NATURAL DISASTER INTENSITY ANALYSIS AND CLASSIFICATION USING ARTIFICIAL INTELLIGENCE

PROJECT REPORT
SUBMITTED BY

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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 Pre-trained model and the type of disaster is identified and showcased on the OpenCV window.

1.2 Purpose

Natural disasters are inevitable, and the occurrence of disasters drastically affects the economy, ecosystem and human life. Buildings collapse, ailments spread and sometimes natural disasters such as tsunamis, earthquakes, and forest fires can devastate nations. When earthquakes occur, millions of buildings collapse due to seismological effects. Many machine learning approaches have been used for wildfire predictions since the 1990s. A recent study used a machine learning approach in Italy. This study used the random forest technique for susceptibility mapping of wildfire. Floods are the most devastating natural disaster, damaging properties, human lives and infrastructures. To map flood susceptibility, an assembled machine learning technique based on random forest (RF), random subspace (RS) and support vector machine (SVM) was used. As the population is growing rapidly, people need to acquire land to live on, and as a result the ecosystem is disturbed horrifically, which causes global warming and increases the number of natural disasters. Populations in underdeveloped countries cannot afford damages disasters cause to infrastructures. The aftermath of disasters leaves the humans in miserable situations, and sometimes the devastating effects cannot be detected; additionally, rescue operations cannot take place in most of the places and victims are unable to be identified due to geographical factors of the different areas. Disasters such as forest fires spread rapidly in

dense areas, so firefighting is difficult to carry out; in this case, development of the strategy to predict such circumstances is crucial so that such disasters can be prevented beforehand.

2. LITERATURE SURVEY

2.1 Existing problem

AUTHOR	TECHNOLOGY	DESCRIPTION	ADVANTAGES	DISADVANTAGES
Muhammad Aamir, Tariq Ali, Muhammad Irfan, Ahmad Shaf	Natural Disaster Intensity analysis and classification based on multispectral images using multilayered deep CNN	It works in two blocks .Block-I CNN for detection and occurance of the disaster and Block-II for classification of disaster intensity types with different filters and parameters	Not face various issues due noise and serious class imbalance problem	Complexity due to multilayer
Seth Guikema	Artificial Intelligence for Natural Hazards Risk Analysis	Focused on two methods like the physical loading due to the hazard given occurrence of the hazard or physical damage or loss of system functionality given hazard loading	Existing of large training set, the model are representative of the future situations andit is highly flexible	The issue of validation, Difficult to convey model accuracy and the uncertainty that is inherent in any AI model output to decision makers
Mummaneni Sobhana	A disaster classification application using convolutional neural network by performing data augmentation	Based on the development in the domains of computer vision and image processing,machine learning and deep learning models can	Complexity is low, highly efficient and identify features from noisy data	The loss is continuously increasing over each epoch

		integrate images		
Vasileios Linardos, Maria Drakaki, Panagiotis T zionas, Yannis L. Karnavas	Machine Learning in disaster management	For the recognition and detection of natural disaster through the framework,a satellite images data set of the disasters are used	This framework has less cost in terms of computational power and had better accuracy	Unstructured data tend to be hard to analyse , low quality datasets could potentially causes confusion.
Sreenivasulu Madichetty	Detecting informative tweets during disaster using deep neural networks	This method is for classifying the informative and noninformative tweets during a disaster. The proposed approach is based on the Convolutional Neural Network (CNN) and Artificial Neural Network (ANN). CNN is used for feature extraction and ANN used as a classifier for classifying the tweets	It gives better performance than the use of CNN and ANN alone	It doesnot extended to other dataset and contains few layers

2.2 References

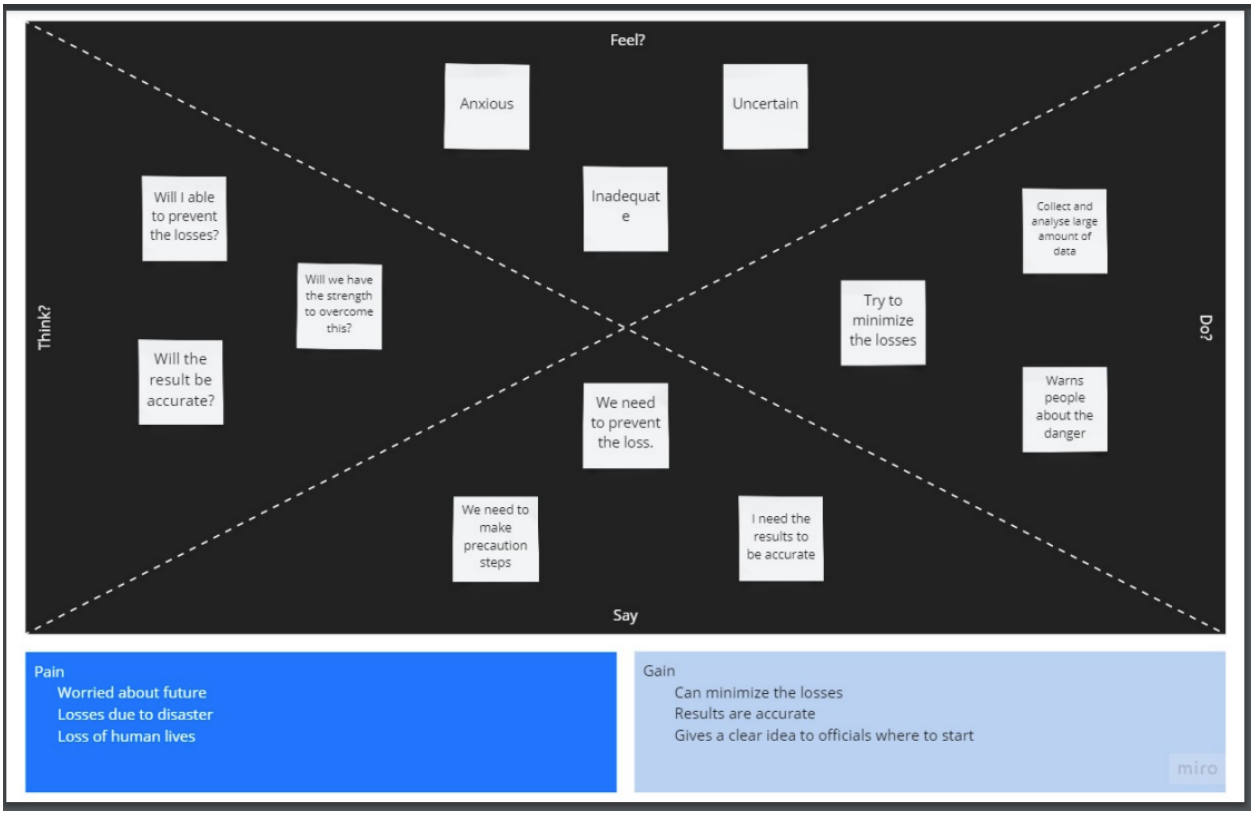
1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8069408/
2. https://deepblue.lib.umich.edu/bitstream/handle/2027.42/155885 /risa13476.pdf?sequence=2
3. https://ijeecs.iaescore.com/index.php/IJEECS/article/view/2926 7#:~:text=The%20detection%20of%20natural%20disasters,floo ds%2C%20cyclones%2C%20and%20wildfires
4. https://www.mdpi.com/25044990/4/2/20/pdf?version=16519165 64
5. https://www.researchgate.net/publication/333072370_Detecting _Informative_Tweets_during_Disaster_using_Deep_Neural_Net works

2.3 Problem Statement Definition

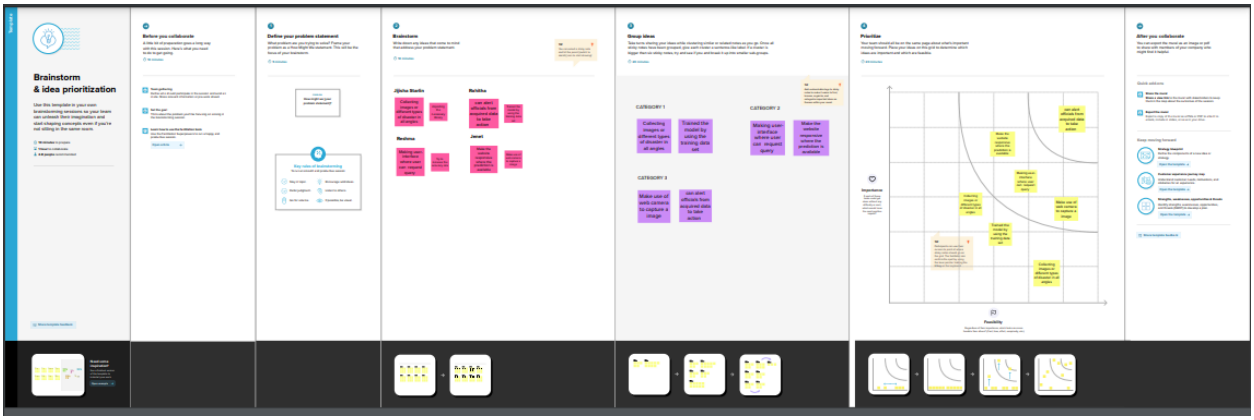
1. Government plans and implements various plans to keep our country economically strong but face a downfall of economy because of damages in buildings caused by natural disasters which makes them feel scared, uncertain of future.
2. Government wish their citizens to be happy and secure but families are torn apart and it affects their mental health because of the loss of people's lives caused by natural disasters which makes them feel guilty, Inadequate.
3. Scientists like seismologists , volcanologists, and meteorologists warns the Government and people about the natural disasters but they fail to predict correctly sometimes because of the lack of data or technology which makes them feel Inadequate.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming

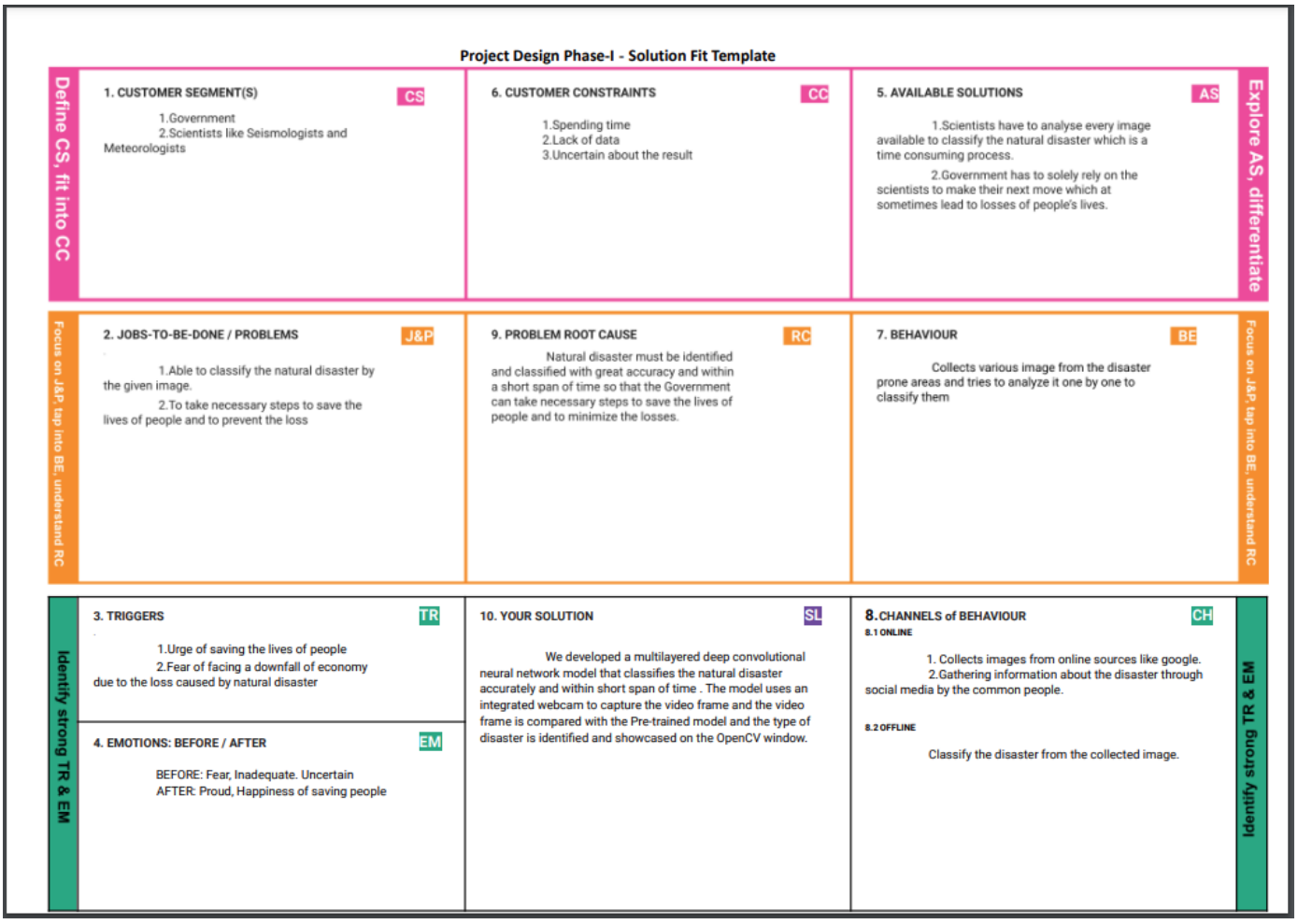


3.3 Proposed Solution

SI NO	PARAMETER	DESCRIPTION
1	Problem Statement (Problem to be solved)	To develop a AI based natural disaster intensity analysis and classification by following criteria, 1. To eliminate the damage of people lives that caused by natural disaster. 2. To provide economical strength to the government so that they can implement their plan.
2	Idea / Solution description	We developed a multilayered deep convolutional neural network model that classifies the natural disaster. The model uses an integrated webcam to capture the video frame is compared with the pre-trained model and the type of disaster is identified and showcased on the openCV window.

3	Novelty / Uniqueness	A multilayered deep convolutional neural network model is used to classify and analyse the natural disaster with great accuracy and within a short span of time.
4	Social Impact / Customer Satisfaction	It will save the lives of people, and minimize the loss of infrastructure, finance by classifying the disaster using AI.
5	Business Model (Revenue Model)	There are 2 ways to generate revenue from this project. One is by helping the government and getting fund from it. Another one is by giving the information to companies.
6	Scalability of the Solution	It can classify the natural disaster with great level of accuracy even when the image is flipped at any angle or even when it has no proper dimensions

3.4 Problem Solution fit



4. REQUIREMENT ANALYSIS

4.1 Functional requirements

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Request permission	Accessibility to camera
FR-2	Prediction	Based on the given input it predicts the natural disaster

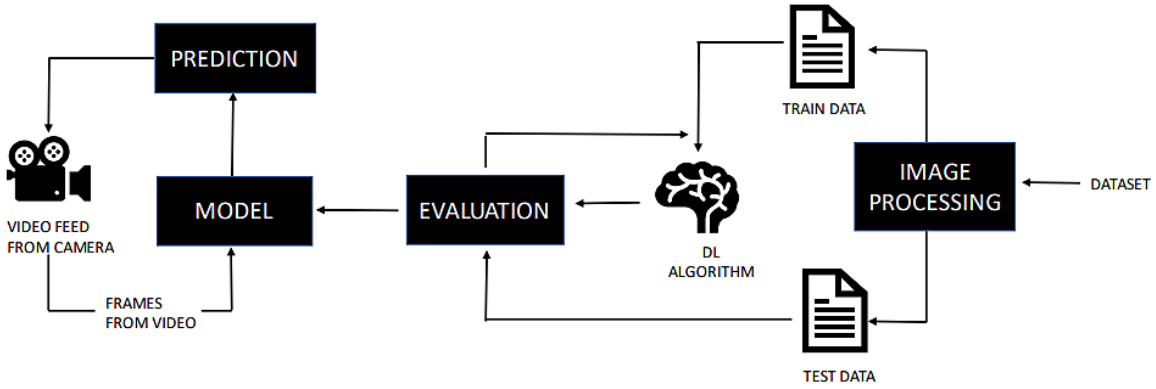
4.2 Non-Functional requirements

NFR No.	Non-Functional Requirement	Description

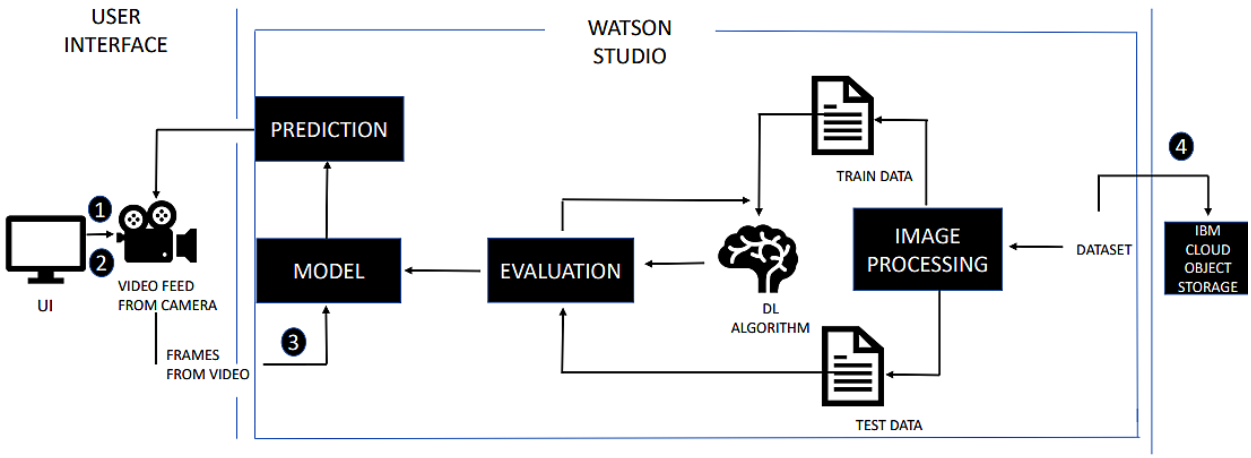
NRF-1	Usability	User friendly and easy to classify the disaster
NRF-2	Security	There is no user login needed so there is no security issue.
NRF-3	Reliability	This is highly reliable because it can undergoes without any fault or access inability
NRF-4	Performance	The accuracy of the result is about 90% and the result is updated within a short period of time
NRF-5	Availability	It can be accessed at any situation of disaster occurrence.
NRF-6	Scalability	The website can run on web browsers like Google chrome, Microsoft internet explorer, etc.

5. PROJECT DESIGN

5.1 DataFlow Diagrams



5.2 Solution & Technical Architecture



5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web user	Dashboard	USN-1	As a user, I can view the home page where the different natural disasters are defined.	I can access the dashboard	High	Sprint-4
		USN-2	As a user, I can view the introduction page	I can access the dashboard	Medium	Sprint-4
		USN-3	As a user, I can open my web camera to stream live		High	Sprint-4
		USN-4	As a user, I can view the prediction during the live stream		High	Sprint-4
Administra-	Monitori		As a user, I can			

tor	ng the website feasiblen ess	USN-1	check whether the website is working smoothly.		High	Sprint-4
	Monitori ng the accuracy	USN-2	As a user, I can check the accuracy of the prediction		High	Sprint-2

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story points	Priority	Team Members
Sprint-1	Create and configure IBM cloud services	USN-1	As a user, I need to enroll in cloud registration	3	High	S.Jijisha Starlin
Sprint-1		USN-2	After registration, I will create a account in IBM cloud.	2	Medium	S.Jijisha Starlin
Sprint-1		USN-3	After that, in IBM cloud, creating a AI platform	5	High	R.V Rahitha
Sprint-1		USN-4	Create a node in IBM Watson platform	7	High	R.V Rahitha
Sprint-1		USN-5	After creating node get device type and id	1	Low	X. Reshma
Sprint-1		USN-6	Simulate the required data to view output	3	Medium	X. Reshma
	Accumulati		Create a deep learning	5		

Sprint-2	on of required data	USN-7	by gathering data		High	S. Jenet
Sprint-2		USN-8	Connect IBM Watson with deep learning through API key	2	Low	S. Jenet
Sprint-2		USN-9	Built the project flow using deep learning	7	High	S.Jijisha Starlin
Sprint-2		USN-10	Check the connection and view the output in data gathered	3	Medium	S.Jijisha Starlin
Sprint-3	Create a database	USN-11	Launch the cloudant DB and create database to store the location data	4	High	R.V Rahitha
Sprint-3		USN-12	Install python software	2	High	R.V Rahitha
Sprint-3		USN-13	Develop the python flask to publish details to IBM AI platform	6	High	X. Reshma
Sprint-3		USN-14	Integrate the device id, authentication token in python flask	2	High	X. Reshma
Sprint-3		USN-15	Create a python code for the location	8	High	S.Jenet
Sprint-4	Develop the python script	USN-16	Develop web application using deep learning	5	High	S.Jenet
Sprint-4		USN-17	Connect the IBM AI platform and get the location and store the data in the cloudant	2	High	S.Jijisha St arlin
			Create a multilayered	8		

Sprint-4		USN-18	deep convolution nural network mode that tells the intensity of disaster		High	S.Jijisha St arlin
Sprint-4		USN-19	Integrate the type of disaster is identified and show cased on the open CV window	11	High	R.V Rahith a
Sprint-3		USN-20	Send the notification is the webcam to capture the video frame	4	High	R.V Rahit h a

6.2 Sprint Delivery Schedule

Sprint	Total Story points	Duration	Sprint start date	Sprint End Date(planned)	Story point completed(as planned End date)	Sprint Release Data (Actual)
Sprint	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint	17	6 Days	24 Oct 2022	29 Oct 2022	17	29 Oct 2022
Sprint	22	6 Days	24 Oct 2022	29 Oct 2022	22	29 Oct 2022
Sprint	30	6 Days	24 Oct 2022	29 Oct 2022	30	29 Oct 2022

7. CODING & SOLUTIONING (Explain the features added in the project

along with code)

7.1 Feature 1

Home Page Code

```
<!DOCTYPE html>
<html>
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<body>
<style>
* {box-sizing: border-box;}

.header {
  overflow: hidden;
  background-color: #f1f1f1;
  padding: 15px 10px;
}

.header a {
  float: left;
  color: black;
  text-align: center;
  padding: 12px;
  text-decoration: none;
  font-size: 18px;
  line-height: 25px;
  border-radius: 4px;
}

.header a.logo {
  font-size: 20px;
  font-weight:inherit;

}

.header a:hover {
  background-color: #ddd;
  color: black;
}
```

```
.header a.active {
  background-color: dodgerblue;
  color: white;
}

.header-right {
  float: right;
}

@media screen and (max-width: 500px) {
  .header a {
    float: none;
    display: block;
    text-align: left;
  }

  .header-right {
    float: none;
  }
}

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

.mySlides {
  display: none;
}

.prev, .next {
  cursor: pointer;
  position: absolute;
  top: 50%;
  width: auto;
```

```
  margin-top: -22px;
  padding: 16px;
  color: white;
  font-weight: bold;
  font-size: 18px;
  transition: 0.6s ease;
  border-radius: 0 3px 3px 0;
  user-select: none;
}

.next {
  right: 0;
  border-radius: 3px 0 0 3px;
}

.prev:hover, .next:hover {
  background-color: rgba(0,0,0,0.8);
}

.text {
  color: #f2f2f2;
  font-size: 15px;
  padding: 8px 12px;
  position: absolute;
  bottom: 8px;
  width: 100%;
  text-align: center;
}

.numbertext {
  color: #f2f2f2;
  font-size: 12px;
  padding: 8px 12px;
  position: absolute;
  top: 0;
}
```

```
.dot {
  cursor: pointer;
  height: 15px;
  width: 15px;
  margin: 0 2px;
  background-color: #bbb;
  border-radius: 50%;
  display: inline-block;
  transition: background-color 0.6s ease;
}

.active, .dot:hover {
  background-color: #717171;
}

.fade {
  animation-name: fade;
  animation-duration: 1.5s;
}

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

.text {
  position: absolute;
  bottom: 0;
  background: rgb(0, 0, 0);
  background: rgba(0, 0, 0, 0.5);
  color: #f1f1f1;
  font: 1em sans-serif;
  width: 100%;
  padding: 20px;
}
</style>
<div class="header">
```

```
    <a href="#default" class="logo">AI Based Natural Disaster Analysis</a>
    <div class="header-right">
      <a class="active" href="home.html">Home</a>
      <a href="intro.html">Introduction</a>
      <a href="upload.html">Open Web Cam</a>
    </div>
</div>

<div class="slideshow-container">

    <div class="mySlides fade">
      <div class="numbertext">1 / 4</div>
      <img src="Cyclone.jpg" width="1000px" height="525px">
      <div class="text">
        <h2>Cyclone</h2>
        <p>A system of winds that are rotating inwards to an area of low barometric pressure, such that in the Northern Hemisphere it is anticlockwise and in the Southern Hemisphere it is clockwise circulation. Every year there are 70 to 90 cyclonic systems developed across the globe.</p>
      </div>
    </div>

    <div class="mySlides fade">
      <div class="numbertext">2 / 4</div>
      <img src="Earthquake.jpg" width="1000px" height="525px">
      <div class="text">
        <h2>Earthquake</h2>
        <p>An earthquake is a sudden, rapid shaking of the ground caused by the shifting of rocks deep underneath the earth's surface. Earthquakes can cause fires, tsunamis, landslides or avalanches.</p>
      </div>
    </div>

    <div class="mySlides fade">
      <div class="numbertext">3 / 4</div>
      <img src="Flood.jpg" width="1000px" height="525px">
      <div class="text">
```

```
      <h2>Flood</h2>
      <p>Flooding is an overflowing of water onto land that is normally dry. Floods can happen during heavy rains, when ocean waves come on shore, when snow melts quickly, or when dams or levees break. </p>
    </div>
  </div>

  <div class="mySlides fade">
    <div class="numbertext">4 / 4</div>
    <img src="Wildfire.jpg" width="1000px" height="525px">
    <div class="text">
      <h2>Wildfire</h2>
      <p>A wildfire is an unplanned fire that burns in a natural area such as a forest, grassland, or prairie. Wildfires are often caused by human activity or a natural phenomenon such as lightning, and they can happen at any time or anywhere. </p>
    </div>
  </div>

  <a class="prev" onclick="plusSlides(-1)">&#10094;</a>
  <a class="next" onclick="plusSlides(1)">&#10095;</a>
 </div>
 <br>

 <div style="text-align:center">
  <span class="dot" onclick="currentSlide(1)"></span>
  <span class="dot" onclick="currentSlide(2)"></span>
  <span class="dot" onclick="currentSlide(3)"></span>
  <span class="dot" onclick="currentSlide(4)"></span>
 </div>

 <script>
  let slideIndex = 1;
  showSlides(slideIndex);

  function plusSlides(n) {
    showSlides(slideIndex += n);
  }
```

```
function currentSlide(n) {
  showSlides(slideIndex = n);
}

function showSlides(n) {
  let i;
  let slides = document.getElementsByClassName("mySlides");
  let dots = document.getElementsByClassName("dot");
  if (n > slides.length) {slideIndex = 1}
  if (n < 1) {slideIndex = slides.length}
  for (i = 0; i < slides.length; i++) {
    slides[i].style.display = "none";
  }
  for (i = 0; i < dots.length; i++) {
    dots[i].className = dots[i].className.replace(" active", "");
  }
  slides[slideIndex-1].style.display = "block";
  dots[slideIndex-1].className += " active";
}
</script>
</body>
</html>
```

Explaination:

A home page is the default or front page of a site. It is the first page that visitors see when they load a URL. Web managers can control the home page as a way of directing the user experience.Home pages are located in the root directory of the website. The home page often serves to orient visitors by providing titles, headlines and images and visuals that show what the website is about, and in some cases,who owns it and maintains it.

7.2 Feature 2

IntroductionCode:

```
<!DOCTYPE html>
<html>
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<body>
<style>
* {box-sizing: border-box;}
```

```
.header {
  overflow: hidden;
  background-color: #f1f1f1;
  padding: 15px 10px;
}

.header a {
  float: left;
  color: black;
  text-align: center;
  padding: 12px;
  text-decoration: none;
  font-size: 18px;
  line-height: 25px;
  border-radius: 4px;
}

.header a.logo {
  font-size: 20px;
  font-weight:inherit;

}

.header a:hover {
  background-color: #ddd;
  color: black;
}

.header a.active {
  background-color: dodgerblue;
  color: white;
}

.header-right {
  float: right;
}
```

```
@media screen and (max-width: 500px) {
  .header a {
    float: none;
    display: block;
    text-align: left;
  }

  .header-right {
    float: none;
  }
}
.intro{
  width: 700px;
  padding: 30px;
  box-sizing: border-box;

}
body{
    background-color: lightsteelblue;
}

</style>
<div class="header">
    <a href="#default" class="logo">AI Based Natural Disaster Analysis</a>
    <div class="header-right">
        <a href="home.html">Home</a>
        <a class="active" href="intro.html">Introduction</a>
        <a href="upload.html">Open Web Cam</a>
    </div>
</div>
<center>
<div class="intro">
    <center>
        <p>A natural disaster is the negative impact following an actual occurrence of natural hazard in the event that it significantly harms a community.</p>
        <p>A natural disaster can cause loss of life or damage property, and typically leaves some
```

economic damage in its wake. Examples of natural hazards include: Cyclone, Earthquake, Flood, Earthquake etc.

Between 1995 and 2015, according to the UN's disaster-monitoring system, the greatest number of natural disasters occurred in America, China and India.

The objective of the project is to build a web application to detect the type of disaster. The input is taken from the inbuilt web cam, which in turn is given to the pretrained model. The model predicts the type of disaster and displays on UI

</body>
</html>

Explaination:

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

Open Web Cam Code:

```
<!DOCTYPE html>
<html>
<meta name="viewport" content="width=device-width, initial-scale=1.0">
<body>
<style>
* {box-sizing: border-box;}

.header {
  overflow: hidden;
  background-color: #f1f1f1;
  padding: 15px 10px;
}

.header a {
  float: left;
  color: black;
  text-align: center;
```

```
  padding: 12px;
  text-decoration: none;
  font-size: 18px;
  line-height: 25px;
  border-radius: 4px;
}

.header a.logo {
  font-size: 20px;
  font-weight:inherit;

}

.header a:hover {
  background-color: #ddd;
  color: black;
}

.header a.active {
  background-color: dodgerblue;
  color: white;
}

.header-right {
  float: right;
}

@media screen and (max-width: 500px) {
  .header a {
    float: none;
    display: block;
    text-align: left;
  }

  .header-right {
    float: none;
  }
```

```
}
</style>
<div class="header">
   <a href="#default" class="logo">AI Based Natural Disaster Analysis</a>
   <div class="header-right">
      <a href="home.html">Home</a>
      <a href="intro.html">Introduction</a>
      <a class="active" href="upload.html">Open Web Cam</a>
   </div>
</div>
</body>
</html>
```

Explaination:

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.

8. TESTING

8.1 Test Cases

8.2 User Acceptance Testing

```
from flask import Flask,render_template,request
import cv2
from tensorflow.keras.models import load_model
import numpy as np
from werkzeug.utils import secure_filename

app=Flask(__name__,template_folder="templates")
model=load_model('disaster.h5')
print("Loaded model from disk")

@app.route('/',methods=['GET'])
def index():
  return render_template('home.html')
@app.route('/home',methods=['GET'])
def home():
```

```
  return render_template('home.html')
@app.route('/intro',methods=['GET'])
def about():
  return render_template('introduction.html')
@app.route('/upload',methods=['GET' , 'POST'])
def predict():
   cap=cv2.VideoCapture(0)
   (H,W)=(None,None)
   while True:
      _, frame=cap.read()
      frame=cv2.flip(frame,1)
      while True:
         (grabbed, frame)=cap.read()
         if not grabbed:
           break
         if W is None or H is None:
           (H,W) = frame.shape[:2]
         output=frame.copy()
      frame=cv2.cvtColor(frame, cv2.COLOR_BGR2RGB)
      frame=cv2.resize(frame, (64,64))
      x=np.expand_dims(frame, axis=0)
      result=np.argmax(model.predict(x),axis=-1)
      index=['Cyclone','Earthquake','Flood','Wildfire']
      result=str(index[result[0]])
      cv2.putText(output, "activity:
{}".format(result),(10,120),cv2.FONT_HERSHEY_PLAIN,1,(0,255,255),1)
      cv2.imshow("Output",output)
      key=cv2.waitKey(1) & 0xFF
      if key == ord("q"):
        break
   print("[INFO] cleaning up...")
   cap.release()
   cv2.destroyAllWindows()
   return render_template("upload.html")
if __name__ == '__main__':
    app.run(host='0.0.0.0', port=8000, debug=False)
```

9. RESULT

9.1 Performance Metrics

SI NO	PARAMETER	VALUES
1	Model Summary	-96%
2	Accuracy	Traning Accuracy -80% Validation Accuracy -92.5%
3	Confidence Score	Class detected -Nill

10. ADVANTAGES & DISADVANTAGES

ADVANTAGES

1. Humans also need 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 weatherand the days ahead.
3. Helpful in getting life back on track.
4. Their Alert nature able to respond effectively and efficiently which defend the societyfrom 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 andincreasing 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.

11. CONCLUSION

Natural disasters inflict severe damage on almost the entire spectrum of social and natural habitats, ranging from housing and shelter, water, food, health, sanitation, and waste management to information and communication networks, supply of power and energy, and transportation infrastructure. The major challenges faced in all disasters include pre-disaster early warning infrastructure; the supply of food and clean drinking water; health and sanitation; information and communication; power and energy for lighting and cooking; waste collection and disposal, including rapid disposal of dead bodies of humans and animals; disaster-proof housing and shelter; emergency and post-disaster shelters; rescue and relief operations; and transport infrastructure. Though it is not possible to prevent most of the disasters, still their

effects can be alleviated or mitigated in magnitude by anticipated preparedness. Advanced disaster management technology could provide a critical support system for disaster management authorities at times of disaster-related crises. Such a technology also provides important inputs for any disaster management plan of action in modern times. Communities and individuals have to be educated on pre-disaster planning and preparedness. Awareness must be created amongst masses, for which first-aid training at grass roots level is essential. There should be a National Disaster Plan that defines the tasks of the communities and local health personnel.

12. FUTURE SCOPE

In the future, the research will be continued to obtain the data from all over the country, not only west java province, and with the use of more complete analysis, so that the government or related institution could make a better anticipation work as a mitigation effort.

13. APPENDIX

SOURCE CODE

```
from flask import Flask,render_template,request
import cv2
from tensorflow.keras.models import load_model
import numpy as np
from werkzeug.utils import secure_filename

app=Flask(_name_,template_folder="templates")
model=load_model('disaster.h5')
print("Loaded model from disk")

@app.route('/',methods=['GET'])
def index():
  return render_template('home.html')
@app.route('/home',methods=['GET'])
def home():
  return render_template('home.html')
@app.route('/intro',methods=['GET'])
def about():
  return render_template('introduction.html')
@app.route('/upload',methods=['GET' , 'POST'])
def predict():
   cap=cv2.VideoCapture(0)
   (H,W)=(None,None)
   while True:
```

```
        _, frame=cap.read()
        frame=cv2.flip(frame,1)
        while True:
           (grabbed, frame)=cap.read()
           if not grabbed:
             break
           if W is None or H is None:
             (H,W) = frame.shape[:2]
           output=frame.copy()
        frame=cv2.cvtColor(frame, cv2.COLOR_BGR2RGB)
        frame=cv2.resize(frame, (64,64))
        x=np.expand_dims(frame, axis=0)
        result=np.argmax(model.predict(x),axis=-1)
        index=['Cyclone','Earthquake','Flood','Wildfire']
        result=str(index[result[0]])
        cv2.putText(output, "activity:
{}".format(result),(10,120),cv2.FONT_HERSHEY_PLAIN,1,(0,255,255),1)
        cv2.imshow("Output",output)
        key=cv2.waitKey(1) & 0xFF
        if key == ord("q"):
          break
    print("[INFO] cleaning up...")
    cap.release()
    cv2.destroyAllWindows()
    return render_template("upload.html")
if _name_ == '_main_':
     app.run(host='0.0.0.0', port=8000, debug=False)
```

Github & Project Demo Link

Github link - https://github.com/IBM-EPBL/IBM-Project-41067-1660639041

Demo video link - https://youtu.be/KLtygqGj3