding: 15px
32px;   text-align: center;
textdecoration: none;   display:
inline-block;   font-size: 12px;
border-radius: 16px;



}
.button:hover {
  box-shadow: 0 12px 16px 0 rgba(0,0,0,0.24), 0 17px 50px 0 rgba(0,0,0,0.19);
}
form {border: 3px solid #f1f1f1; margin-left:400px;margin-right:400px;}

input[type=text], input[type=password] {
width: 100%;   padding: 12px 20px;
display: inline-block;   marginbottom:18px;
border: 1px solid #ccc;   box-sizing: border-
box;
}

button {      background-color:
#091425;           color:   white;
padding:        14px        20px;
marginbottom:10px;     border:
none;   cursor: pointer;   width:
17%;           borderradius:4px;
fontfamily:Montserrat;
}

button:hover {
opacity: 0.8;
}

.cancelbtn {    width: auto;
padding: 10px
18px;  background-color:
  #f44336;
}

.imgcontainer {    textalign:
center;   margin:
24px 0 12px 0;
}

img.avatar {    width:
30%;   border-radius:
50%;
```

```
}

.container {   padding:
16px;
}



span.psw {    float:
right;   padding-
top: 16px;
}

/* Change styles for span and cancel button on extra small screens */
@media screen and (max-width: 300px) {
span.psw {     display: block;     float: none;
}    .cancelbtn {
    width: 100%;
  }
}

.home{  margin:80px;

  width: 84%;
height: 500px;   padding-top:10px;
  padding-left: 30px;

}   .login{      margin:80px;
box-sizing:      content-box;
width:    84%;          height:
420px;     padding:     30px;
border: 10px solid blue;
}
.left,.right{     box-sizing:
content-box;         height:
400px;       margin:20px;
border: 10px solid blue;
}

.mySlides {display: none;}
img {vertical-align: middle;}

/* Slideshow container */
.slideshow-container {
max-width: 1000px;
position: relative;   margin:
auto;
}
```

```
/* Caption text */ .text
{   color:
#f2f2f2;      font-size:
15px;    padding: 8px
12px;          position:
absolute;       bottom:
8px;     width: 100%;
text-align: center;
}
/* The dots/bullets/indicators */  .dot
{   height: 15px;   width: 15px;
margin: 0 2px;   background-color:
#bbb;   border-radius: 50%;   display:
inline-block;                  transition:
backgroundcolor 0.6s ease;
}

.active {   background-color:
#FCAD98;
}

/* Fading animation */
.fade {
  -webkit-animation-name: fade;   -webkit-animation-duration: 1.5s;   animation-name: fade;   animation-duration: 1.5s;  }

@-webkit-keyframes fade {   from
{opacity: .4}    to
{opacity: 1}
}

@keyframes fade {
from {opacity: .4}    to
{opacity: 1}
}

/* On smaller screens, decrease text size */
@media only screen and (max-width: 300px) {
  .text {font-size: 11px}
}
```

```
.bar { margin: 0px; padding:20px;
backgroundcolor:white;
opacity:0.6; color:black;
fontfamily:'Roboto',sans-serif;
font-style: italic;
border-radius:20px;
font-size:25px; } a {
color:grey; float:right;
textdecoration:none;
font-style:normal;
padding-right:20px;
}  a:hover{
background-color:black;
color:white; borderradius:15px;0
font-size:30px; padding-
left:10px;
} body
{     background-image: url("https://images.unsplash.com/photo-
1532883130016- f3d311140ba8?ixid=MXwxMjA3fDB8MHxwaG90by1wYWdlfHx8fGVufDB8fHw%3D&ixlib=rb-
1.2.1&auto=format&fit=crop&w=1050&q=80");
   background-size: cover;
} p { color:white;
font-style:italic;
font-size:30px;
}
</style>
</head>

<body>

<div class="header">
<div style="width:50%;float:left;font-size:2vw;text-align:left;color:black; padding-top:1%;padding-left:5%;">AI based
Natural disaster analysis</div>
  <div class="topnav-right"style="padding-top:0.5%;">

    <a  href="/home">Home</a>
    <a href="/intro">Introduction</a>
    <a class="active" href="/upload">Open Web Cam</a>
</div>
</div>

</body>
```

OUTPUT:



GITHUB LINK:

IBM-EPBL/IBM-Project-11775-1659345564: Natural Disasters Intensity Analysis and Classification using Artificial Intelligence (github.com)

DEMOLINK:

https://drive.google.com/file/d/11iY7dsr8C0tqkafOCPcgfhFnTbmTwNMo/view?usp=drivesdk