NATURAL DISASTERS INTENSITY ANALYSIS& CLASSIFICATION USING ARTIFICIAL INTELLIGENCE PROJECT REPORT

Submitted By

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BONAFIDE CERTIFICATE

Certified that this project report “NATURAL DISASTERS INTENSITY ANALYSIS & CLASSIFICATION USING ARTIFICIAL INTELLIGENCE”
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Project viva-voce examination held on …….

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1.INTRODUCTION

1.1 Project Overv

1.2 purpose

Natl 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.
- Neural networks provide multilevel network architectures, where Convolutional Neural Networks (CNNs) are the most frequently implemented architecture as the direct input of multidimensional vector images, speech recognition, and image processing can be carried out with low complexity. CNNs efficiently perform feature extraction by denoising the images and removing interference and achieve highly accurate results.
- The proposed multi layered deep convolutional neural network method works in two blocks of convolutional neural networks. The first block, known as Block-I Convolutional Neural Network (B-I CNN), detects the occurrence of a natural disaster and the second one, known as Block-II Convolutional Neural Network (B-II CNN), defines the intensity of the natural disaster. Additionally, the first block consists of three mini convolutional blocks with four layers each and includes an

image input and fully connected layers. On the other hand, the second block also consists of three mini convolutional blocks with two layers each, including an image input layer and fully connected layer.

2.LITERATURE SURVEY

2.1 Existing problem

TITLE: "Natural disasters intensity analysis and classification based on multi spectral images using multilayer deep convolutional neural network"

Muhammad Aamir, Tariq Ali, Muhammad Irfan, Ahmad Shaf, Muhammad Zee Shan Azam,
Adam Glowacz,FrantisekBrumercik,WitoldGlowacz , Samar AlqhtaniandSaifur Rahman.
Academic Editor: Rudy Arthur
Received: 25 March 2021
Accepted: 7 April 2021
Published: 9 April 2021
We proposed a multi-layered 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 disasterintensity types with different filters and parameters. It is used to find the overall accuracy for the whole model.

TITLE: Simultaneous earthquake detection on multiple stations via a convolutional neural network

Author(s): Yang Shaobohu Jing Zhang haijiang Liu Guiquan.In recent years, as the amount of seismic data has grown rapidly, it is very important to develop a fast and reliable event detection and association algorithm. Generally, event detection is first performed on individual stations followed by event association through linking phase arrivals to a common event generating them. This study considers earthquake detection as the problem of image classification and convolutional neural networks (CNNs), as some of the widely used deep-learning tools in image processing, can be well used to solve this problem. In contrast to existing studies training the network using seismic data from individual stations, in this study, we train a CNN model jointly using records of multiple stations. Because the CNN automatically synthesizes information among multiple stations, the detector can more reliably detect seismic events and is less affected by spurious signals. The CNN is trained using aftershock data of the 2013 Mw 6.6 Lushan earthquake. We have applied it on two very different datasets of Gofar transform fault, East Pacific Rise and Changningshale gas field in southern Sichuan basin, China. The tests show that the trained CNN has strong generalization ability and is flexible with the number of available stations, different instrument types, and different data sampling rates. It can detect many more events than the conventional short-term average/long-term average detector and is more efficient than template-matching methods.

TITLE: Neural network applications in earthquake prediction (1994-2019); meta-analytic and statistical insights on their limitations.ArnaudMignan and Marco BroccardoNeural network applications in earthquake prediction (1994-2019); meta-analytic and statistical insights on their limitationsSeismological Research Letters (May 2020)

In the last few years, deep learning has solved seemingly intractable problems, boosting the hope to find approximate solutions to problems that now are considered unsolvable. Earthquake prediction, the Grail of Seismology, is, in this context of continuous exciting discoveries, an obvious choice for deep learning exploration. We reviewed the literature of artificial neural network (ANN) applications for earthquake prediction (77 articles, 1994-2019 period) and found two emerging trends: an increasing interest in this domain over time and a complexification of ANN models toward deep learning. Despite the relatively positive results claimed in those studies, we verified that far simpler (and traditional) models seem to offer similar predictive powers, if not better ones. Those include an exponential law for magnitude prediction and a power law (approximated by a logistic regression or one artificial neuron) for aftershock prediction in space. Because of the structured, tabulated nature of earthquake catalogs, and the limited number of features so far considered, simpler and more transparent machine-learning models than ANNs seem preferable at the present stage of research. Those baseline models follow first physical principles and are consistent with the known empirical laws of statistical seismology (e.g., the Gutenberg-Richter law), which are already known to have minimal abilities to predict large earthquakes.

TITLE:A Deep Learning Approach of Recognizing Natural Disasters on Images using Convolutional Neural Network and Transfer Learning December 2021icARTi '21: International Conference on Artificial Intelligence and its ApplicationsDaryl B. Valdezrey Anthony G. Godmalin.

Natural disasters are uncontrollable phenomena occurring yearly which cause extensive damage to lives, property and cause permanent damage to the environment.Howeverby, using Deep Learning, real-time recognition of these disasters can help the victims and emergency response agencies during the onset of these destructive events. At present, there are still gaps in the literature regarding real-time natural disaster recognition. In this paper, we present a dataset for the joint classification of natural disasters and intensity. We also proposed a lightweight convolutional neural network with two classification heads for the two tasks. This study leveraged on transfer learning in training the network to recognize natural disasters, as well as detecting normal, no-disaster images. At the same time, it is also capable of recognizing disaster intensity. Under controlled conditions, the model showed promising results on the two classification tasks. Thus, the study proved that accurate recognition of natural disasters is possible using a lightweight model and transfer learning. We hope that this study would lead to development of monitoring or surveillance systems that can perform accurate, on-the-ground, and real-time recognition of natural disasters allowing for rapid emergency responses mitigating the loss of lives and damages to properties.

TITLE: Keeping Disaster Human: Empathy, Systematization, and the Law J.D., Yale Law School; Ph.D.,

Cambridge University, expected 2016.For valuable comments and encouragement, I sincerely thank Doug Kysar,

Paul Slovic, Richard Brooks, Rob Verchick, Kenneth Townsend, Ann DiamondHarrison, Taylor Steel man, Jacqueline Carter, Michael P. Bennett, Erwann Michel-Kerjan, Michele Landis Dauber, Dan Farber, and Emily Harrison and The MJLST editorial staff. I am also grateful to psychologists Dan Batson and Paul Bloom, economist Steven Horwitz and neuroscientists Jean Decety,JeremyR.Gray and Claus Lam for useful discussion and feedback.In response to recent disasters, legal scholars and policymakers have condemned the lack of a universal and systematic characterization of disaster and response. They contend that more formally standardizing disaster definitions and protocols will improve efficiency, clarity, and coordination. Despite some truth to these claims, they fail to consider that increase systematization may result in unintended, deleterious consequences. In particular, it may subvert or distort the empathic decision-making and prosocial motivation essential to effective disaster management. Innovative research in psychology and neuroscience indicates that empathy and prosocial motivation are not automatic responses to the plight of others, but are fragile and easily weakened. Who conceptualizes harm, risk, and disaster, with which tools, and for what purpose all substantially influence whether affective reactions effectively translate into prosocial behaviour. The systematization of disaster, victims, and harm via statistics, quanta, and impersonal procedures may thus compromise the vital human dimensions of disaster response. It can also impair elite decision-making, weaken political will, and decrease donations. As such, failure to take into consideration the broader implications of systematizing reforms risks inadvertently undermining meaningful improvements in disaster risk management.

2.2 References

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with image enhancement for image classification. Math. Probl. Eng. 2020, 2020. [CrossRef]

2.3 Problem Statement Definition:

CustomerProblemStatementTemplate:

Createaproblemstatementtounderstandyourcustomer'spointofview.TheCustomerProblemStatementtemplatehelpsyoufocusonwhatmatters tocreateexperiencespeoplewilllove.
A well - articulatedcustomerproblemstatementallowsyouandyourteamtofindtheidealsolutionforthechallengesyourcustomersface.Throughouttheprocess,you'llalsobeabletoempathizewithyourcustomers,whichhelpsyoubetterunderstandhowthehyperceiveyourproductorservice.

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

3. IDEATION & PROPOSED SOLUTION

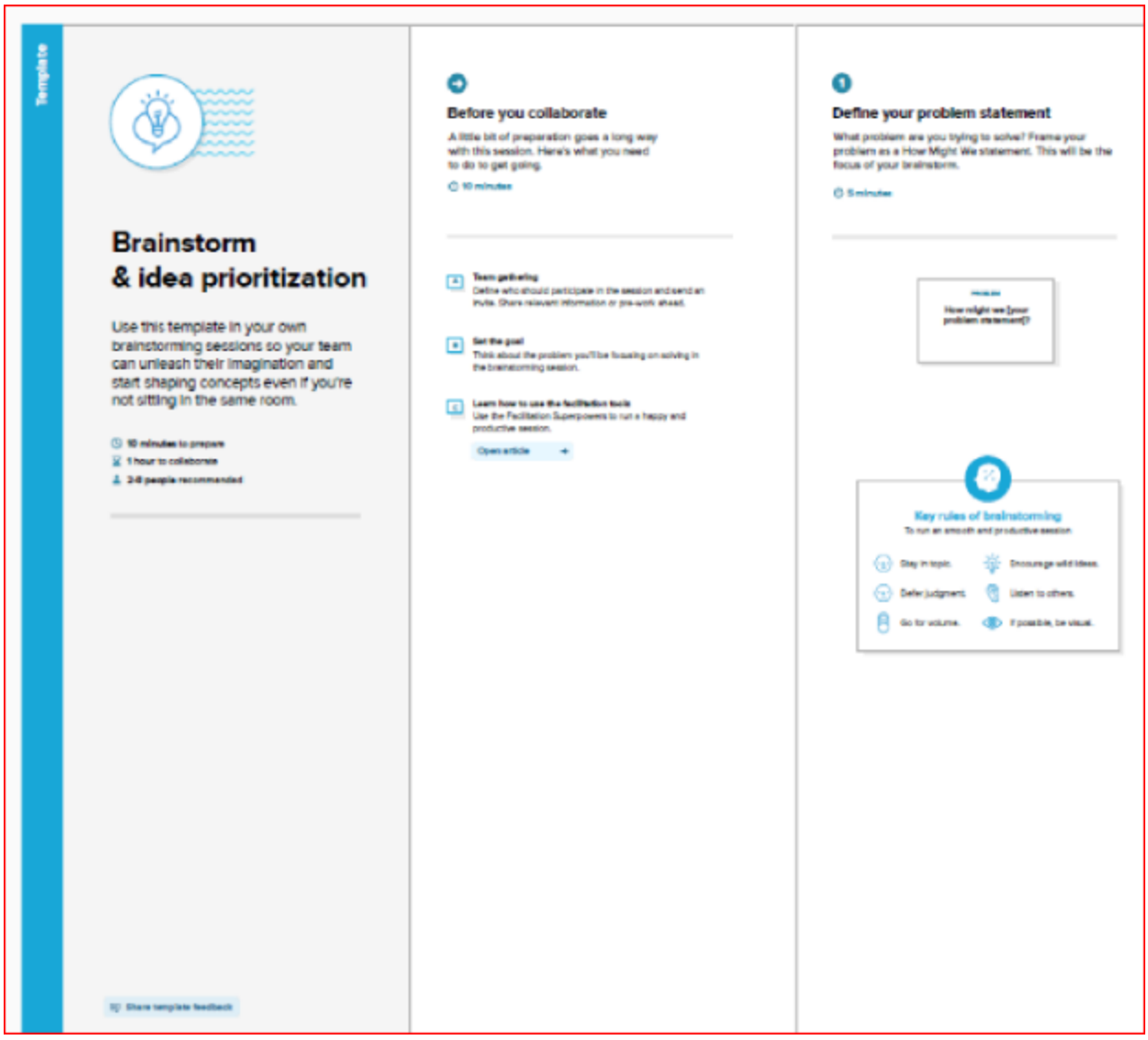
3.1 EMPATHY MAP CANVAS :

3.2 Ideation & Brainstorming

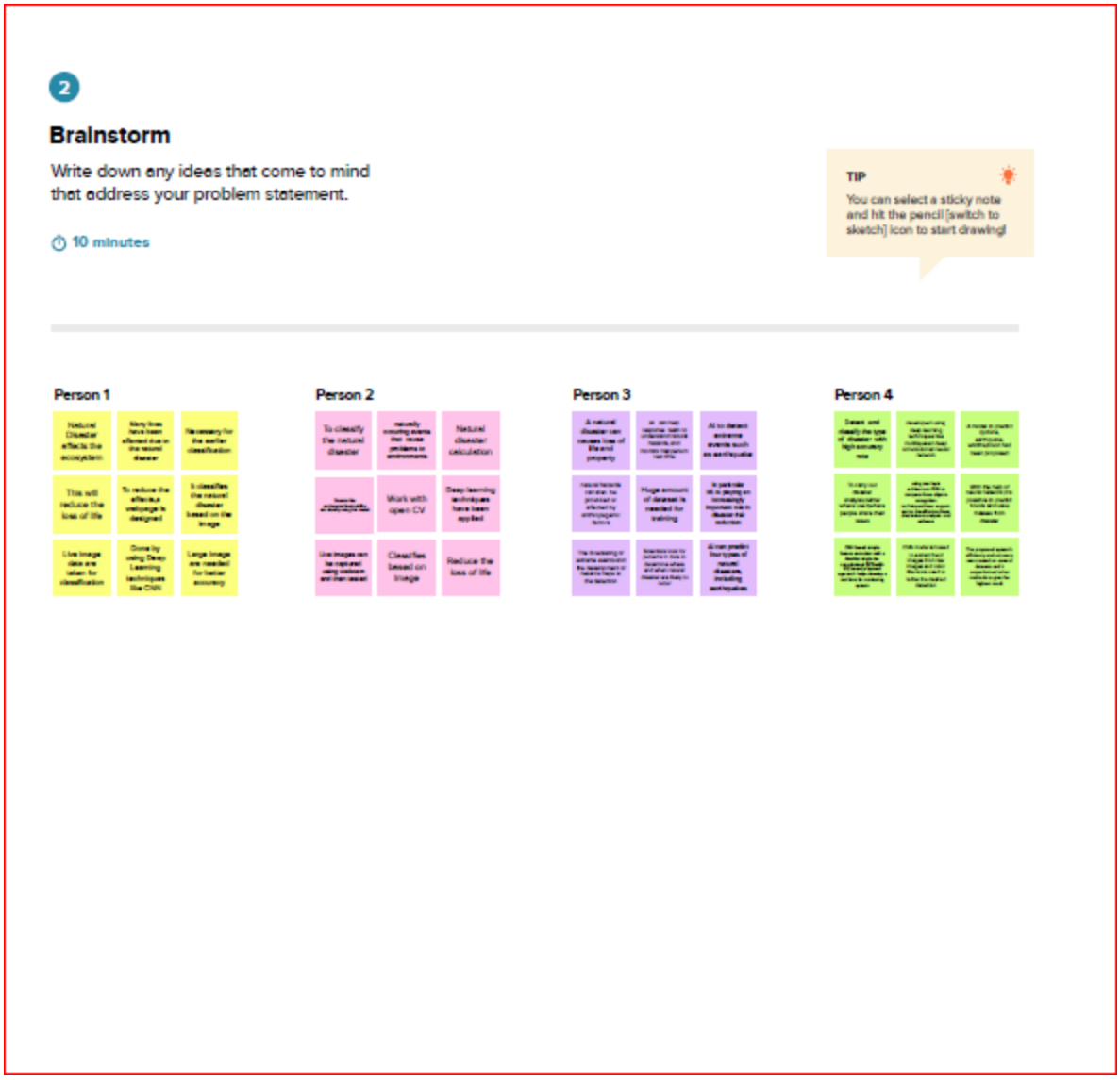
Brainstorming provides a free and open environment that encourages everyone with in a team to participate in the creative thinking process that lead stop problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions. Use this template in your own brainstorming sessions so your team can unleash their magination and starts haping concept seven if you're not sitting in the same room. Brainstorm& Idea Prioritization for “Natural Disaster Intensity Analysis and Classification Using Artificial Intelligence”:

Reference:
https://app.mural.co/t/naturaldisastersintensityana6798/m/naturaldisastersintensityana6798/1664760602924/f88a333c4f3b4107ee6bec504bc7eb0e5096ef1a?sender=u32a9f563542802c156589148

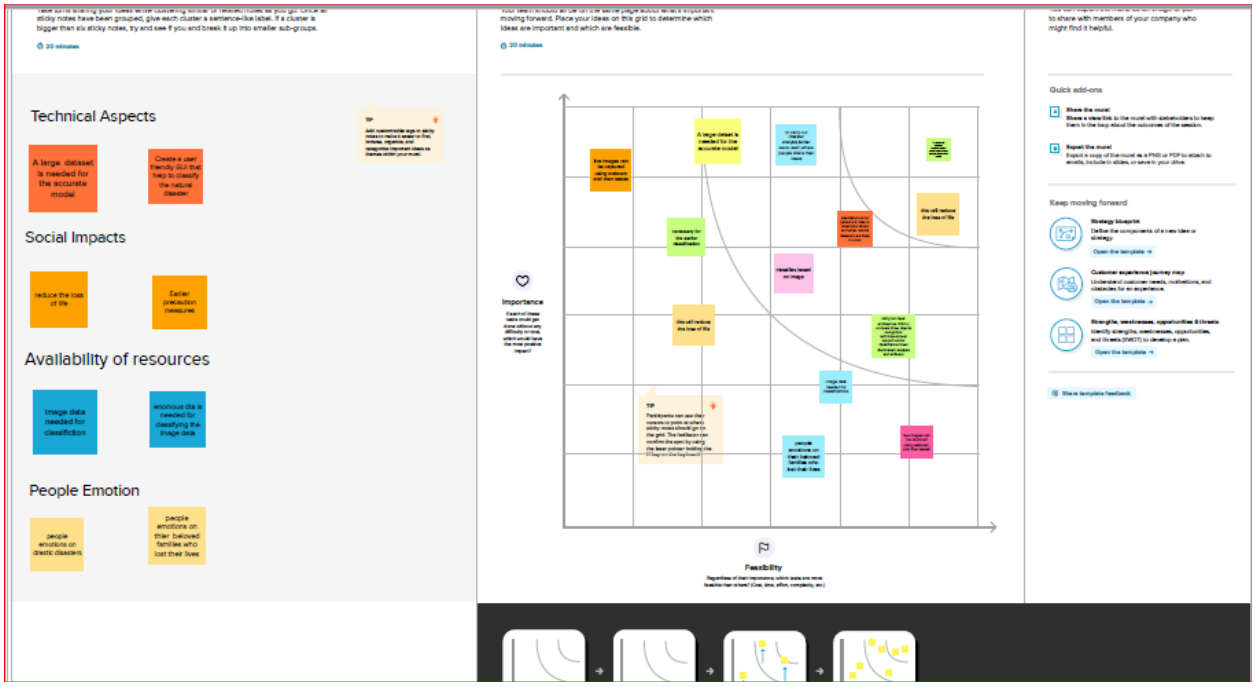
Step-1:TeamGathering,CollaborationandSelecttheProblemStatement



Step2:Brainstormidealisteningandgroupin:



Step3:IdeaPrioritization:



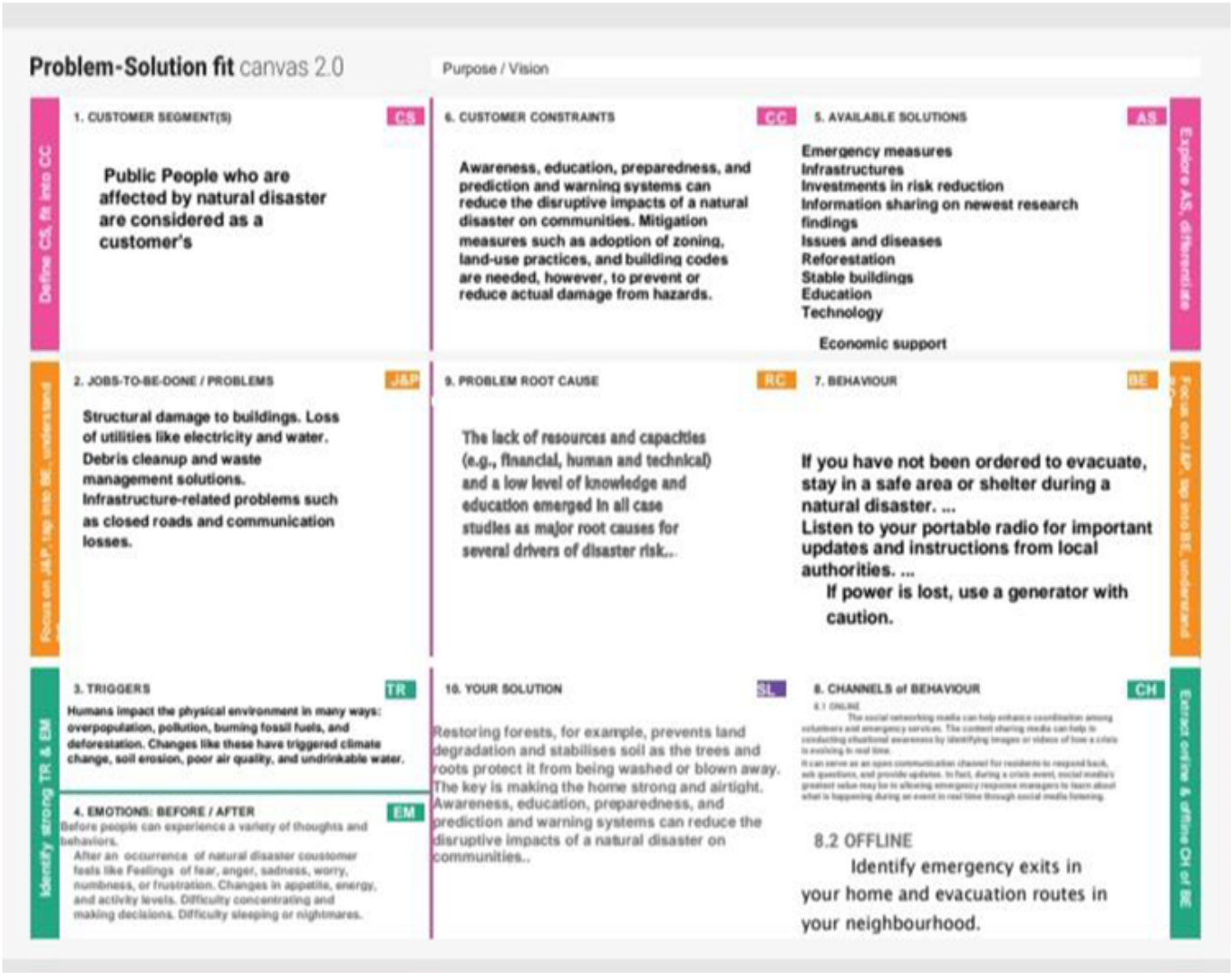
3.3 PROPOSED SOLUTION

Project team shall fill the following information in proposed a solution template.

s.no	Parameter	description
1.	Problem Statement (Problem to be solved)	The main purpose of this model is to detect and classify the type of disaster with a high accuracy rate.
2.	Idea / Solution description	Emergency measures, Investments in risk reduction, Information sharing on newest research findings, Reforestation, Stable buildings,

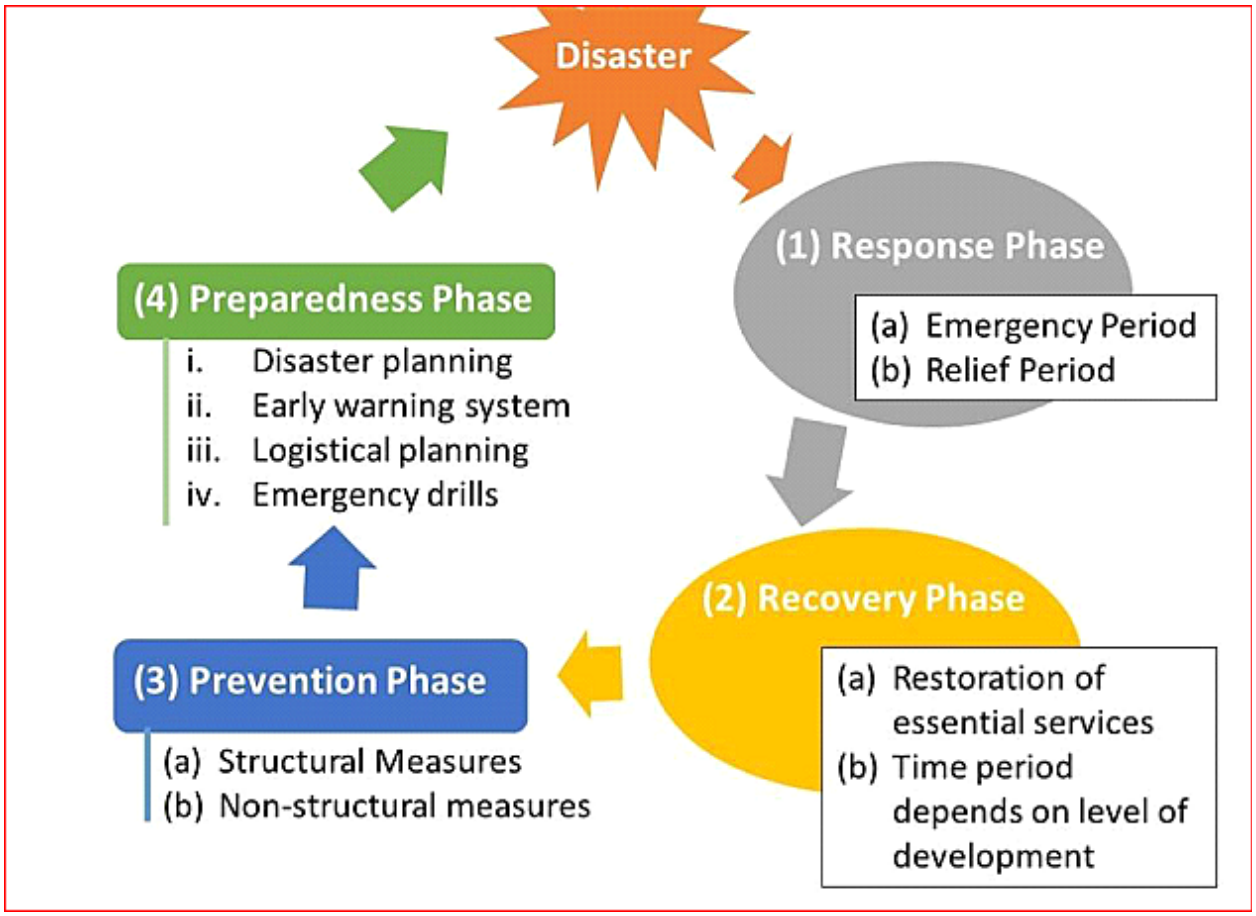
		Education, Technology, Governance.
3.	Novelty / Uniqueness	A natural disaster is "the negative impact following an actual occurrence of natural hazard in the event that it significantly harms a community".
4.	Social Impact / Customer Satisfaction	Increased mental health issues, alcohol misuse, domestic violence, chronic disease and short-term unemployment have resulted from extreme weather events such as bushfires, severe storms, cyclones, floods and earthquakes.
5.	Business Model (Revenue Model)	Be Aware of the Natural Disasters that Could Affect Your Business, Create a Disaster Response Plan, Implement Communication Plans, Backup Documents and Data, Protect the Power, Plan to Recover, Review Your Commercial Insurance Coverage.
6.	Scalability of the Solution	Scalability: Implementing disaster recovery measures involves identifying new and scalable solutions, such as the cloud.

3.4 PROBLEM SOLUTION FIT:



4.REQUIREMENT ANALYSIS
4.1 FUNCTIONAL REQUIREMENT

Being prepared can reduce fear, anxiety, and losses that accompany disasters. Communities, families, and individuals should know what to do in the event of a fire and where to seek shelter during a powerful storm. They should be ready to evacuate their homes and take refuge in public shelters and know how to care for their basic medical needs.
People also can reduce the impact of disasters (flood proofing, elevating a home or moving a home out of harm's way, and securing items that could shake loose in an earthquake) and sometimes avoid the danger completely. 2
You should know how to respond to severe weather or any disaster that could occur in your area – hurricanes, earthquakes, extreme cold, flooding, or terrorism.
You should also be ready to be self-sufficient for at least three days. This may mean providing for your own shelter, first aid, food, water, and sanitation.
There are many types of disasters and emergencies: fires, floods, earthquakes or man-made disasters. You and your family may need to survive on your own after an emergency. Having sufficient supplies such as food, water, medicine and emergency essentials is important. Local officials and relief workers will be on the scene after a disaster but they cannot reach everyone immediately. You could get help in hours or it might take days. It is estimated that after a major disaster, it may take up to three days for relief workers to reach some basic disaster supplies kit.



1. A three-day supply of water – one gallon of water per person, per day
2. Portable, battery-powered radio or television and extra batteries
3. Flashlight and extra batteries
4.First aid kit and manual
5. Sanitation and hygiene items (moist towelettes and toilet paper)
6. Matches and a waterproof container
7 Whistle
8. Extra clothing
9. Kitchen accessories and cooking utensils, including a can opener
10. Photocopies of credit and identification cards
11. Cash and coins
12. Items for infants, such as formula, diapers, bottles, and pacifiers.

4.REQUIRMENT ANALYSIS

4.1FUNCTIONAL REQUIREMENT:

FR NO	**Functional Requirement(Epic)**	**Sub Requirement (Story / Sub-Task)**
FR - 1	Request Permission	Access permission from web camera.
FR - 2	Disaster Detection	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.

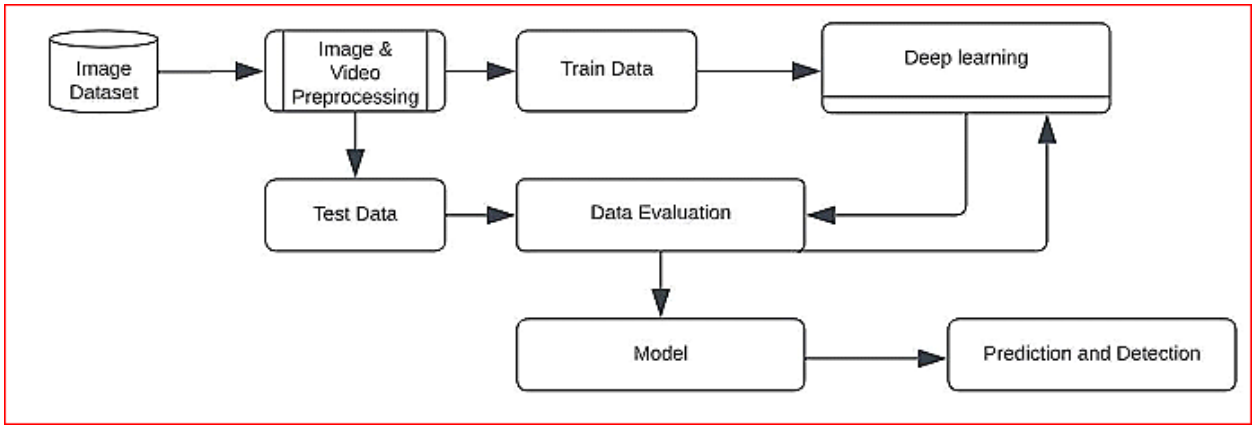
4.2NON-FUNCTIONAL REQUIREMENTS:

NFR NO	**NONFUNCTIONAL 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 95 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 Googlechrome, Microsoft edge and also it can be extended to the NDRFand 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 to be enter and leaves the system, what changes the information, and where data is store



FLOW DIAGRAM

5.2SOLUTION & TECHNICAL ARCHITECTURE SOLUTION ARCHITECTURE

SOLUTION

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions.

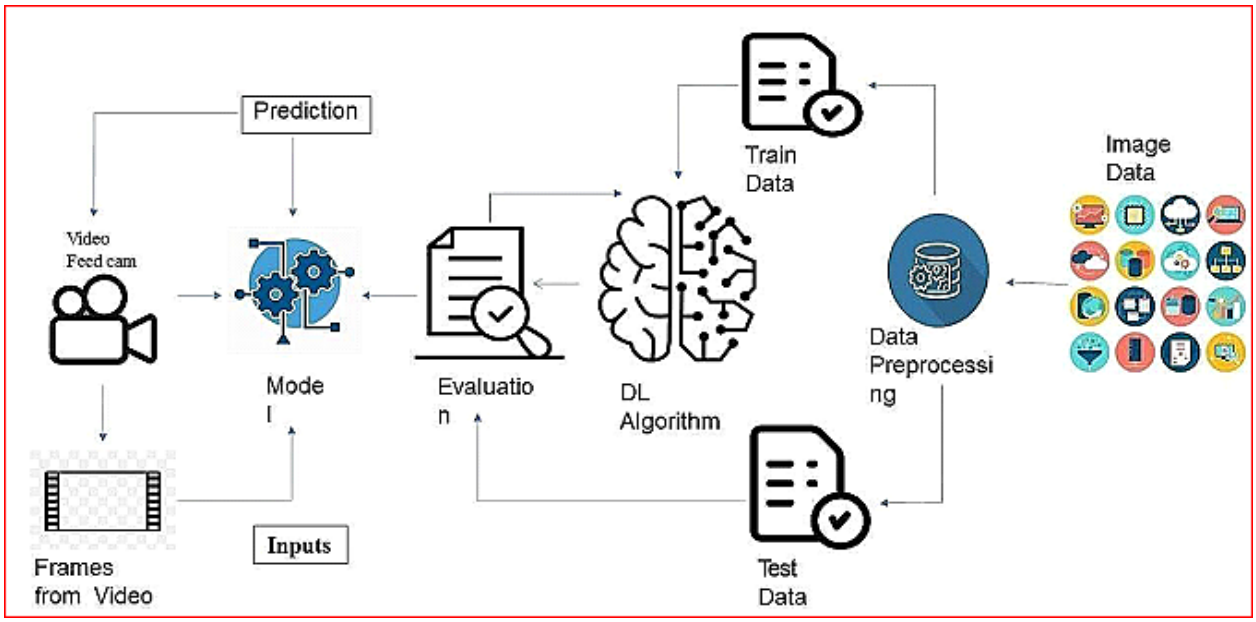
Its goals are to:

● Find the best tech solution to solve existing business problems.

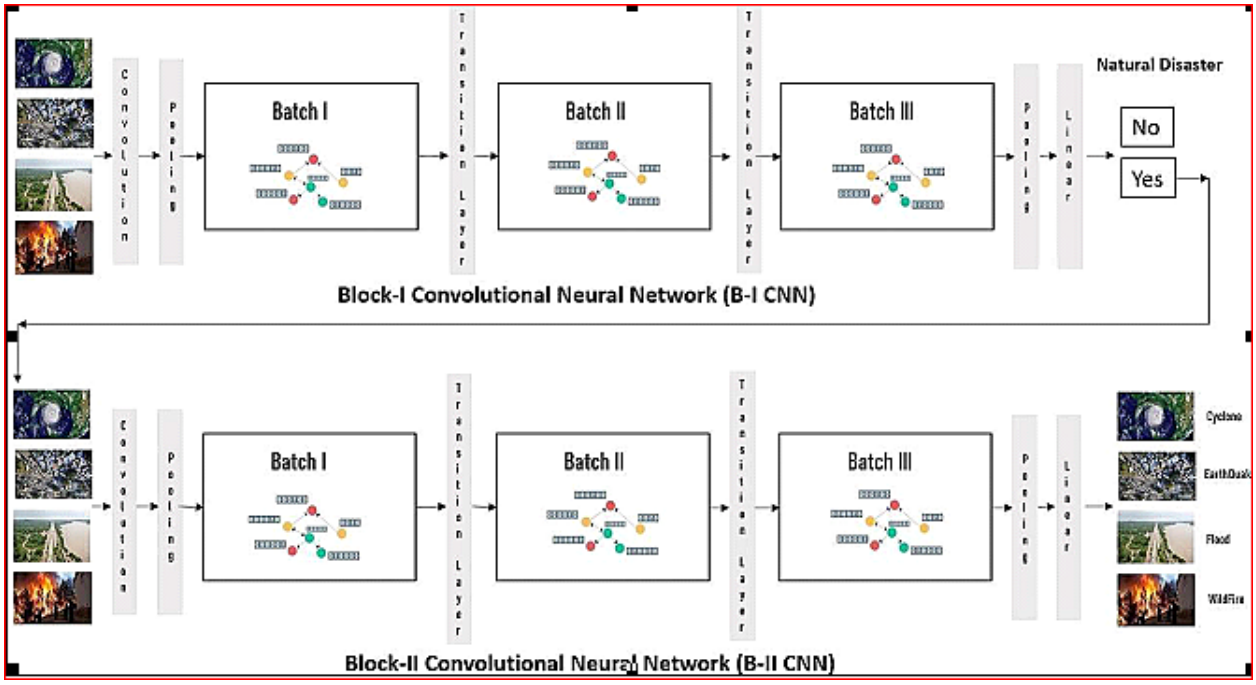
● Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
● Define features, development phases, and solution requirements.

● Provide specifications according to which the solution is defined, managed, and delivered.

SOLUTION ARCHITECTURE:



TECHNICAL ARCHITECTURE:



COMPONENTS & TECHNOLOGIES:

S.NO	Component	Description	Technology
1.	User Interface	User interacts with application for the detection of any Natural disaster's intensity and classify which happened just before.	HTML, CSS, JavaScript, Django, Python.
2.	Disaster Detection	This function is used to detect,Outcomes from the new trained data to perform new Convolution tasks and solve new problems.	Decision trees,Regression, Convolution Neural networks.
3.	Evaluation System	It monitors that how Algorithm performs on data as well as during training.	Chi-Square, Confusion Matrix, etc.
4.	Input Data	To interact with ou r model and give it problems to solve. Usually this takes the form of an API, a user interface, or a commandline interface.	Application programming interface, etc.
5.	Data Collection Unit	Data is only useful if it's accessible, so it needs to be stored ideally in a consistent structure and conveniently in one place.	IBM Cloud, SQL Server.
6.	Database Management System	An organized collection of data stored in database,	My SQL , Dynamo DB etc.

		so that it can be easily accessed and managed.	

APPLICATION CHARACTERISTICS:

S.NO	CHARCTERISTICS	DESCRIPTION	TECHNOLOGY
1.	Open-Source Frameworks	An open source framework is a template for software development that is designed by a social network of software developers. These frameworks are free for public use and provide the foundation for building a software application.	Keras ,Tensorflow.
2.	Authendication	This keep sour models secure and makes sure only those who have permission can use them.	Encryption and Decryption (OTP).
3.	Application Interface	User uses mobile application and web application to interact with model	Web Develop ment (HTML,CSS)
4.	Availability (both Online and Offline work)	Its include both online and offline work. As good internet connection is need for online work	Caching, backend server.

		to explore the software perfectly. Offline work includes the saved data to explore for later time.	
5.	Regular Updates	The truly excellent software product needs a continuous process of improvements and updates. Maintain your server and make sure that your content is always up-todate. Regularly update an app and enrich it with new features.	Waterfall Approach, Incremental Approach, Spiral Approach
6.	personalisation	Software has features like flexible fonts, backgrounds, settings, colour themes, etc. which make a software interface looks good and functional.	CSS

5.3USER STORIES:

Functional Requirement(Epic)	User Story Number	User Story/Task	Acceptance Criteria
Collection of dataset	USN-1	As a user, I can collect the dataset for monitoring and analyzing	Enough data collected for training Model.
Home Page	USN-2	As a user, I want to know to about the basics of frequently	I can get the idea about the Application.

		occurring Disasters.	
Intro Page	USN-3	As a user, I want to about the introduction of Disaster in particular areas.	can get idea about the disaster and where it occurs.
Openwebcam	USN-4	As a user, I adapt with the webcam to analyze and classify the Disaster from video capturing	I can capture a video or image of particular disaster to analyze and classify.
Analysis of required phenomenon	USN-5	As a user, I can regulate certain factors influencing the action and report on past event analysis.	Model should be easy to use & working fine from the web app
Algorithm selection	USN-6	As a user, I can choose the required algorithm for specific analysis.	Selection must give the better accuracy and better output.
Training and Testing	USN-7	As a user, I can train and test the model using the algorithm.	Training the model to classify and analyze the intensity.
Detection and analysis of data	USN-8	As a user, I can detect and visualize the data effectively	I can capture a video or image of particular disaster to analyze and detect.
Model building	USN-9	As a user I can build with the web application.	Model should be predicting occurrence of the disaster and intensity level of disaster.
Integrate the web app with the AI Model	USN-10	As a user, I can use Flask app to use model easily through web app.	Model zshould be easy to use and working fine from the web app.

Model deployment	USN-11	As an administrator, I can deploy the AI model in IBM Cloud.	Model's prediction should be available for users to make decision

6.PROJECT PLANNING & SCHEDULING

6.1SPRINT PLANNING & ESTIMATION:

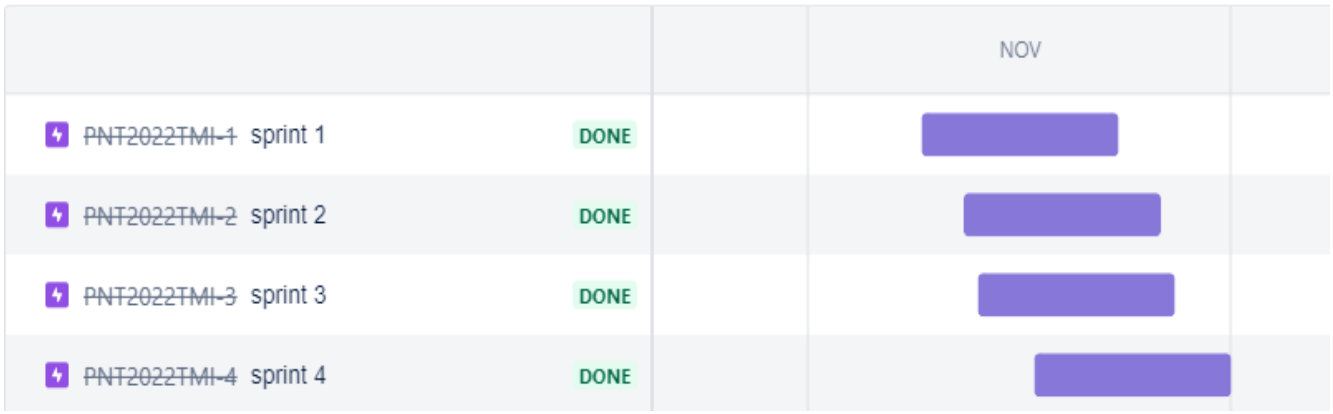
SPRINT	FUNCTIONAL REQUIREMENT (EPIC)	USER STORY NUMBER	USER STORY / TASK	STORY POSITIONS
Sprint-1	Collection of Dataset	USN-1	As a user, I can collect the dataset for monitoring and analysing.	5
Sprint-1	Home page	USN-2	As a user, I can collect the dataset for monitoring and analysing.	5
Sprint-1	Intro page	USN-3	As a user, I want to about the introduction of Disaster in particular areas.	5
Sprint-1	Open Webcam	USN-4	As a user, I adapt with the webcam to analyse and classify the Disaster from video capturing	5
Sprint-2	Analysis of required phenomenon	USN-5	As a user, I can regulate certain factors	5

Sprint-2	Algorithm selection	USN-6	As a user, I can choose the required Algorithm for specific analysis.	5
Sprint-2	Training and Testing	USN-7	As a user, I can train and test the model using the algorithm.	10
Sprint-3	Detection and analysis of data	USN-8	As a user, I can detect and visualise the data effectively	10
Sprint-3	Model building	USN-9	As a user, I can build with the web application	10
USN-4	Integrate the web app with the AI model	USN-10	As a user, I can use Flask app to use model easily through web app.	10
USN-4	Model deployment	USN-11	As an administrator, I can deploy the AI model in IBM Cloud	10

6.2SPRINT DELIVERY SCHEDULE:

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

Reports from Jira ：



7.CODING & SOLUTIONING

7.1FEATURE 1

The project focuses on the analysis of intensity of Disaster for giving precautionary measures for the people living in the Danger zone.

It focuses on classifying the type of Disaster which oftenly occurs in that particular zone.

7.2FEATURE 2

The accuracy of the project is improved more better than the previously submitted models.
The accuracy is improved by training and testing more images in the dataset.

8.TESTING

8.1TEST CASE

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 elements in Home page	Application should show below UI elements: Home page button Intro page button Open 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 Intro page	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
TC_008	Intro page	Verify user is able to navigate to the required page	Application should navigate to the Open webcam page	Working as expected	pass

TC_009	Welcome page	Verify user is able to see the webcam page	Webcam page is displayed	Working as expected	pass
TC_010	Welcome page	Verify the Emergency pull button is visible while the webcam is not connected	Application should show below UI elements: a. Emergency pull button	Working as expected	pass
TC_011	Welcome page	Verify user is able to see the output window	Application should detect the type of Disaster from the real time video	Working as expected	pass

8.1User Acceptance Testing

It is to briefly explain the test coverage and open issues of the natural disasters intensity analysis and classification using artificial intelligence project at the time of the release to User Acceptance Testing (UAT).

Defect Analysis:

This report shows the number of resolved or closed bugs at each severity level, and how theywere resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	1	0	0	2	3
Duplicate	1	0	0	0	1
External	0	0	0	0	0
Fixed	1	0	0	2	3
Not Reproduce	0	0	0	0	0
Skipped	0	0	0	1	1
Won’t Fix	0	0	0	0	0
Totals	3	0	0	5	8

8.2Test Case Analysis:

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

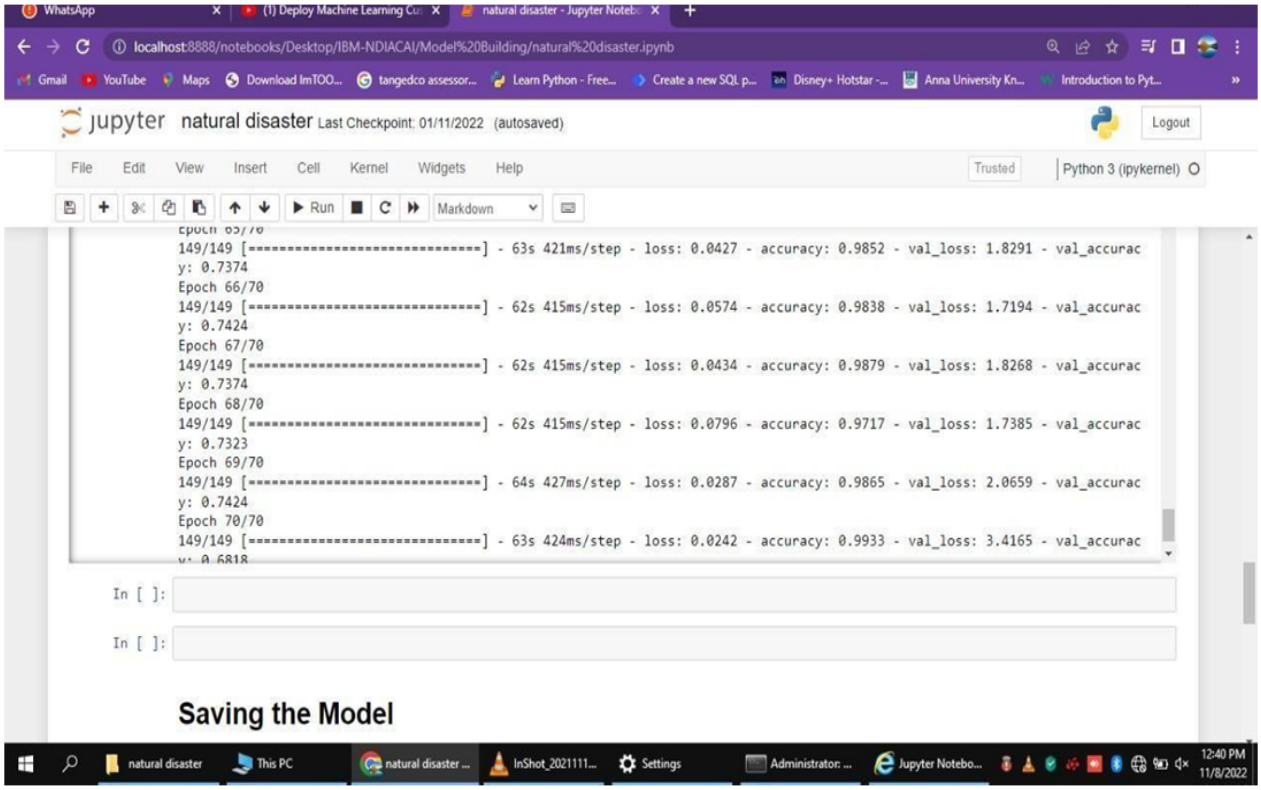
Section	Test Case	Not Tested	Fail	Pass
Home Page	4	0	0	4
Intro Page	4	0	0	4
Open Webcam	3	0	0	3

9.RESULTS

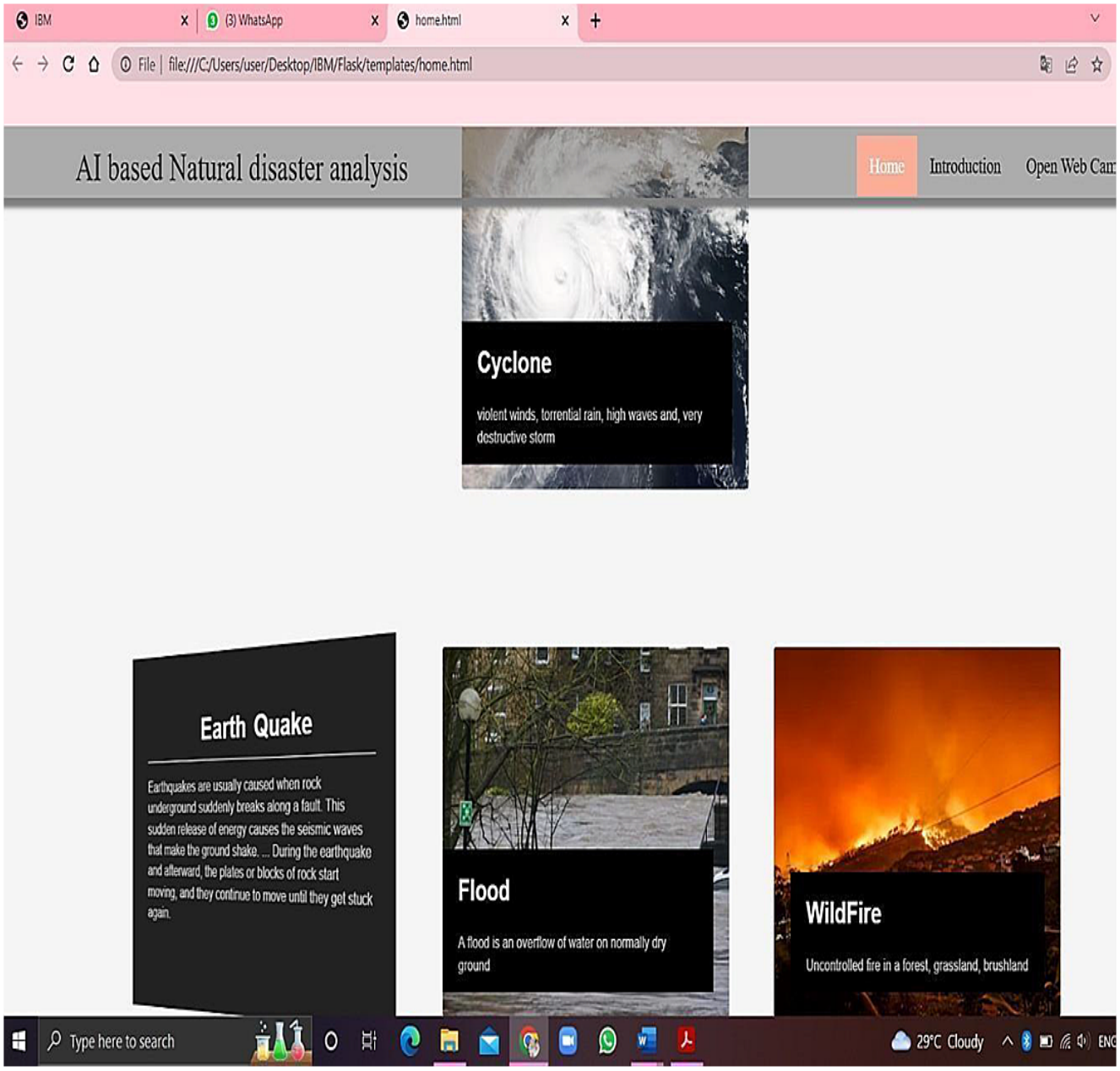
9.1PERFORMANCE METRICS

The nature disaster intensity analysis and classification with test data and train data has been executed successfully. The model has been trained over 1000+ images and the model have an accuracy of nearly 99% and the model has been tested with the data which is separate from the trained data and has predicted the data well.

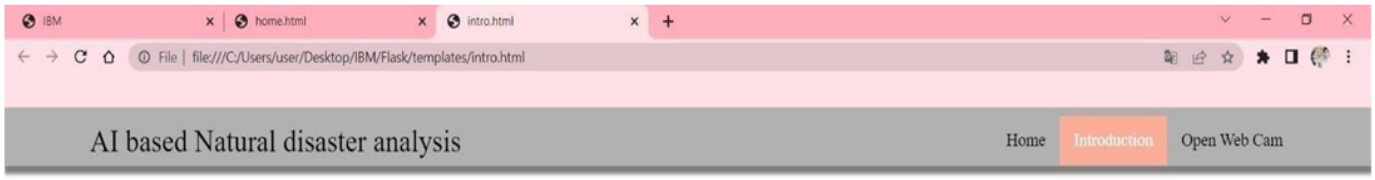
OUTPUT OF APPLICATION:



HOME PAGE

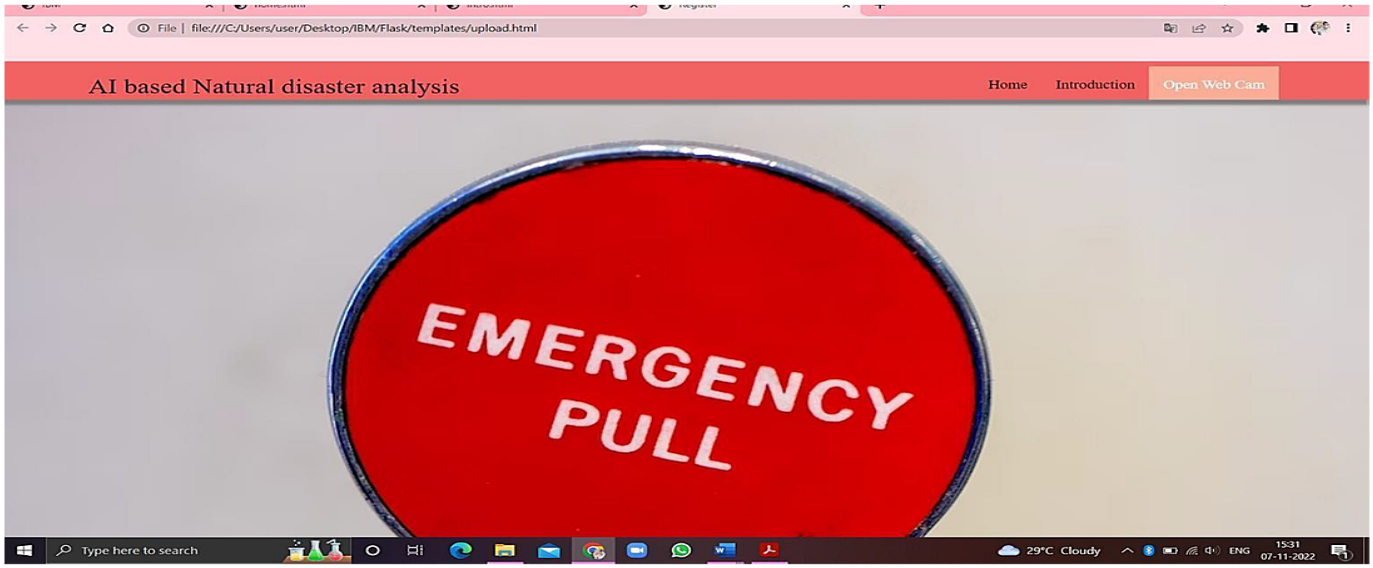

IBM
(3) WhatsApp
home.html
File | file:///C:/Users/user/Desktop/IBM/Flask/templates/home.html
AI based Natural disaster analysis
Home
Introduction
Open Web Cam
Cyclone
violent winds, torrential rain, high waves and, very destructive storm
Earth Quake
Earthquakes are usually caused when rock underground 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.
Flood
A flood is an overflow of water on normally dry ground
WildFire
Uncontrolled fire in a forest, grassland, brushland
Type here to search
29°C Cloudy

INTRODUCTION PAGE:

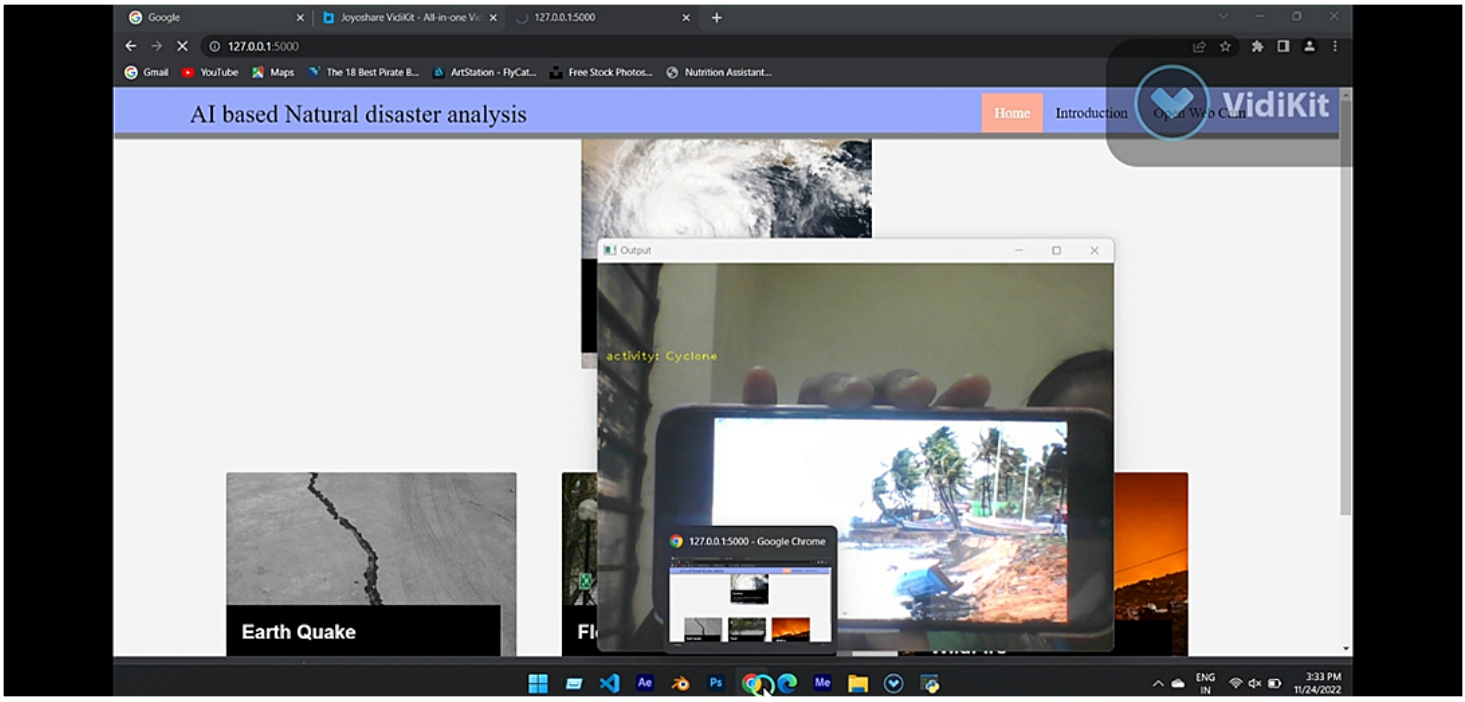


China, India and the United States are among the countries of the world most affected by natural disasters.
Natural disasters have the potential to wreck and even end the lives of those people, who stand in their way. However, whether or not you are likely to be affected by a natural disaster greatly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

WEB CAM



DETECTION OF NATURE DISASTER:



10.ADVANTAGES & DISADVANTAGES

ADVANTAGES

a. The proposed model will be used as a real time natural disaster detection model and provide some upcoming predictions for future disasters.

b. The model is to detect and classify the type of disaster and The model have a high accuracy rate (99.33).

c. The model was used to prevent natural disasters in the future and model can be used to predict future disasters and take some action against heavy loss of human ecological systems and property.

d. The proposed system helps to reduce the impact of hazards occur during natural disaster. This provides an efficient way to warn and educate people about disaster prone areas.

e. It will help us be prepared in times of disaster.

DISADVANTAGES

a. The resultant model unable to validate the model performance under uncontrolled conditions.

b. The model cannot be used for various natural disaster.

11.CONCLUSION

It focused how image from given dataset (trained dataset) in field and past data set used predict the pattern of different nature disaster using CNN model. In the system had applied different type of CNN compared the accuracy. The natural disaster in Indonesia frequently happened, due to the geographical position of the country. Thus, natural disasters mostly occurred as an impact of the natural condition. However, the weather and climate condition has also influenced and triggered the disasters.

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.APPANDIX

Download the dataset.
Import the dataset:

```
import drive
drive. mount('/content/drive')
get_ipython().system('unzipdrive/My\\Drive/dataset.zip')

# import necessarylib:
from tensorflow.keras.preprocessing.image import ImageDataGenerator
#image Data Augmentation :
#setting parameter for Image Data agumentation to the traingdata

train_datagen = ImageDataGenerator (rescale=1./255, shear_range=0.2,zoom_range=0.2,
horizontal_flip=True) #Image Data agumentation to the testing data test_datagen=ImageDataGenerator
(rescale=1./255)
#Loading our data and performing data agumentation
#performing data agumentation to train data :
```

X_train = train_datagen.flow_from_directory('../data/train_set',target_size=(64, 64), batch_size=5, color_mode='rgb',class_mode='categorical')
#performing data agumentation to test data
X_test = test_datagen.flow_from_directory('../data/test_set',target_size=(64, 64), batch_size=5, color_mode='rgb',class_mode='categorical')
Importing Neccessary Libraries :
import numpy as np used for numerical analysis
import tensorflow
#open source used for both ML and DL for computation

from tensorflow.keras.models import Sequential
#it is a plain stack of Layers
from tensorflow.keras import layers #A Layer consists of a tensor-in tensor-out computation function
#Dense layer is the regular deeply connected neural network Layer
from tensorflow.keras.layers import Dense, Flatten
#Faltten-used for flattening the input or change the dimension
from tensorflow.keras.layers import Conv2D, MaxPooling2D #Convolutional Layer
#MaxPooling20-for downsampling the image
from keras.preprocessing.image import ImageDataGenerator
model=Sequential()
# First convolution layer and pooling
Classifier.add(Conv2D(32, (3, 3), input_shape=(64, 64, 3), activation='relu'))
classifier.add(MaxPooling2D(pool_size=(2, 2)))
# Second convolution layer and pooling
Classifier.add(Conv2D(32, (3, 3), activation='relu'))
# input_shape is going to be the pooled feature maps from the previous convolution l
Classifier.add(MaxPooling2D(pool_size=Classifier.add(Flatten())
# Adding a fully connected Layer classifier.add(Dense (units=128, activation='relu')) classifier.add(Dense (units=4, activation='softmax'))
# softmax for more than 2
#Compiling the model
Compiling the CNN
categorical_crossentropy for more than 2
Classifier. Compile(optimizer='adam', loss="categorical_crossentropy', metrics=['accuracy'])
#Fitting the model
classifier.fit_generator(generator=x_train, steps_per_epoch = len(x_train), epochs=20, validation_data=x_test, validation_steps = len(x_test))# No of images in test set
# Save the model
Classifier.save('disaster.h5')
Model_json = classifier.to_json()
With open("model-bw.json", "w") as json_file:

```
Json_file.write(model_json)
from tensorflow.keras.models import load_model from keras.preprocessing import image model =
load_model("disaster.h5") #Loading the mode
img = image.load_img(r"D:\ML_training may 2020\Projects_50\Final\AI based Natural disaster analysis
\data\te
target_size= (64,64)) #Loading of the image
x = image.img_to_array(img)#image to array
x = np.expand_dims(x,axis = 0) #changing the shape
pred = model.predict_classes(x) #predicting the classes
pred
index=['Cyclone','Earthquake','Flood', 'Wildfire']
Result=str(index[pred[@]])
Result
#Build a flask application:
from flask import Flask, render_template, request
# Flask-It is our framework which we are going to use to r
#request-for accessing file which was uploaded by the user
#import operator
import cv2
# opencv library
from tensorflow.keras.models import load_model# load our model
import numpy as np
#import os
from werkzeug.utils import secure_ filename
# Creating our flask application and loading our model by using load_model method
App = Flask (___name___,template_folder="templates")
# initialize
# Loading the model model=load_model('disaster.h5') print("Loaded model from disk")
Routing to the html Page:
@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('intro.html')
#when webcam is opened then it start to predict:
@app.route('/upload', methods=['GET', 'POST'])
 def predict():
```

```
cap= cv2.VideoCapture (0)
while True:
  frame cap.read()
 #capturing the video frame values #Simulating mirror image
 frame = cv2.flip(frame, 1)
#Loop over frames from the video file stream while True: # read the next frame from the file
(grabbed, frame) = vs.read()
# if the frame was not grabbed, then we have reach # of the stream
if not grabbed:
break
# if the frame dimensions are empty, grab them
if W is None or H is None:
(H, W) = frame.shape[:2]
# clone the output frame, then convert it from BGI # ordering and resize the frame to a fixed 224x224
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, 120), 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
# release the file pointers 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)
```

DEMOLINK:

https://youtu.be/_FwmcOk4CwE

GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-43405-1660716680