NANDHA ENGINEERING COLLEGE
(Autonomous)

Erode – 638 052

Natural Disasters Intensity Analysis and Classification using Artificial Intelligence

An IBM Project Report

Submitted by

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Natural Disasters Intensity Analysis and Classification using Artificial Intelligence

Introduction

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 propose a multi-layered deep convolutional neural network.

Purpose:

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.

Literature Survey

Existing problem:

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 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 disaster intensity types with different filters and parameters.

Reference:

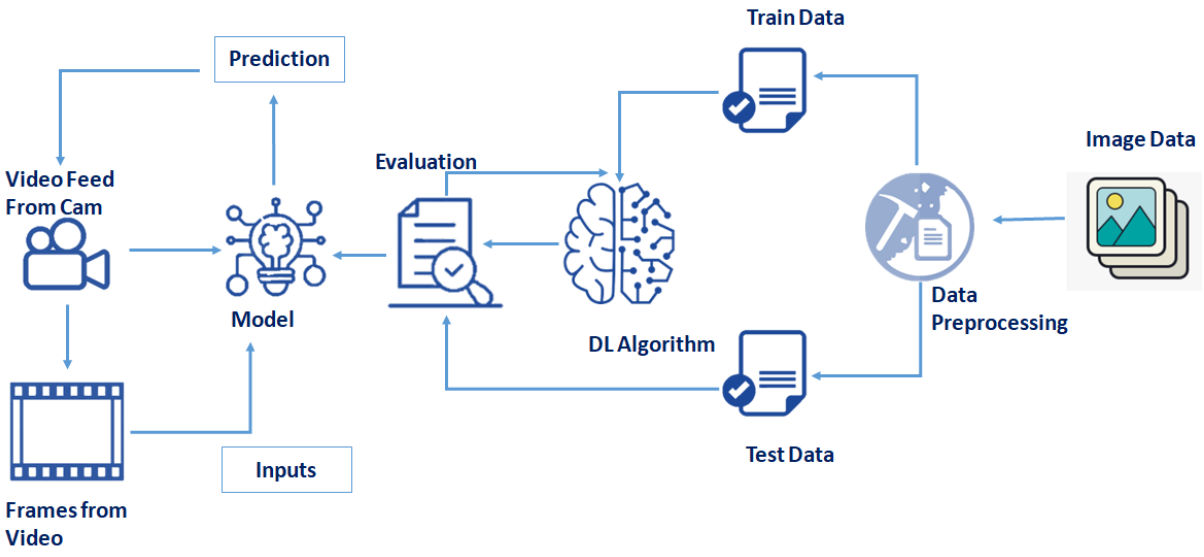
Abkowitz, M., and E. Meyer. 1996. Technological advancements in hazardous materials evacuation planning. Transportation Research Record 1522:116-121.

Adams, B.J., C.K. Huyck, M.Z. Mio, S. Cho, S. Ghosh, S, H. Chung, R.T. Eguchi, B. Houshmand, M. Shinozuka, and B. Mansouri. 2004a.

National Academies of Sciences, Engineering, and Medicine. 2006. Facing Hazards and Disasters: Understanding Human Dimensions. Washington, DC: The National Academies Press. https://doi.org/10.17226/11671.

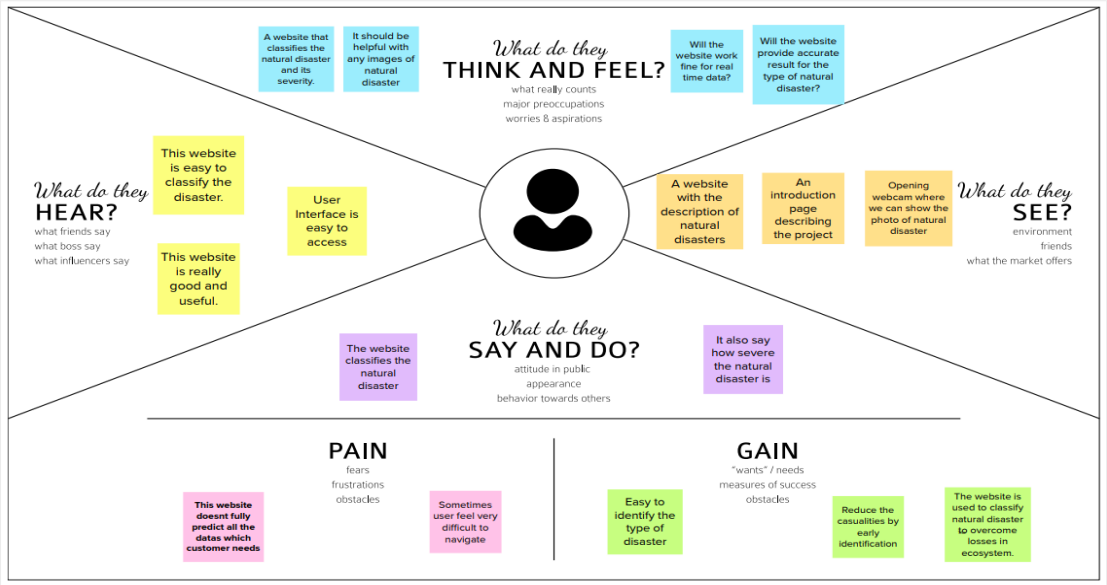
Problem Statement:

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.

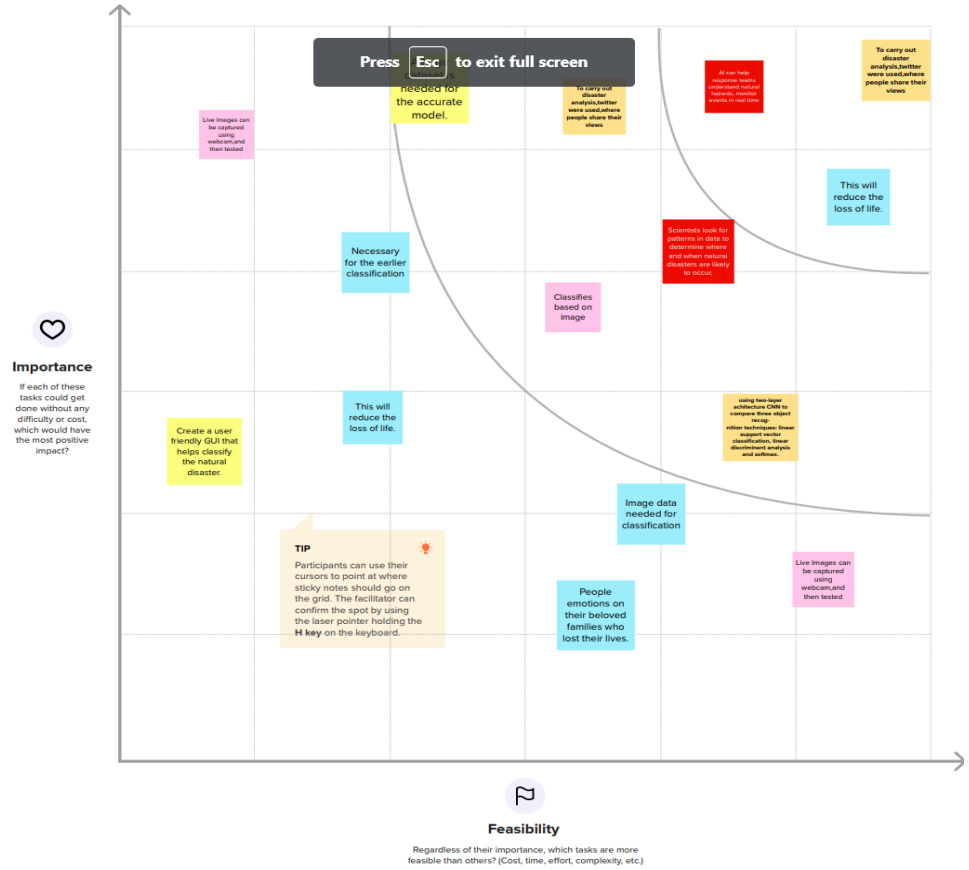


Ideation & Proposed Solution:

Empathy Map:



Ideation & Brainstorm:



Brainstorm:

SHARVESH

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

SENTHILNATHAN

To Classify the natural diasters

naturally occuring events that cause problems to environment

Cyclone Intensity Calculation

Disasters like earthquake,flood, Wildfire are classfiy 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

SATHISHKUMAR

A natural disaster can causes loss of life and property

AI can help response teams understand natural hazards, monitor events in real time

AI to detect extreme events such asearthquakes

Natural hazards can also be provoked or affected by anthropogenic factors

Huge amount of dataset is needed for training

In particular (ML is playing an increasingly important role in disaster risk reduction

The forecasting of extreme events and the development of hazard maps to the detection

Scientists look for patterns in data to determine where and when natural disasters are likely to occur.

AI can predict four types of natural disasters, including: Earthquakes

PRADEEP

detect and classify the type of disaster with high accuracy rate

developed using deep learning techniques like multilayered deep convolutiin neural network

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

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

using two-layer achitecture CNN to compare three object recog-nition techniques: linear support vector classification, linear discriminant analysis and softmax.

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

CNN-based simple feature extraction with a AlexNet single deconvolution (SFEwAN-SD)-based proposed approach helps develop 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 desired detection

The proposed system's efficiency and accuracy were tested on several datasets and it outperformed other methods to give the highest results.

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.

Problem Solution Fit:

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioural patterns and recognize what would work and why.