

# **Project Report**

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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 multi-layered 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

By the end of this project, you will:

- Know fundamental concepts and techniques of the Artificial Neural Network and Convolution Neural Networks
- Gain a broad understanding of image data.
- Work with Sequential type of modelling
- Work with Keras capabilities
- Work with image processing techniques
- Work with OpenCV

## 2.LITERATURE SURVEY

### 2.1 Existing Problem

Artificial neural network (ANN), Neural Network Particular machine learning the methodology of Natural Disasters Intensity Analysis and Classification using Artificial Intelligence is based on the video between two frames.

### 2.3 Problem Statement Definition

<b>I am</b>	Describe customer with 3-4 key characteristics - <i>who are they?</i>	Describe the customer and their attributes here
<b>I'm trying to</b>	List their outcome or "job" the care about - <i>what are they trying to achieve?</i>	List the thing they are trying to achieve here
<b>but</b>	Describe what problems or barriers stand in the way - <i>what bothers them most?</i>	Describe the problems or barriers that get in the way here
<b>because</b>	Enter the "root cause" of why the problem or barrier exists - <i>what needs to be solved?</i>	Describe the reason the problems or barriers exist
<b>which makes me feel</b>	Describe the emotions from the customer's point of view - <i>how does it impact them emotionally?</i>	Describe the emotions the result from experiencing the problems or barriers

#### PROBLEM STATEMENT 1:

I am	I'm trying to	but	Because	Which makes me feel
an employee from NDRF	classify the type of natural disaster	it is difficult to identify	the data is of images and images are of various forms	tensed and frustrated

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
Problem Statement-1	An employee from NDRF	Classify the type of natural disaster	It is difficult to identify	The data is of images and images are of various forms	Tensed and frustrated
Problem Statement-2	A student	Classify the type of natural disaster in order to learn about that disaster	It is difficult to identify	The data is of images and images are of various forms	Tensed and frustrated

Taken before and after the natural disasters. Then the videos are compared with current satellite frames. The next stage of video will be considering as a model by prediction. By taken inputs from video, model will be move to evaluate. Evaluation of the frames will be tested by deep learning (DL) algorithm. The output of the DL algorithm test gives the result of data pre-processing. The data pre-processing is considering as the image data. The output (image data) is used to calculate the intensity of natural disaster.

## PROBLEM STATEMENT 2:



## 2.2 References

- Becker, G. 1976. “Altruism, Egoism and Genetic Fitness: Economics and Sociobiology,” *Journal of Economic Literature*, 14, pp. 817-826.
- Bellows, J. and E. Miguel. 2009. “War and Local Collective Action in Sierra Leone,” *Journal of Public Economics*, 93(11-12), pp. 1144-57.
- Berg, J., J. Dickhaut, and K. McCabe. 1995. “Trust, Reciprocity, and Social History,” *Games and Economic Behavior*, 10, pp. 122-142.
- Boyd, R., H. Gintis, S. Bowles, and P. Richerson. 2002. “The evolution of altruistic punishment,” *Proceedings of the National Academy of Sciences*, 100, pp. 3531–3535.

### 3. IDEATION & PROPOSED SOLUTION


#### 3.1 Empathy Map Canvas



## 3.2 Ideation & Brainstorming

### Step-1: Team Gathering, Collaboration and Select the Problem Statement


Template



## Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

🕒 10 minutes to prepare  
🕒 1 hour to collaborate  
👤 2-8 people recommended



#### Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

🕒 10 minutes

A

#### Team gathering

Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B

#### Set the goal

Think about the problem you'll be focusing on solving in the brainstorming session.

C

#### Learn how to use the facilitation tools

Use the Facilitation Superpowers to run a happy and productive session.

[Open article](#) →

1


#### Define your problem statement

To classify the natural disaster based on the live image given as input by using Deep Learning.

🕒 5 minutes


PROBLEM


How might we tackle the problem of classifying the natural disaster?





#### Key rules of brainstorming


To run a smooth and productive session


 Stay in topic.

 Encourage wild ideas.

 Defer judgment.

 Listen to others.

 Go for volume.

 If possible, be visual.



## Step-2: Brainstorm, Idea Listing and Grouping

**2 Brainstorm**  
Ideas related to the classification of natural disaster

**3 Group Ideas**  
Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

**Technical Aspects**

**Social Impacts**

**Availability of resources**

**People emotions**

**TIP**  
You can select a sticky note and hit the pencil button to start drawing!

**TIP**  
Add customized tags to sticky notes to make it easier to find, remove, organize, and rearrange important ideas as themes within your mind.

**Natural disasters affect the ecosystem.**

**Many lives have been affected due to the natural disaster.**

**Necessary for the earlier classification.**

**This will reduce the loss of life.**

**To reduce the effects, a webpage is designed.**

**It classifies the natural disaster based on the image.**

**Live image data are taken for classification.**

**Done by using Deep Learning Techniques like CNN.**

**Large images are needed for better accuracy.**

**To Classify the natural disasters**

**naturally occurring events that cause problems to environment**

**Cyclone Intensity Calculation**

**Disasters like earthquake, flood, wildfire are classify using this model**

**Work with open CV**

**Deep Learning techniques have been applied**

**Live Images can be captured using webcam and then tested**

**Classifies based on image**

**Reduce the loss of life**

**Image data needed for classification**

**Enormous data is needed for classifying the image data**

**People emotions on disaster**

**Person emotions are been looked before and after their loss**

**A report generated on the disaster causes loss of life and property**

**All various natural disasters, natural hazards, natural events in that area**

**do to detect the natural disasters using deep learning**

**Natural disasters can be an environmental problem or a natural hazard**

**Major disasters of disaster is recorded for insurance**

**It provides an analysis of the disaster and helps to take the necessary action**

**The proposed approach can be used to detect the disaster in the images**

**Images can be processed using deep learning techniques**

**It can predict the disaster in the images**

**detect and classify the type of disaster with high accuracy rate**

**developed using deep learning techniques like convolutional neural network**

**A model to predict cyclone, earthquake, wildfire, flood has been proposed**

**To carry out disaster analysis, better were used where people share their views**

**using two-layer architecture that is known as convolutional neural network**

**With the help of neural network, it is possible to predict floods and save masses from disaster**

**CNN based simple feature extraction with a Another single dimensional set of pixels is used proposed approach helps describe a real time fire monitoring system**

**CNN model is used to extract flood images from raw images and color filters are used to refine the detected direction**

**The proposed system's efficiency and accuracy were tested on several datasets and it is implemented after analysis to give the highest results**

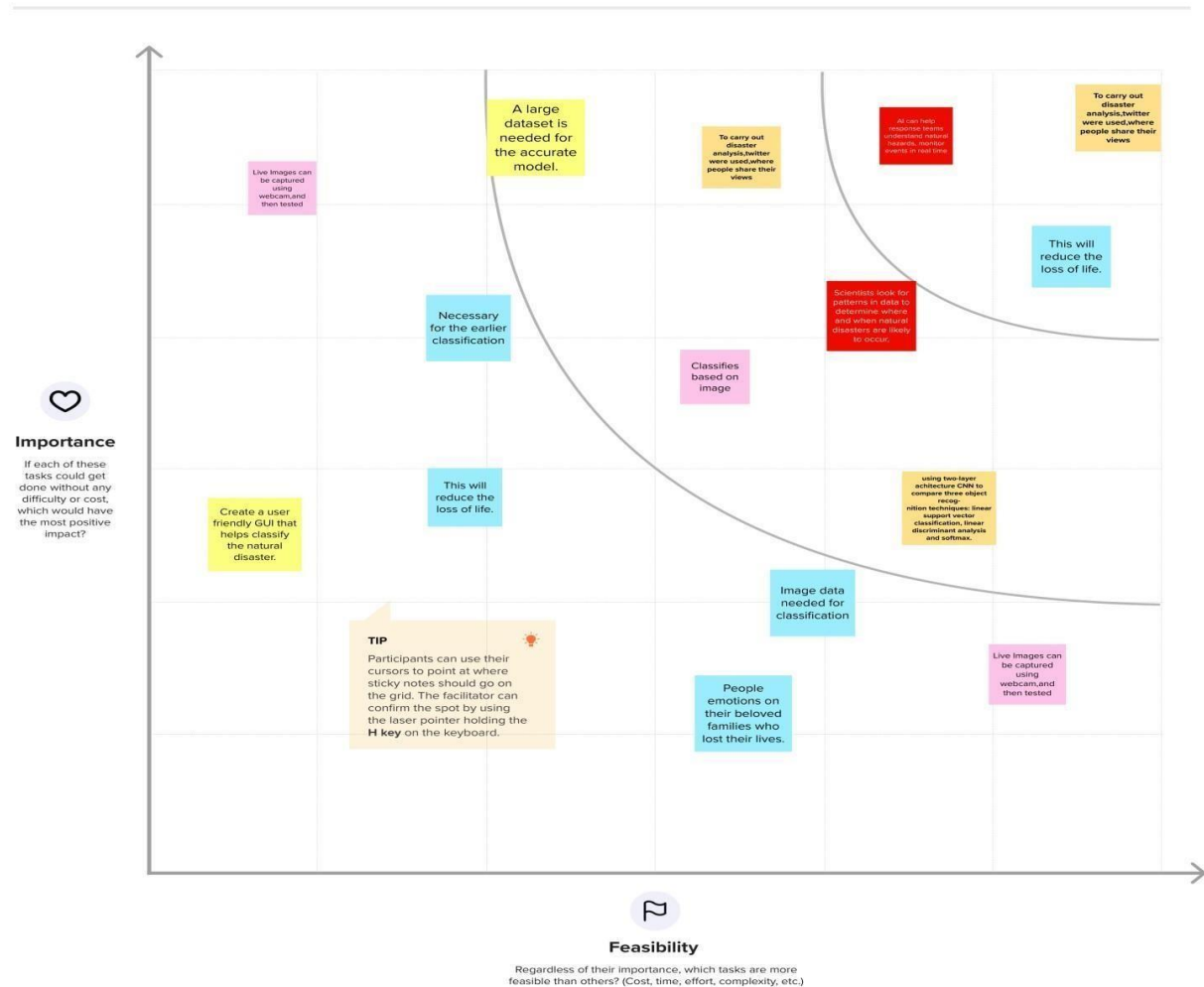
## Step-3: Idea Prioritization

4

### Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

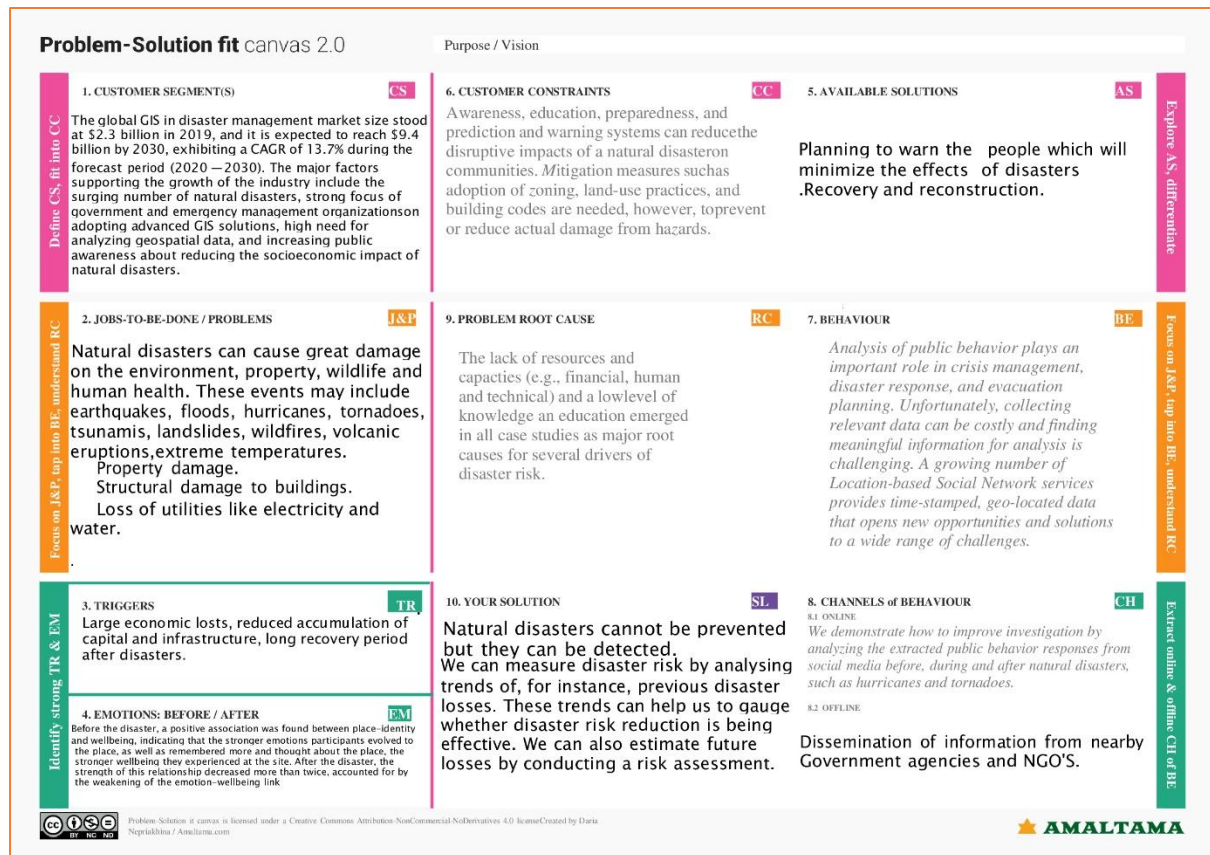
🕒 20 minutes



### 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.

### 3.3 Problem Solution fit



## 4.REQUIREMENT ANALYSIS

### 4.1 Functional requirement

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 to capture the video Frames.
FR-6	User Interface	Maximizing the interaction in Web Designing Service.

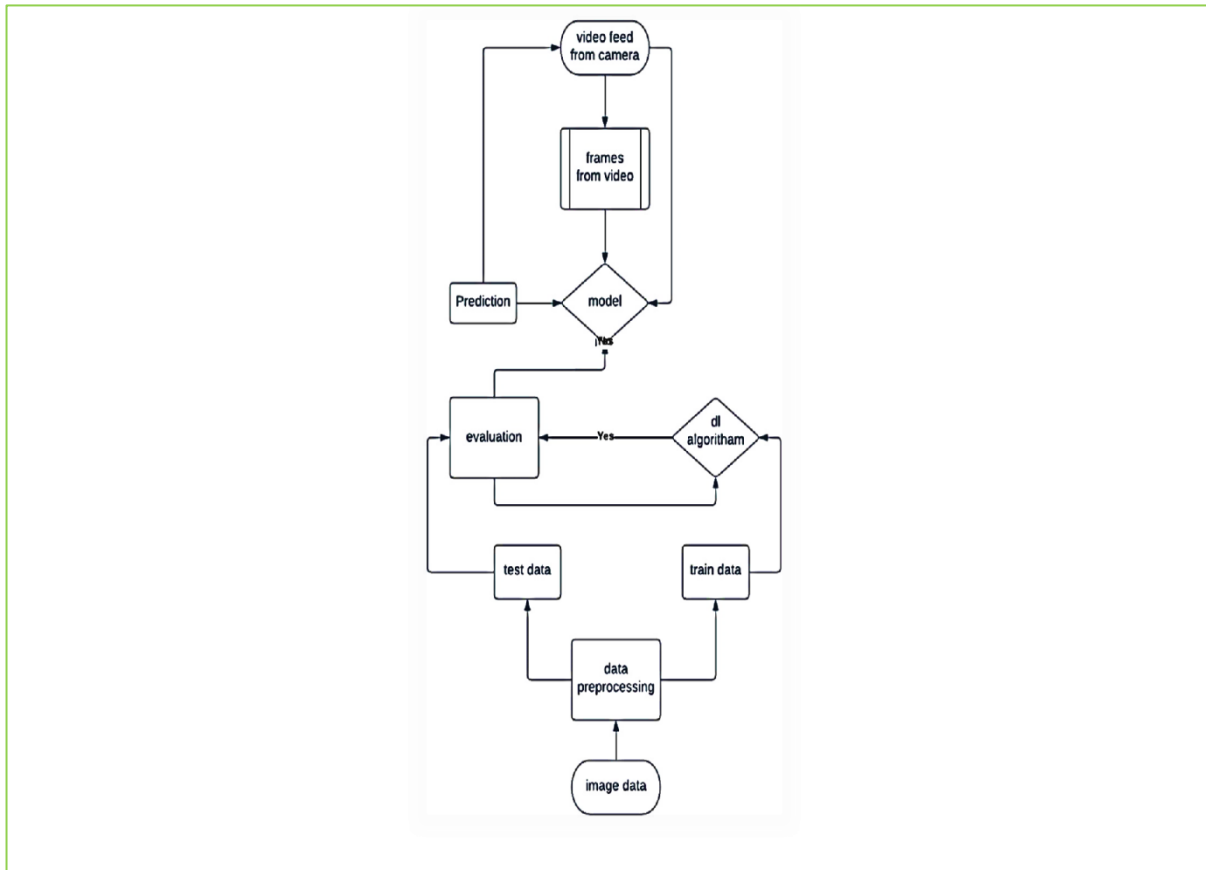
#### Non-functional Requirements:

FR 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.

## 5.PROJECT DESIGN

### 5.1 Data Flow Diagrams

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

The World Health Organization (WHO) includes earthquakes, tsunamis, volcanic eruptions, landslides, hurricanes, floods, wildfires, heatwaves, and droughts as natural disasters — and each have unique impacts on wherever they take place.

Depending on the risk profile of an area, disaster-sensitive building materials can include anything from bamboo to vinyl. However, it's important to note that there's not a single material that's a good fit for all hazards. For instance, research shows that lightweight and natural elements can remarkably increase the resiliency of buildings against some natural disasters, particularly earthquakes. But they might not be the optimal choice for flooding – e.g., raw wood swells in water.

In August 2018, a series of earthquakes destroyed more than 32,000 homes in the Indonesian island of Lombok. Remarkably, many of the traditional wooden houses stood unharmed. It was the cultural wisdom of building with light and flexible materials aligned with nature that saved these homes.

On the other hand, traditional wooden houses might not exhibit the same resilience against different types of natural disasters, such as floods or typhoons, as well as wildfires. In flood-prone areas, architecture can reduce disaster risks by employing materials highly resistant to floodwater damage, including damage caused by moving water. These can include a combination of concrete, latex, and vinyl on the floor, and bricks and metals on the walls and ceilings.

## 5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer	Installation	USN-1	As a user, I can install this where the disaster occur	I can do it by myself	High	Sprint-1
Customer	Power connection	USN-2	As a user, I want ensure power supply for all devices	I will ensure it	High	Sprint-2
Customer	Safety	USN-3	As a user, I want to ensure that the device should be in safest place which covers the maximum area	I will ensure that	High	Sprint-3
Customer	Battery backup	USN-4	As a user, I want check the batter backup to prevent it from power loss	I can assure that	High	Sprint-4
Customer	Internet Connectivity	USN-5	As a user, I want to check the internet connectivity	I will ensure that	High	Sprint-5

## 6.PROJECT PLANNING & SCHEDULING

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming that.	2	Low	Hari Dharsan
Sprint-1	Registration	USN-2	As a user, I will receive confirmation email once I have registered for the application.	3	High	Saravanaeswaran
Sprint-1	Login	USN-3	As a user, I adapt to logging into the system with credentials.	2	Low	Krithic
Sprint-1	Designation of Region	USN-4	As a user, I can collect the dataset and select the region of interest to be monitored and analysed.	5	Medium	Sadaiyappan
Sprint-2	Analysis of required phenomenon	USN-5	As a user, I can regulate certain factors influencing the action and report on past event analysis.	4	High	Sadaiyappan, saravanaeswaran
Sprint-2	Algorithm selection	USN-6	As a user, I can choose the required algorithm for specific analysis.	4	Medium	Hari Dharsan, Krithic
Sprint-2	Training and Testing	USN-7	As a user, I can train and test the model using the algorithm.	4	High	Sadaiyappan, saravanaeswaran
Sprint-3	Detection and analysis of data	USN-8	As a user, I can detect and visualise the data effectively.	4	High	HariDharsan, Krithic

Sprint-3	Model building	USN-9	As a user, I can build with the web application.	8	High	Sadaiyappan, saravanaeswaran
Sprint-4	Report generation	USN-10	As a user, I can generate detailed report on product data analysis.	4	High	Sadaiyappan, saravanaeswaran
Sprint-4	Model deployment	USN-11	As an administrator, I can maintain third-party services.	8	High	Hari Dharsan, Krithic

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	31 Oct 2022	20	31 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

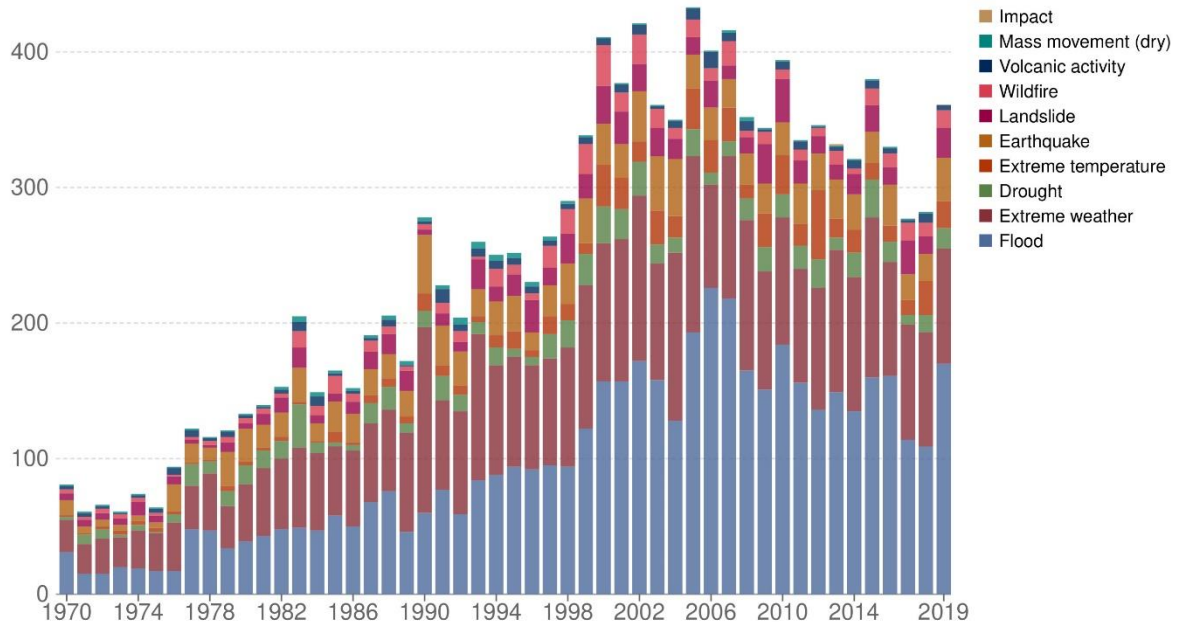


## 6.3 Reports from JIRA

### Global reported natural disasters by type, 1970 to 2019

The annual reported number of natural disasters, categorised by type. This includes both weather and non-weather related disasters.

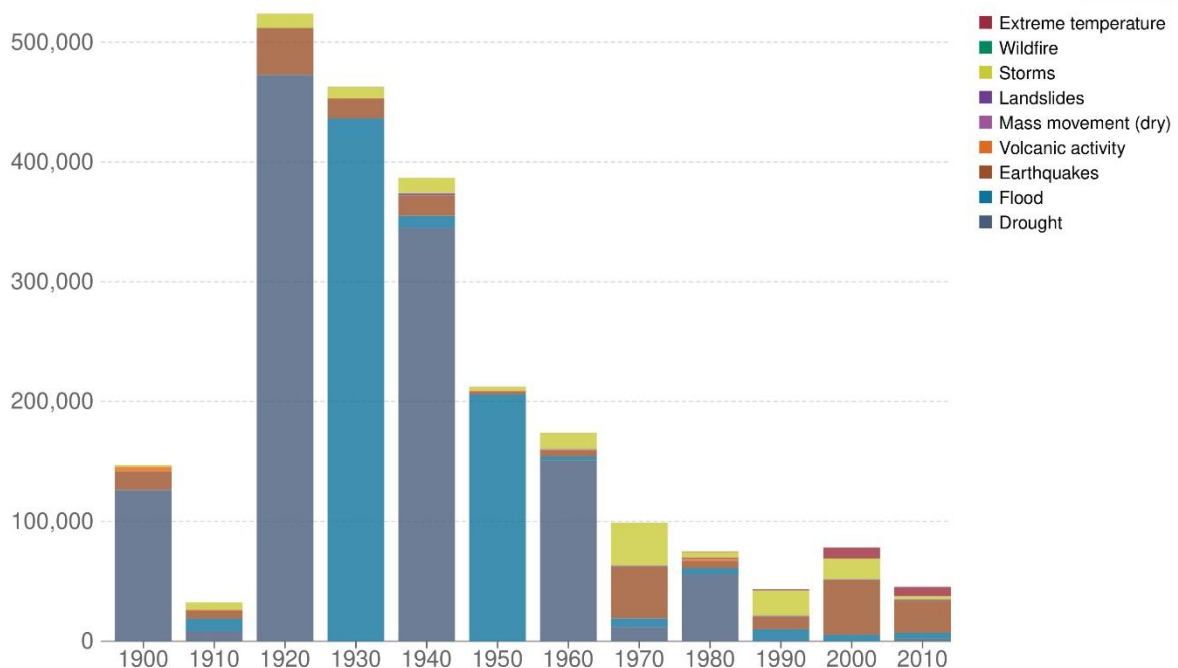
Our World  
in Data



Source: EMDAT (2020): OFDA/CRED International Disaster Database, Université catholique de Louvain – Brussels – Belgium  
OurWorldInData.org/natural-disasters • CC BY

### Decadal average: Number of deaths from natural disasters

Our World  
in Data



Source: Calculated by Our World in Data based on EM-DAT, CRED / UCLouvain, Brussels, Belgium – (D. Guha-Sapir)  
OurWorldInData.org/natural-disasters • CC BY

## 7. CODING & SOLUTIONS

### App.py

```
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('index.html')
@app.route('/home', methods=['GET'])
def home():
    return render_template('index.html')
@app.route('/intro', methods=['GET'])
def about():
    return render_template('intro.html')
@app.route('/testing', methods=['GET', 'POST'])
def predict():
    cap = cv2.VideoCapture(0)

    while True:
        _, frame = cap.read()
        frame = cv2.flip(frame, 1)

        while True:
            (grabbed, frame) = vs.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})
            #frame = frame.astype("float32")
            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]])
```

```

#print(result)
#result=result.tolist()

cv2.putText(output, "activity: {}".format(result), (10, 20),
cv2.FONT_HERSHEY_PLAIN, 1, (0,255,255), 1)
#playaudio("Emergency it is a disaster")
cv2.imshow("Output", output)
key = cv2.waitKey(1) & 0xFF
#if the 'q' key was pressed, break from the loop
if key == ord("q"):
break

print("[INFO] cleaning up...")
vs.release()
cv2.destroyAllWindows()
return render_template("/upload.html")

if __name__=='__main__':
app.run(host='0.0.0.0', port=8000, debug=False)

```

## 8.TESTING

### 8.1 Test Class

#### Train the Model on IBM

[ApplyImageDataGeneratorFunctionalityToTrainsetAndTestset.ipynb](#)

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        "!unzip '/content/dataset.zip'"
      ],
      "metadata": {
        "colab": {
          "base_uri": "https://localhost:8080/"
        }
      }
    }
  ]
}
```

```

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"   creating: dataset/test_set/\n",
"   creating: dataset/test_set/Cyclone/\n",
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" inflating: dataset/train\_set/Wildfire/79.jpg \n",  
" inflating: dataset/train\_set/Wildfire/8.jpg \n",  
" inflating: dataset/train\_set/Wildfire/80.jpg \n",  
" inflating: dataset/train\_set/Wildfire/81.jpg \n",  
" inflating: dataset/train\_set/Wildfire/82.jpg \n",  
" inflating: dataset/train\_set/Wildfire/83.jpg \n",  
" inflating: dataset/train\_set/Wildfire/84.jpg \n",  
" inflating: dataset/train\_set/Wildfire/85.jpg \n",  
" inflating: dataset/train\_set/Wildfire/86.jpg \n",  
" inflating: dataset/train\_set/Wildfire/87.jpg \n",  
" inflating: dataset/train\_set/Wildfire/88.jpg \n",  
" inflating: dataset/train\_set/Wildfire/89.jpg \n",  
" inflating: dataset/train\_set/Wildfire/9.jpg \n",  
" inflating: dataset/train\_set/Wildfire/90.jpg \n",  
" inflating: dataset/train\_set/Wildfire/91.jpg \n",  
" inflating: dataset/train\_set/Wildfire/92.jpg \n",  
" inflating: dataset/train\_set/Wildfire/93.jpg \n",  
" inflating: dataset/train\_set/Wildfire/94.jpg \n",  
" inflating: dataset/train\_set/Wildfire/95.jpg \n",  
" inflating: dataset/train\_set/Wildfire/96.jpg \n",  
" inflating: dataset/train\_set/Wildfire/97.jpg \n",  
" inflating: dataset/train\_set/Wildfire/98.jpg \n",  
" inflating: dataset/train\_set/Wildfire/99.jpg \n"

```

]
}
]
},
{
  "cell_type": "code",
  "execution_count": null,
  "metadata": {
    "id": "7_CsxokHf_OW"
  },
  "outputs": [],
  "source": [
    "#importing image data generator library"
  ]
},
{
  "cell_type": "code",
  "source": [
    "from keras.preprocessing.image import ImageDataGenerator"
  ],
  "metadata": {
    "id": "JdykdCBFgN2J"
  },
  "execution_count": 15,
  "outputs": []
},
{
  "cell_type": "markdown",
  "source": [
    "Image Data Augmentation"
  ],
  "metadata": {
    "id": "XivRHpgxi8IL"
  }
},
{
  "cell_type": "code",

```

```

"source": [
"#Configuring image Data Generator Class\n",
"\n",
"#Setting Parameter for Image Augmentation for training data\n",
"\n",
"train_datagen = ImageDataGenerator(rescale = 1./255, shear_range = 0.2, zoom_range = 0.2,
horizontal_flip = True)\n",
"\n",
"#Image Data Augmentation for testing data\n",
"\n",
"test_datagen = ImageDataGenerator(rescale = 1./255)"
],
"metadata": {
"id": "KaGWzURyjDtx"
},
"execution_count": 16,
"outputs": []
},
{
"cell_type": "markdown",
"source": [
"# Apply ImageDataGenerator Functionality To Trainset And Testset\n"
],
"metadata": {
"id": "-2RvJqUSa0fJ"
}
},
{
"cell_type": "code",
"source": [
"#Performing data augmentation to train data\n",
"\n",
"x_train = train_datagen.flow_from_directory('/content/dataset/train_set', target_size = (64,64),
batch_size = 5, color_mode = 'rgb', class_mode = 'categorical')\n",
"\n",
"#performing data augmentation to test data\n",
"\n",

```



```

"x_test = test_datagen.flow_from_directory('/content/dataset/test_set', target_size = (64,64), batch_size
= 5, color_mode = 'rgb', class_mode = 'categorical')\n"
],
"metadata": {
"colab": {
"base_uri": "https://localhost:8080/"
},
"id": "WC6KDeZ_a3ni",
"outputId": "89fc09a0-0f55-4e29-a949-37990863829d"
},
"execution_count": 18,
"outputs": [
{
"output_type": "stream",
"name": "stdout",
"text": [
"Found 742 images belonging to 4 classes.\n",
"Found 198 images belonging to 4 classes.\n"
]
}
]
}

```

#### 1. ConfigureImageDataGeneratorClass.ipynb

```

{
  "nbformat": 4,
  "nbformat_minor": 0,
  "metadata": {
    "colab": {
      "provenance": []
    },
    "kernelspec": {
      "name": "python3",
      "display_name": "Python 3"
    }
  }
}

```

```

},
"language_info": {
  "name": "python"
},
"cells": [
  {
    "cell_type": "code",
    "execution_count": null,
    "metadata": {
      "id": "7_CsxokHf_OW"
    },
    "outputs": [],
    "source": [
      "#importing image data generator library"
    ],
  },
  {
    "cell_type": "code",
    "source": [
      "from keras.preprocessing.image import ImageDataGenerator"
    ],
    "metadata": {
      "id": "JdykdCBFgN2J"
    },
    "execution_count": 1,
    "outputs": []
  },
  {
    "cell_type": "markdown",
    "source": [

```

```

"Image Data Augmentation"
],
"metadata": {
  "id": "XivRHpgxi8IL"
}
},
{
  "cell_type": "code",
  "source": [
    "#Configuring image Data Generator Class\n",
    "\n",
    "#Setting Parameter for Image Augmentation for training data\n",
    "\n",
    "train_datagen = ImageDataGenerator(rescale = 1./255, shear_range = 0.2,
    zoom_range = 0.2, horizontal_flip = True)\n",
    "\n",
    "#Image Data Augmentation for testing data\n",
    "\n",
    "test_datagen = ImageDataGenerator(rescale = 1./255)"
  ],
  "metadata": {
    "id": "KaGWzURyjDtx"
  },
  "execution_count": 2,
  "outputs": []
}
]
}

```

## 2.ImportImageDataGeneratorLibrary.ipynb

```
{
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  "nbformat_minor": 0,
  "metadata": {
    "colab": {
      "provenance": []
    },
    "kernelspec": {
      "name": "python3",
      "display_name": "Python 3"
    },
    "language_info": {
      "name": "python"
    }
  },
  "cells": [
    {
      "cell_type": "code",
      "execution_count": null,
      "metadata": {
        "id": "7_CsxokHf_OW"
      },
      "outputs": [],
      "source": [
        "#importing image data generator library"
      ]
    },
    {
      "cell_type": "code",
      "source": [
```

```
"from keras.preprocessing.image import ImageDataGenerator"  
],  
"metadata": {  
  "id": "JdykdCBFgN2J"  
},  
"execution_count": 1,  
"outputs": []  
}  
]  
}
```

## 8.2 User Acceptance Testing

[illegible]

## **9.RESULTS**

### **Screenshots:**

#### **9.1 Performance Matrices**

Enterprises can have hundreds to thousands of processes and you can't restore a process without a plan. A key metric for BC/DR planning is the number of processes that are threatened by a potential disaster.

You should start with a risk analysis and business impact analysis to a) understand the greatest risks that threaten your organization and, b) the impact of those risks on various functions of the business. Then, you can create plans to protect these processes and minimize the disruption when disaster strikes.

But static plans can stagnate. You can't restore processes unless you update plans periodically to account for changes in applications, data, environments, employees and risks. You should set reminders for yourself to prompt plan reviews at appropriate points in the cycle. In a perfect world, you'd receive confirmation from the managers of various departments who have reviewed and updated their plans, but let's be real – reviewing and updating those plans is a huge hassle and it's near miraculous if they do it on time. Using software can alleviate this pain point – you can automate email reminders to the various plan owners and track their progress all within the software – no passive aggressive emails needed! Software also removes many of the tedious tasks concerned with change management. For example, automated data integrations will keep your data updated automatically as that data changes in other applications. If a single contact is used in 100 plans and their phone number changes, an integrated system will carry that change over to your business continuity and emergency management plans as well.

## **10.ADVANTAGES & DISADVANTAGES**

### **Advantages:**

#### **1. Continuity**

Every minute that your operations are offline is detrimental to your business. It increases the costs incurred and can cause irreparable damage to your reputation. Not to mention the impact it can have on your teams' productivity as they struggle to access the tools they need to do their work.

Having a disaster recovery plan in place, with your data backed up and recoverable in the cloud, will mean that even when a data disaster strikes, your business operations will be able to continue. Often entirely uninterrupted.

#### **2. Enhanced Security**

Ransomware attacks are on the rise every year. Businesses who are ill prepared for a data disaster are often forced to pay millions of Rands in compensation to criminals in order to retain their information.

Incorporating data backup and restore policies into your disaster recovery plan can ensure that even if your business does fall victim to a ransomware or malware attack, the impact is limited. Don't let your data held at ransom. You can simply restore a backup of your information that is not at risk of being compromised, making criminal efforts moot.

Plus, cloud backup services themselves include enhanced security features. These can not only detect unauthorised access, but can help you stop suspicious activity before it can have an impact for your business.

#### **3. Customer Retention**

If your customers cannot trust you to keep their personal information secure, why should they trust in your services?

Whenever a data disaster strikes, customers become wary. They start to question the way in which your data was being stored and how reliable your company's practices and services really are. The longer the disaster impacts your operations, the more frustrated your client base will become. After all, people can excuse a momentary lapse in service. But when your services are offline for hours or days on end, the reputation that you have spent years building up can quickly crumble.

One of the many advantages of a disaster recovery plan is that you can ensure your teams are well-equipped to handle client questions. Keep your customers up-to-date on the situation, and show that you are well prepared even in the face of disaster. The right disaster recovery plan can not only see you maintaining your well-earned reputation. It can even boosting it if handled correctly! You can set a great example that other companies should live up to.



## **4. Cost Efficiency**

Data disasters can be extremely costly affairs. Between ransoms that are being demanded, penalties that can be incurred when personal information becomes compromised, loss of income and of productivity, a single data disaster has the potential to force company closure.

Having a disaster recovery plan in place can see you avoiding each of these costly effects. It can even impact your bottom line in a positive way when business is operating as normal! Backing data up to the cloud using a service like Microsoft 365 Backup, rather than to on-premises disks or servers, can see you reducing your operating costs significantly. For example, cloud storage solutions are more cost effective to both run and maintain than their in-office counterparts. And this is just one of the cost benefits of disaster recovery plans.

When working with an external team to put a disaster recovery plan in place, there's even further room for cost-efficiency. Your internal teams will be able to put their time to more effective use, while an external company will monitor, manage and maintain your data.

## **5. Increased Productivity**

A disaster recovery plan can keep your data accessible and available even when disaster strikes. But just having a plan in place can improve productivity as well!

Ensuring that your teams know their roles in keeping your data secure, and know precisely how to respond when an attack occurs, will reduce the risk posed to your information. It will even improve efficiency all around. After all, one of the advantages of a disaster recovery plan is that your employees have steps to follow that will reduce the sense of panic that is bound to erupt when a disaster crops up. Instead, they'll handle the situation calmly and effectively.

## **DISADVANTAGES:**

Disaster management involves examining and managing causal factors. It requires assessing the extent to which a community can withstand a disaster. Some communities are more vulnerable than others. For example, poorer communities have fewer resources to prepare themselves for a storm or bounce back from flood damage

## 11.CONCLUSION

### **RE-STATE THE OBJECTIVE OF YOUR DISASTER MANAGEMENT PLAN**

Start your conclusion by reminding the reader of the goal of your disaster management plan. For example, if your business is located in an area where forest fires are common in the summer, they could have a debilitating impact on your business. As a result, the goal of your disaster management plan is to **navigate the situation** should a forest fire occur near your business.

By restating your goal, you provide the reader of the disaster plan the background and context they need to quickly understand the situation. For example, “Our goal is to ensure that each employee is safe if a forest fire spreads while they are at work.”

### **GO OVER THE POTENTIAL HAZARDS THE COMPANY FACES**

In the conclusion of your natural disasters article or plan, outline the potential disasters that your company may be at risk of facing. These may include **natural disasters** such as floods, forest fires, earthquakes and hurricanes. It may also include **man-made disasters** such as theft, arson, data loss, chemical leakages or terrorist threats.

Specify what may happen to the business should such a disaster occur. For example, if your business deals with toxic chemicals, a leak could affect the environment around you and cause you to close your business for several weeks or months while clean-up takes place. This would lead to a considerable loss of income. The leak could also result in your employees getting sick or injured. This could lead to workers’ compensation claims or employee litigation.

### **SUMMARIZE ACTION PLANS FOR POSSIBLE HAZARDS**

In your conclusion, provide a brief summary of the plan you stated in the report. Your essay on natural disasters may include a step-by-step disaster management plan on what to do should a neighboring building catch fire. In your conclusion, you can summarize the plan in two or three sentences. For example, “Evacuate the building immediately, call 911 and notify the business owner. Once everyone is out safely, notify customers of closures or changes in schedule.”

### **REVIEW EMPLOYEE TRAINING FOR DISASTER RELIEF**

Regardless of how many employees you have at your small business, it’s vital to make them aware of your disaster management plan. Your employees need to understand the possible natural and man-made risks to your business, and **what to do** when a disaster occurs. In the conclusion of your disaster management plan, provide a brief synopsis of how you will get your employees involved. For example, “We will review our fire evacuation plan with employees at every quarterly meeting so that they are up to date on emergency exit procedures. We will also provide the management team with continuity plans so they can continue to run the business effectively once the imminent threat has been removed.”

### **ACTIONABLE TAKEAWAYS IN A GOOD CONCLUSION FOR NATURAL DISASTERS**

A good conclusion of natural disasters planning for small business needs to include actionable advice for improvement. In your disaster management plan, it’s wise to provide a detailed list of recommendations for the business so they can better navigate the disaster. Your conclusion should summarize these recommendations. For example, “We recommend reviewing our insurance policy to ensure we are covered for any risks. We also recommend installing security cameras on the inside and outside of all exits to deter thefts from taking place.”

## **12.FUTURE SCOPE**

- Understand the need for disaster recovery
- Analyse the impacts of disasters
- Analyse the business's needs
- Maintain executive and organizational cooperation
- Make an informed decision on an appropriate solution
- Implement the solution and maintain readiness

## 13.APPENDIX

### Source Code:

#### Home.html

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="utf-8">
  <meta name="viewport" content="width=device-width, initial-scale=1, shrink-
to-fit=no">
  <meta name="description" content="Start your development with Meyawo landing
page.">
  <meta name="author" content="Devcrud">
  <title>Natural Disaster </title>
  <!-- font icons -->
  <link rel="stylesheet" href="assets/vendors/themify-icons/css/themify-
icons.css">
  <!-- Bootstrap + Meyawo main styles -->
  <link rel="stylesheet" href="assets/css/meyawo.css">
</head>
<body data-spy="scroll" data-target=".navbar" data-offset="40" id="home">

  <!-- Page Navbar -->
  <nav class="custom-navbar" data-spy="affix" data-offset-top="20">
    <div class="container">
      <a class="logo" href="#">DISASTER</a>
      <ul class="nav">
        <li class="item">
          <a class="link" href="home.html">Home</a>
        </li>
        <li class="item">
          <a class="link" href="intro.html">Intro</a>
        </li>
        <li class="item">
          <a class="link" href="upload.html">Upload</a>
        </li>
      </ul>
      <a href="javascript:void(0)" id="nav-toggle" class="hamburger
hamburger--elastic">
        <div class="hamburger-box">
          <div class="hamburger-inner"></div>
        </div>
      </a>
    </div>
  </nav>
```

```

</nav><!-- End of Page Navbar -->

<!-- page header -->
<header id="home" class="header">
  <div class="overlay"></div>
  <div class="header-content container">
    <h1 class="header-title">
    </h1>

    <p class="header-subtitle"><b>NATURAL DISASTER</b></p>
    <h4 class="h4"></h4><b>natural disaster is "the negative impact
following an actual occurrence of natural
    hazard in the event that it significantly harms a community". A
natural disaster can cause
    loss of life or damage property,
    and typically leaves some economic damage in its
wake.</b></h4>>
  </div>
</header><!-- end of page header -->

<!-- contact section -->
<section class="section" id="contact">
  <div class="container text-center">
    <p class="section-subtitle">How can you communicate?</p>
    <h6 class="section-title mb-5">Contact Me</h6>
    <!-- contact form -->
    <form action="" class="contact-form col-md-10 col-lg-8 m-auto">
      <div class="form-row">
        <div class="form-group col-sm-6">
          <input type="text" size="50" class="form-control"
placeholder="Your Name" required>
        </div>
        <div class="form-group col-sm-6">
          <input type="email" class="form-control"
placeholder="Enter Email"required>
        </div>
        <div class="form-group col-sm-12">
          <textarea name="comment" id="comment"
rows="6" class="form-control" placeholder="Write Something"></textarea>
        </div>
        <div class="form-group col-sm-12 mt-3">
          <input type="submit" value="Send Message" class="btn
btn-outline-primary rounded">
        </div>
      </div>
    </form><!-- end of contact form -->
  </div><!-- end of container -->

```

```

</section><!-- end of contact section -->

<!-- footer -->
<div class="container">
    <footer class="footer">
        <p class="mb-0">Copyright <script>document.write(new
Date().getFullYear())</script> &copy; <a
href="http://www.devcrud.com">DevCRUD</a></p>
        <div class="social-links text-right m-auto ml-sm-auto">
            <a href="javascript:void(0)" class="link"><i class="ti-
facebook"></i></a>
            <a href="javascript:void(0)" class="link"><i class="ti-twitter-
alt"></i></a>
            <a href="javascript:void(0)" class="link"><i class="ti-
google"></i></a>
            <a href="javascript:void(0)" class="link"><i class="ti-
pinterest-alt"></i></a>
            <a href="javascript:void(0)" class="link"><i class="ti-
instagram"></i></a>
            <a href="javascript:void(0)" class="link"><i class="ti-
rss"></i></a>
        </div>
    </footer>
</div> <!-- end of page footer -->

<!-- core -->
<script src="assets/vendors/jquery/jquery-3.4.1.js"></script>
<script src="assets/vendors/bootstrap/bootstrap.bundle.js"></script>

<!-- bootstrap 3 affix -->
<script src="assets/vendors/bootstrap/bootstrap.affix.js"></script>

<!-- Meyawo js -->
<script src="assets/js/meyawo.js"></script>

</body>
</html>

```

## Intro.html

```

<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width, initial-scale=1, shrink-
to-fit=no">
    <meta name="description" content="Start your development with Meyawo landing
page.">
    <meta name="author" content="Devcrud">
    <title>Natural Disaster </title>
    <!-- font icons -->
    <link rel="stylesheet" href="assets/vendors/themify-icons/css/themify-
icons.css">
    <!-- Bootstrap + Meyawo main styles -->
    <link rel="stylesheet" href="assets/css/meyawo.css">
  </head>
  <body data-spy="scroll" data-target=".navbar" data-offset="40" id="home">

    <!-- Page Navbar -->
    <nav class="custom-navbar" data-spy="affix" data-offset-top="20">
      <div class="container">
        <a class="logo" href="#">DISASTER</a>
        <ul class="nav">
          <li class="item">
            <a class="link" href="home.html">Home</a>
          </li>
          <li class="item">
            <a class="link" href="intro.html">Intro</a>
          </li>
          <li class="item">
            <a class="link" href="#portfolio">Upload</a>
          </li>
        </ul>
        <a href="javascript:void(0)" id="nav-toggle" class="hamburger
hamburger--elastic">
          <div class="hamburger-box">
            <div class="hamburger-inner"></div>
          </div>
        </a>
      </div>
    </nav><!-- End of Page Navbar -->

    <!-- about section -->
    <section class="section pt-0" id="about">
      <!-- container -->
      <div class="container text-center">
        <!-- about wrapper -->
        <div class="about">

```

```

        <div class="about-img-holder">
    </div>
    <div class="about-caption">
        
        <p class="section-subtitle">What's Natural Disaster ?</p>
        <h2 class="section-title mb-3"></h2>
        <p>
            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 propose
            a multilayered deep convolutional neural network. The proposed model works in
            two blocks: Block-I convolutional neural network (B-I CNN), for detection and
            occurrence of disasters, and Block-II convolutional neural network (B-II CNN),
            for classification of natural disaster intensity types with different filters
            and parameters. The model is tested on 4428 natural images and performance is
            calculated and expressed as different statistical values: sensitivity (SE),
            97.54%; specificity (SP), 98.22%; accuracy rate (AR), 99.92%; precision (PRE),
            97.79%; and F1-score (F1), 97.97%. The overall accuracy for the whole model is
            99.92%, which is competitive and comparable with state-of-the-art algorithms.
        </p>
        <a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8069408/"
target="_blank">Read more</a>
    </div>
</div><!-- end of about wrapper -->
</div><!-- end of container -->
</section> <!-- end of about section -->

<!-- service section -->
<section class="section" id="service">
    <div class="container text-center">
        <p class="section-subtitle">What it Do ?</p>
        <h6 class="section-title mb-6">Management</h6>
        <!-- row -->
        <div class="row">
            <div class="col-md-6 col-lg-3">
                <div class="service-card">
                    <div class="body">
                        
                            <h6 class="title">Earthquakes</h6>

```



```

        <p class="subtitle">An earthquake is what happens when
two blocks of the earth suddenly slip past one another. The surface where they
slip is called the fault or fault plane..</p>
    </div>
</div>
</div>
<div class="col-md-6 col-lg-3">
    <div class="service-card">
        <div class="body">
            
            <h6 class="title">Wildfire</h6>
            <p class="subtitle">A wildfire, forest fire, bushfire,
wildland fire or rural fire is an unplanned, uncontrolled and unpredictable
fire in an area of combustible vegetation starting in rural and urban areas..</p>
        </div>
    </div>
</div>
<div class="col-md-6 col-lg-3">
    <div class="service-card">
        <div class="body">
            
            <h6 class="title">flood</h6>
            <p class="subtitle">A flood is an overflow of water
that submerges land that is usually dry. In the sense of "flowing water", the
word may also be applied to the inflow of the tide..</p>
        </div>
    </div>
</div>
<div class="col-md-6 col-lg-3">
    <div class="service-card">
        <div class="body">
            
            <h6 class="title">cyclone</h6>
            <p class="subtitle">In meteorology, a cyclone is a large
air mass that rotates around a strong center of low atmospheric pressure,
counterclockwise in the Northern Hemisphere and clockwise in the Southern
Hemisphere as viewed from above. Cyclones are characterized by inward-spiraling
winds that rotate about a zone of low pressure.</p>
        </div>
    </div>
</div>

```

```

        </div>
    </div>
</div><!-- end of row -->
</div>
</section><!-- end of service section -->
</body>
</html>

```

## Upload.html

```

<!DOCTYPE html>
<html>
    <head>
    <style>
        // Imports
        //
        @import url(https://maxcdn.bootstrapcdn.com/font-awesome/4.5.0/css/font-awesome.min.css);
        @import url('https://fonts.googleapis.com/css?family=Roboto');

        // Vars and Reset
        //
        $theme:      #454cad;
        $dark-text:  #5f6982;

        html,body,* { box-sizing: border-box; font-size: 16px;}
        html,body   { height: 100%; text-align: center;}
        body         { padding: 2rem; background: #f8f8f8;}

        h2 {
            font-family: "Roboto", sans-serif;
            font-size: 26px;
            line-height: 1;
            color: $theme;
            margin-bottom: 0;
        }
        p {
            font-family: "Roboto", sans-serif;
            font-size: 18px;
            color: $dark-text;
        }
        // Upload Demo
        //
        .uploader {

```

```

display: block;
clear: both;
margin: 0 auto;
width: 100%;
max-width: 600px;

label {
  float: left;
  clear: both;
  width: 100%;
  padding: 2rem 1.5rem;
  text-align: center;
  background: #fff;
  border-radius: 7px;
  border: 3px solid #eee;
  transition: all .2s ease;
  user-select: none;

  &:hover {
    border-color: $theme;
  }
  &.hover {
    border: 3px solid $theme;
    box-shadow: inset 0 0 0 6px #eee;

    #start {
      i.fa {
        transform: scale(0.8);
        opacity: 0.3;
      }
    }
  }
}

#start {
  float: left;
  clear: both;
  width: 100%;
  &.hidden {
    display: none;
  }
  i.fa {
    font-size: 50px;
    margin-bottom: 1rem;
    transition: all .2s ease-in-out;
  }
}

#response {

```

```

float: left;
clear: both;
width: 100%;
&.hidden {
    display: none;
}
#messages {
    margin-bottom: .5rem;
}
}

#file-image {
    display: inline;
    margin: 0 auto .5rem auto;
    width: auto;
    height: auto;
    max-width: 180px;
    &.hidden {
        display: none;
    }
}

#notimage {
    display: block;
    float: left;
    clear: both;
    width: 100%;
    &.hidden {
        display: none;
    }
}

progress,
.progress {
    // appearance: none;
    display: inline;
    clear: both;
    margin: 0 auto;
    width: 100%;
    max-width: 180px;
    height: 8px;
    border: 0;
    border-radius: 4px;
    background-color: #eee;
    overflow: hidden;
}

.progress[value]::-webkit-progress-bar {

```

```

    border-radius: 4px;
    background-color: #eee;
}

.progress[value]::-webkit-progress-value {
    background: linear-gradient(to right, darken($theme,8%) 0%, $theme 50%);
    border-radius: 4px;
}
.progress[value]::-moz-progress-bar {
    background: linear-gradient(to right, darken($theme,8%) 0%, $theme 50%);
    border-radius: 4px;
}

input[type="file"] {
    display: none;
}

div {
    margin: 0 0 .5rem 0;
    color: $dark-text;
}

.btn {
    display: inline-block;
    margin: .5rem .5rem 1rem .5rem;
    clear: both;
    font-family: inherit;
    font-weight: 700;
    font-size: 14px;
    text-decoration: none;
    text-transform: initial;
    border: none;
    border-radius: .2rem;
    outline: none;
    padding: 0 1rem;
    height: 36px;
    line-height: 36px;
    color: #fff;
    transition: all 0.2s ease-in-out;
    box-sizing: border-box;
    background: $theme;
    border-color: $theme;
    cursor: pointer;
}
}
</style>
</head>
</html>
<h2>File Upload & Image Preview</h2>

```

```
<br>
<br>
<br>
<!-- Upload -->
<form id="file-upload-form" class="uploader">
  <input id="file-upload" type="file" name="fileUpload" accept="image/*" />
<br>
<br>
  <span id="file-upload-btn" class="btn btn-primary">Select a file</span>
</progress>
</div>
</label>
</form>
```

GitHub & Project Demo Link:

1.Github

<https://github.com/IBM-EPBL/IBM-Project-47241-1660797573>







