Natural disasters intensity analysis and classification using artificial intelligence

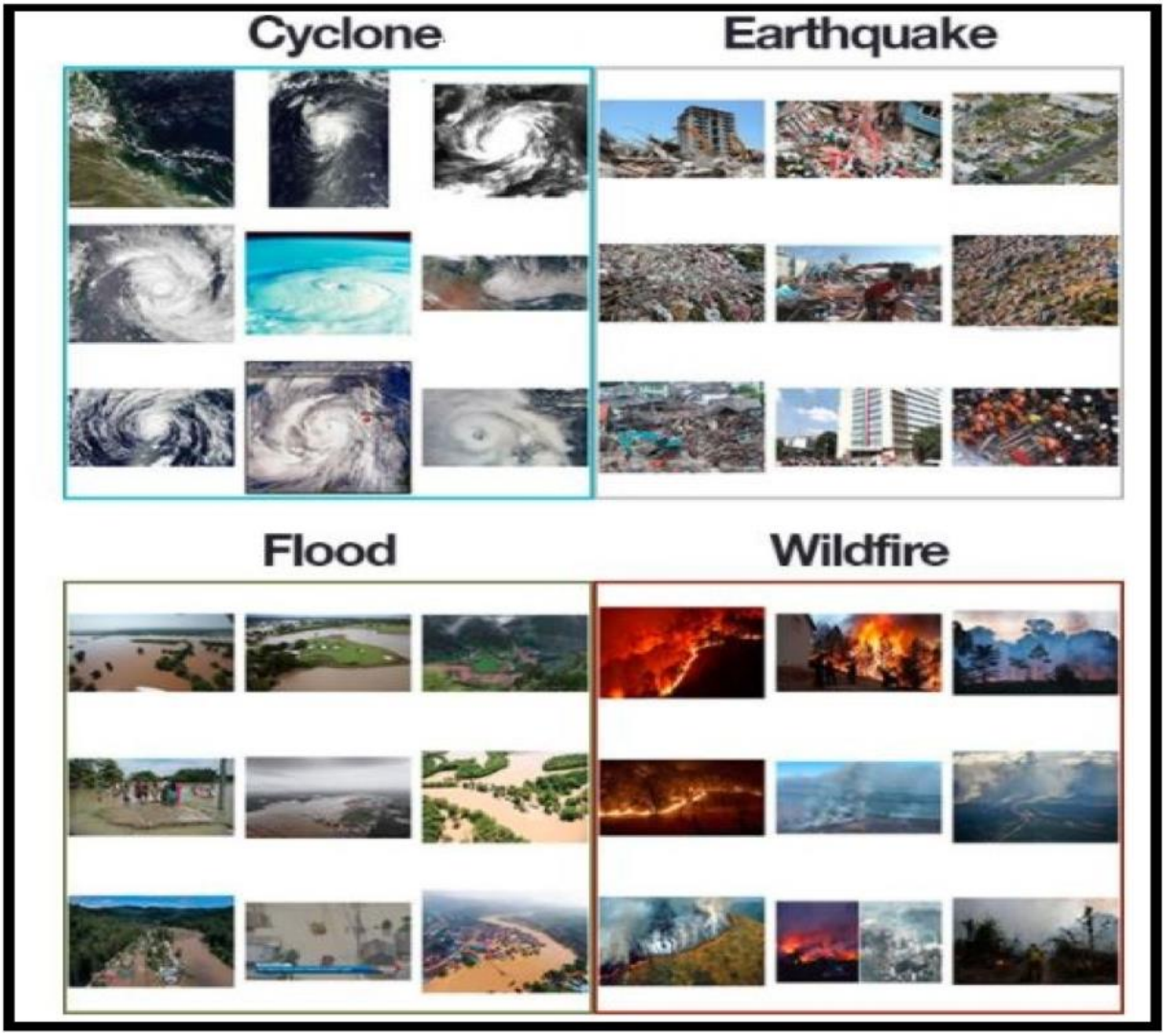
Abstract

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

Need:

As it is quite clear that flood and drought are indeed important and devastating calamities which affects a large population of a demographic every year. So in this situation, if can make a system, or for large user, an app, which analyses the rainfall of the region a person is living in, and can raise alarm for the person if there might can arise a situation of flood, he/ she can take useful measures to ensure least damage to him and his property. Same thing could be used by the Indian Meteorological Department of India to plan and process these events and make sure less people are affected by the calamity.


Cyclone
Earthquake
Flood
Wildfire