Natural Disasters Intensity Analysis and Classification using Artificial Intelligence

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 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.

TECHNOLOGIES USED :

Python, CNN, IBM Cloud, IBM Watson Studio,IBM Cloudant DB, Deep Learning, PythonFlask.

LITERATURE SURVEY:

1.Natural Disasters Intensity Analysis and Classification Based on Multispectral ImagesUsing Multi-Layered Deep Convolutional Neural Network:

Authors: Muhammad Aamir , Tariq Ali , Muhammad Irfan , Ahmad Shaf ,Muhammad Zeeshan Azam , Adam Glowacz , Frantisek Brumercik , Witold Glowacz , Samar Alqhtani , Saifur Rahman .

Natural hazards pose significant risks throughout the world. They are among the deadliest disasters. These events cause significant economic damage as well, with losses from a large tropical cyclone impacting a developed nation approaching or, at times, exceeding U.S. $100 billion. Risk analysis is, in broad terms, a systematic process aimed at understanding the nature of risk in a given situation and expressing the risk together with the underlying knowledge base. The primary focus is on artificial intelligence, machine learning, and statistical methods. The proposed model works in twoblocks: 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 inten-sity types with different filters and parameters.

2.A Deep Learning Approach of Recognizing Natural Disasters on Images using Convolutional Neural Network and Transfer Learning:

Authors: Daryl B. ValdezRey Anthony G. Godmalin December 2021

Natural disasters are uncontrollable phenomena occurring yearly which cause extensive damage to lives, property and cause permanent damage to the environment. However by using Deep Learning, real-time recognition of these disasters can help the victims and emergency response agencies during the onset of these destructive events.In this methode we used Deep learning(DL),Convolutional Neural Network(CNN). It's Ability To Execute Feature Engineering By Itself Anns Have The Ability To Learn And Model Non-Linear And Complex Relationships, Which Is Really Important Because In Real-Life, Many Of The Relationships Between Inputs And Outputs Are Non-Linear As Well As Complex. The Detection Of Natural Disasters By Using Deep Learning Techniques Still Faces Various Issues Due To Noise And Serious Class Imbalance Problems. To Address These Problems, We Proposed A Multilayered Deep Convolutional Neural Network For Detection And Intensity Classification Of Natural Disasters.

3.Rainformer: Features Extraction Balanced Network for Radar-Based Precipitation Nowcasting:

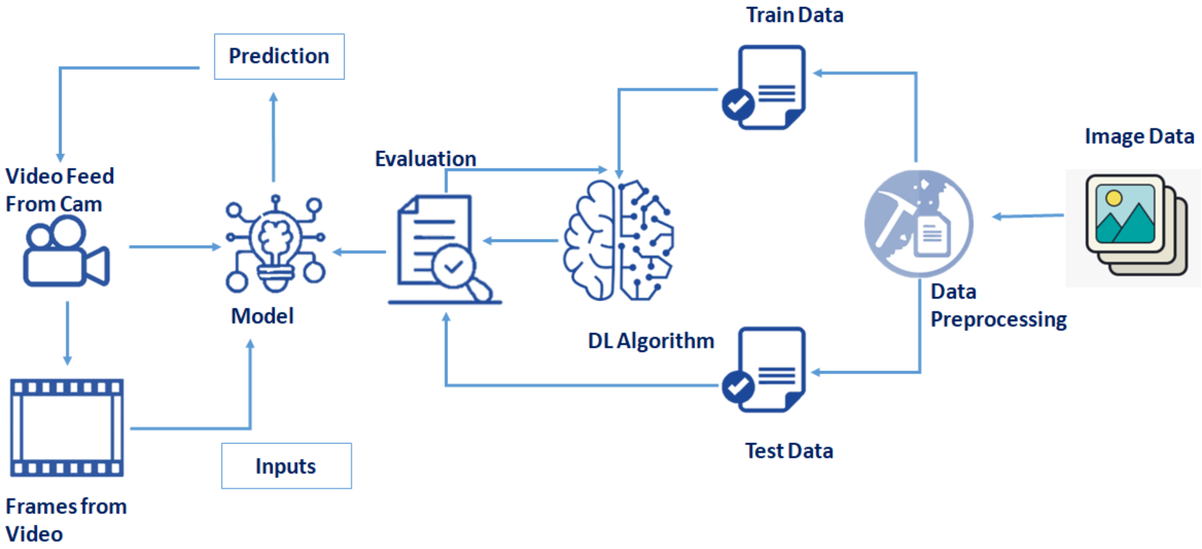
Authors: Bai, Cong; Sun, Feng; Zhang, Jinglin; Song, Yi; Chen, Shengyong

Precipitation nowcasting task is one of the basic challenges in meteorological research. It aims at predicting the rainfall intensity in the future 0–2 h by using specific meteorological information. It has an enormous application range related with human beings. Precipitation nowcasting methods can be roughly divided into numerical weather prediction (NWP) and extrapolation-based methods. NWP relies on vast complex meteorological data as input data and requires an expensive computing resource. At this point, radar extrapolation-based methods may be a good choice. It does not need other meteorological information and only uses several radar maps/frames to predict future radar maps. Convolutional long short-term memory (ConvLSTM) is the first ConvRNN-based method applied to the precipitation nowcasting field to the best of our knowledge. Due to the structure of long short-term memory (LSTM), the ConvRNN-based methods can memorize the past information and effectively capture the movement trend and rainfall intensity variation of rainfall. Although many prior works are superior to traditional algorithms, several issues remain. A new framework for precipitation nowcasting named Rainformer is introduced. It can extract global and local features from radar echo maps separately, and fuses balanced these two features to enhance the model's ability to predict heavy rain or rainstorm. Rainformer consists of an encoder (green box) and decoder (blue box). They both have four stages. When the stage goes deeper, the feature size becomes smaller. Both encoder and decoder include FEBM. FEBM enhances the low to medium and high-intensity rainfall features at every stage.

METHODOLOGY :

This section defines the overall method for natural disaster intensity analysis and classification based on multispectral images using a multilayered deep convolutional neural network. Moreover, this method consists of two blocks of a convolutional neural network. The first block detects a natural disaster occurring and the second one defines the intensity type of the natural disaster. Additionally, the first block consists of three miniconvolutional blocks with four layers each, including 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 and includes an image input layer and fully connected layer.

PROJECT ARCHITECTURE :



CONCLUSION :

The proposed multilayered deep convolutional neural network was simulated on the computer system with Core i7, Central Processing Unit (CPU) 2.8 Ghz with 16 GB RAM in MATLAB 2018a and different types of results were calculated.

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