

LITERATURE SURVEY

Natural Disaster Intensity Analysis And Classification

Author name: Muhammad Aamir

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Description:

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%,

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Description:

Natural 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. 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.

As the technologies are continuously improving, aviation systems have begun adopting smart technologies to develop unmanned aerial vehicles (UAVs) equipped with cameras, which can reach distant areas to identify aftereffects of natural disasters on human life, infrastructure, and transmission lines by capturing images and videos. Data acquired from these UAVs helps to identify the facial expressions of victims, the intensity of their situation and their needs in a post disaster scenario. It helps to take actions and carry out necessary operations to tackle devastating scenarios. Raw images obtained from camera-equipped UAVs are processed and neural network-based feature extraction techniques are applied to analyze the intensity.

Author name: Frantisek Brumercik

Year of publishing:2021

Description:

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. CNN-based simple feature extraction with a AlexNet single deconvolution (SFEwAN-SD)-based proposed approach helps develop a real time fire monitoring system . Samudre et al successfully improved response time, reduced power consumption, and optimized performance by using pipelining among network layers of a CNN, executed on a field-programmable gate array. As the spatial resolution of satellite images was too low, these images could not be used for wildfire detection; Lee et al. modified deep convolutional networks for high spatial resolution images, VGG-13 and Google Net, utilizing UAVs, a disaster forecasting system, web-based visualization system, alert system, and disaster response scenario database and achieved highly accurate results for early wildfire detection. It is a hectic job for a disaster management organization to assess the damage caused by natural disasters. Using images obtained from social media during and after the occurrence of four major natural disasters, Nguyen et al. proposed a method by adapting CNN features based on event-specific and cross-events. Direkoglu et al. proposed a method to produce motion information images computing optical flow vectors and employed a CNN; the proposed method efficiently differentiated normal and abnormal behaviors of people during a natural disaster. UMN and PETS2009 datasets were used to performed experiments. Yuan et al. proposed a wave-shaped neural network (W-Net) to label the density of smoke in images, which is difficult task, so virtual dataset was created. Convolutional encoder decoder architectures were assembled to maximize the input for information extraction from smoke density images and W-Net was proposed. The accuracy of the proposed system is improved by feeding previous encoding outputs to the decoding layers and combining them. Several data mining application were implemented using contents of social media; user generated content helps in disastrous events to gain vast amount of information. The CNN model is used to

extract flood images from raw images and color filters are used to refine the desired detection. In the work of Layek et al, the proposed system's efficiency and accuracy were tested on several datasets and it outperformed other methods to give the highest results. The proposed multilayered convolutional neural network in this research is used to detect and classify the natural disasters, as explained in the methodology section.

Author name:Saifur Rahman

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Description:

Natural disasters are unpredictable events, Hartawan et al enhanced multilayer perceptron algorithm by including convolutional neural network implemented on raspberry pi to find out the victims of natural disasters using streaming cameras and to aid the evacuation team to rescue the disaster victims. Amit et al. proposed applying automatic natural disaster detection to a convolutional neural network using the features of disaster from resized satellite images of landslide and flood detections. Aerial images are able to show more specific and wider surface area of the ground, which helps acquire a vast amount of information about the occurrence of disaster.

Social media networks such as Twitter where people share their views and information have been used as data sources to carry out disaster analysis. S. Yang et al. used the information related to earthquake shared by users on Twitter as a dataset and input it to the real time event detection system based on convolutional neural networks. Implementation of a CNN module made it possible to successfully achieve the detection of an earthquake and its announcement by the government beforehand using information-based tweets. As the tweets provide a significant amount of information, Madichetty et al. implemented a convolutional neural network to perform feature extraction on informative as well as noninformative tweets, categorizing dataset containing tweets by an artificial neural network.

Author name: Selvarajah Mohanarajah

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Description:

There has been an unsettling rise in the intensity and frequency of natural disasters due to climate change and anthropogenic activities. Artificial intelligence (AI) models have shown remarkable success and superiority to handle huge and nonlinear data owing to their higher accuracy and efficiency, making them perfect tools for disaster monitoring and management. Accordingly, natural disaster management (NDM) with the usage of AI models has received increasing attention in recent years, but there has been no systematic review so far. This paper presents a systematic review on how AI models are applied in different NDM stages based on 278 studies retrieved from Elsevier Science, Springer LINK and Web of Science. The review: enables increased visibility into various disaster types in different NDM stages from the methodological and content perspective, obtains many general results including the practicality and gaps of extant studies and provides several recommendations to develop innovative AI models and improve the quality of modeling. Overall, a comprehensive assessment and evaluation for the reviewed studies are performed, which tracked all stages of NDM research with the applications of AI models.

Author name: Muhammad Zeeshan Azam

Year of publishing:2018

Description:

Studies analyzing the intensity of natural disasters have gained significant attention in the current decade. Ashiquzzaman utilized a video source for fire detection; processing video sources is a feasible task due to convolutional neural networks (CNNs), which require high performance computational resources including graphics hardware, and thus a smart and cost-effective fire detection network is proposed based on architecture of convolutional neural networks.

In convolutional neural networks, a model to detect wildfire smoke named wildfire smoke dilated dense net was proposed by Li , consisting of a candidate smoke region segmentation strategy using an advanced network architecture. Mangalathu performed an evaluation of building clusters affected by earthquakes by exploring the deep learning method, which uses long short-term memory.