NATURAL DISASTERS INTENSITY ANALYSIS AND CLASSIFICATION USING IBM WATSON

UG PROJECT PHASE-1 REPORT

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CERTIFICATE OF COMPLETION UG

PROJECT PHASE-1

This is to certify that the UG Project Phase-1 entitled **"NATURAL DISASTERS INTENSITY ANALYSIS AND CLASSIFICATION USING IBM WATSON"** is being submitted by R.Gopichand(H.NO:19UK1A05A5),N.SAI PRIYA H.NO:(19UK1A05C9),S.HARIKA(19UK1A0595),A.MANIKANTESH (19UK1A05C1) in partial fulfillment of the requirements for the award of the degree of Bachelor of Technology in Computer Science and Engineering to Jawaharlal Nehru Technological University Hyderabad during the academic year 2022-2023,is a record of work carried out by them under the guidance and supervision.

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ABSTRACT

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.

Keywords: convolutional neural network; deep learning; natural disasters intensity and classification.

TABLE OF CONTENTS:-

8.APPLICATIONS

The areas where this solution can be applied

9.CONCLUSION

Conclusion summarizing the entire work and findings.

10.FUTURE SCOPE

Enhancements that can be made in the future.

11.BIBILOGRAPHY

References of previous works or websites visited/books refered for analysis about the project,solution previous findings etc.

APPENDIX

A.Source Code

Attach the code for the solution built

1.INTRODUCTION

1.1.Overview

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

1.2. Purpose

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.

2.LITERATURE SURVEY

2.1 Existing problem

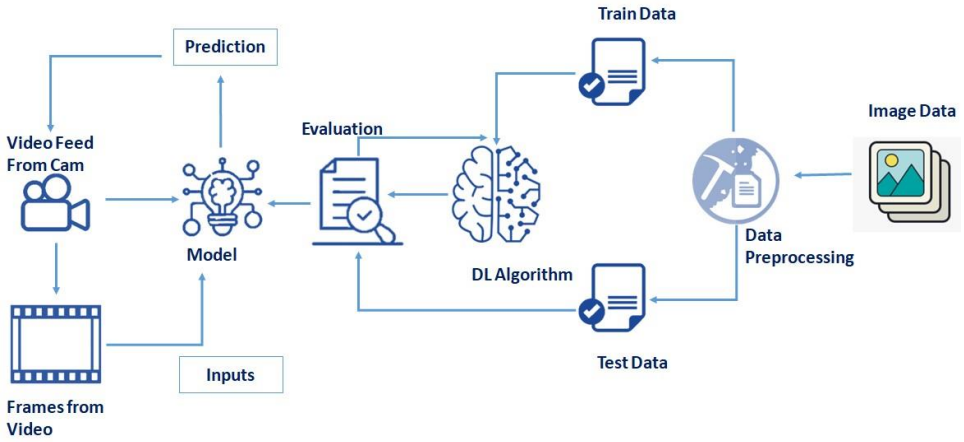
Floods are a calamitous and remarkable disaster. Floods impact greatly on human lives, economically and financially affecting nations. With the help of a neural network, it is possible to predict floods and save the masses from the disaster. By implementing a convolutional neural network and Modified Particle Swarm Optimization (MPSO), Padmawar developed a deep learning approach to foresee the flood circumstances and identify the individuals beforehand.

2.2. Proposed solution

Comparison of processed and raw images was made to test the effectiveness of the proposed strategy.Forest fires drastically affect human lives and economic situations, and locating the victims in a short time is complex task. Convolutional neural networks make it possible to help firefighters to locate the location of victims by detecting density of smoke from images acquired from the unmanned aerial vehicle.

3.THEORITICAL ANALYSIS

3.1. Block Diagram



3.2. Hardware/software designing

To complete this project, you must require the following software's, concepts, and packages Anaconda Navigator is a free and open-source distribution of the Python and R programming languages for data science and machine learning related applications. It can be installed on Windows, Linux, and macOS.Conda is an open-source, cross-platform, package management system. Anaconda comes with so very nice tools like JupyterLab, Jupyter Notebook,QtConsole, Spyder, Glueviz, Orange, Rstudio, Visual Studio Code. For this project, we will be using Jupyter notebook and Spyder.

4.EXPERIMENTAL INVESTIGATIONS

In our research, the dataset used was collected from PyImage Search readers, who used Google Images to collect the total number (4428) of images in different classes. The dataset was separated into four classes: cyclone, earthquake, flood and wildfire, with 928, 1350, 1073 and 1077 images. The dataset was preprocessed to remove the noise by using an adaptive histogram equalizer. The whole dataset was divided into three groups: training, testing and validation. In total, 60% of the dataset was used for training, 23% for testing and 17% for validation. These percentages of the dataset were used to inform the machine on the percentage values of the dataset to be used for testing, training and validation purposes. The validation set was used to count the number of epochs for the whole training process.

* Data Collection.

*Collect the dataset or Create the dataset

*Data Preprocessing.

*Import the ImageDataGenerator library

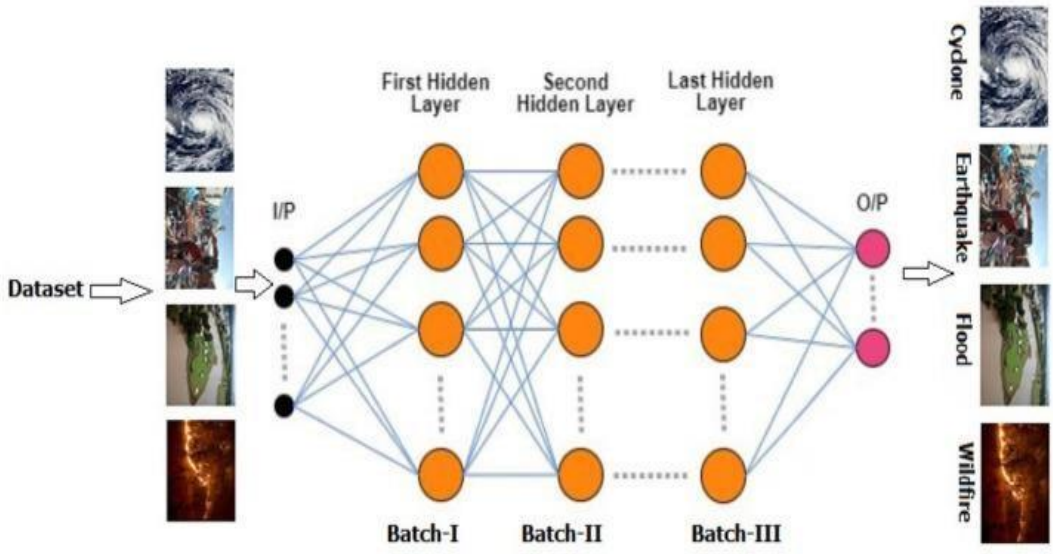
*Configure ImageDataGenerator class

*ApplyImageDataGenerator functionality to Trainset and Testset

*Model Building

*Import the model building Libraries

5. FLOWCHART



6. RESULT

The proposed multilayered deep convolutional neural network was simulated on the computer system with Core i7, Central Processing Unit (CPU) with 16 GB RAM in MATLAB 2018a and different types of results were calculated.

7. ADVANTAGES & DISADVANTAGES

Human capital accumulation may increase following a natural disaster, which could increase the return to physical capital. The increased return to physical capital leads to increased physical capital accumulation. Human capital accumulation positively affects economic growth in most circumstances.

Such stressors place you at risk for emotional and physical health problems. Stress reactions after a disaster look very much like the common reactions seen after any type of trauma.

8.APPLICATIONS

The researchers identified eight broad categories of solutions that are most effective for disaster risk reduction: co-existence with natural processes; innovation; enhancing collaboration; securing livelihoods; modifying consumption patterns; strengthening governance; planning for risks when designing and building.

Despite progress in preparation and response, new extremes and emerging threats are continually catching societies out, noted the report for Environment and Human Security.

In disaster management, remote sensing has various applications:

- Tracking wind patterns. The wind is one of the causes of disaster in the environment. ...
- Detecting earthquake.
- Relief operations. ...
- Wildfires. ...
- Floods management. ...
- Drought prediction.
- Identification of hazards zones. ...
- Reconstruction of areas affected.

9.CONCLUSION

Natural disasters, like floods, earthquakes or extreme climate outbreaks, severely challenge the health and welfare of people, animals and the ecosystem.

Natural disasters are out of human control but the consequences of natural disasters overlap with the consequences of war or combat. In both contexts, there is human suffering caused by damage to life, personal property, and infrastructure. Families are displaced and victims lose shelter. This is complicated further by immense shortages of food and drinking water. Several medical and psychological problems among the victims are major offshoots of natural disasters.

Natural disasters are part of our human environment. Natural disasters do not discriminate between people of a society and other communities. In general, no crisis is solely dependent on natural factors. The purpose of this study is to prepare a landslide susceptibility map using dual logistic regression models and comparative fuzzy inference in northern Tehran.

So far, different methods have been proposed for landslide susceptibility zonation. The accuracy or the error of each of these methods, as well as the use and comparison of each of these methods, requires knowledge of the foundations on which the methods are based. So far, different approaches to landslide susceptibility zonation have been proposed, but what is certain is that all these methods can provide accurate results with minimal data and costs and at very low levels. Combining these models with systems not only increases the accuracy of dealing with complex issues and uncertainties, but also leads to the emergence and development of new theories and methods in a variety of issues. Some would say that it is not appropriate to compare these accidents and natural disasters to the issues facing the global environment. However, it is inescapable to conclude that we human-beings have been incline to lose our sense of awe and respect to the nature, assessing current unsustainable situation such as; how we are using natural resources over the Earth's capacity enable to reproduce them.

10.FUTURE SCOPE

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.

As the population is growing rapidly, people need to acquire land to live on, and as a result the ecosystem is disturbed horrifically, which causes global warming and increases the number of natural disasters. Populations in underdeveloped countries cannot afford damages disasters cause to infrastructures. The aftermath of disasters leaves the humans in miserable situations, and sometimes the devastating effects cannot be detected; additionally, rescue operations cannot take place in most of the places and victims are unable to be identified due to geographical factors of the different areas. Disasters such as forest fires spread rapidly in dense areas, so firefighting is difficult to carry out; in this case, development of the strategy to predict such circumstances is crucial so that such disasters can be prevented beforehand. The proposed multilayered deep convolutional neural network method works in two blocks of convolutional neural networks. Floods are a calamitous and remarkable disaster. Floods impact greatly on human lives, economically and financially affecting nations.

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