NATURAL DISASTER INTENSITY ANALYSIS AND CLASSIFICATION USING ARTIFICIAL INTELLIGENCE

LITERATURE SURVEY

BATCH:B2-2M4E

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NATURAL DISASTER INTENSITY ANALYSIS AND CLASSIFICATION USING AI

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 Pretrained model and the type of disaster is identified and showcased on the OpenCV window.

1.TOPIC: The use of Artificial Intelligence in Disaster Management

AUTHORS: VIMALA NUNAVATH, MORTEN GOODWIN

PUBLISHED IN : 2019

Whenever a disaster occurs, users in social media, sensors, cameras, satellites, and the like generate vast amounts of data. Emergency responders and victims use this data for situational awareness, decision-making, and safe evacuations. However, making sense of the generated information under time-bound situations is a challenging task as the amount of data can be significant, and there is a need for intelligent systems to analyse, process, and visualize it. With recent advancements in Artificial Intelligence (AI), numerous researchers have begun exploring AI, machine learning (ML), and deep learning (DL) techniques for big data analytics in managing disasters efficiently. This paper adopts a systematic literature approach to report on the application of AI, ML, and DL in disaster

management. Through a systematic review process, we identified one relevant hundred publications. After that, we analysed all the identified papers and concluded that most of the reviewed articles used AI, ML, and DL methods on social media data, satellite data, sensor data, and historical data for classification and prediction. The most common algorithms are support vector machines (SVM), Naïve Bayes (NB), Random Forest (RF), Convolutional Neural Networks (CNN), Artificial neural networks (ANN), Natural language processing techniques (NLP), Latent Dirichlet Allocation (LDA), K-nearest neighbour (KNN), and Logistic Regression (LR).

2. TOPIC : Tracking flood phase transistions and establishing a passive hotline with AI-Enabled social data

AUTHORS: RUO-QIAN WANG, YINGIE HU, ZIKAI ZHOU

PUBLISHED IN: 2020

Flooding management requires collecting real-time onsite information widely and rapidly. As an emerging data source, social media demonstrates an advantage of providing in-time, rich data in the format of texts and photos and can be used to improve flooding situation awareness. The present study shows that social media data, with additional information processed by Artificial Intelligence (AI) techniques, can be effectively used to track flooding phase transition and locate emergency incidents. To track phase transition, we train a computer vision model that can classify images embedded in social media data into four categories - preparedness, impact, response, and recovery - that can reflect the phases of disaster event development. To locate emergency incidents, we use a deep learning based natural language processing (NLP) model to recognize locations from textual content of tweets. The geographic coordinates of the recognized locations are assigned by searching through a dedicated local gazetteer rapidly compiled for the disaster affected region based on the GeoNames gazetteer and the US Census data. By combining image and text analysis, we filter the tweets that contain images of the “Impact” category and high-resolution locations to gain the most valuable situation information. We carry out a manual examination step to complement the automatic data processing and find that it can further strengthen the AI-processed results to support comprehensive situation awareness and to establish a passive hotline to inform rescue and search activities. The developed framework is applied to the flood of Hurricane Harvey in the Houston area.

3.TOPIC: A Feasibility Study of Open-Source Sentiment Analysis and Text Classification Systems on Disaster-Specific Social Media Data

AUTHORS: Mayank Kejriwal, Ge Fang, Ying Zhou

PUBLISHED IN : 2021

Crisis informatics is a multi-disciplinary area of research that has taken on renewed urgency due to the COVID-19 pandemic and the runaway effects of climate change. Due to scarce resources, technology, especially augmented artificial intelligence (AI), has the potential to play a meaningful role by using information management for facilitating better crisis response. In part, this is both due to improvements in the underlying technology, as well as an increasing willingness by stakeholders

to release data and systems as open-source. Yet, it is still not clear from published literature if such established systems are truly useful on real-world crisis datasets (such as acquired from Twitter) that often contain noise and inconsistencies. In this paper, we explore this agenda by conducting a set of case studies, using real social media data collected during six disasters (including Hurricane Sandy and the Boston Marathon Bombings) and made publicly available on a crisis informatics platform. We apply established, independently developed AI tools, including a resource specifically designed for the crisis domain, to explore whether they yield useful insights that could be helpful to first-responders. Our results reveal that, while such insights can be obtained with relatively low effort, some caveats and best practices do apply, and sentiment analysis results (in particular) are not always consistent.

4.TOPIC: Automated Disaster Monitoring From Social Media Posts Using AI-Based Location Intelligence and Sentiment Analysis

AUTHORS: Fahim K Sufi, Ibrahim Khalil

PUBLISHED IN : 2022

Crisis informatics is a multi-disciplinary area of research that has taken on renewed urgency due to the COVID-19 pandemic and the runaway effects of climate change. Due to scarce resources, technology, especially augmented artificial intelligence (AI), has the potential to play a meaningful role by using information management for facilitating better crisis response. In part, this is both due to improvements in the underlying technology, as well as an increasing willingness by stakeholders to release data and systems as open-source. Yet, it is still not clear from published literature if such established systems are truly useful on real-world crisis datasets (such as acquired from Twitter) that often contain noise and inconsistencies. In this paper, we explore this agenda by conducting a set of case studies, using real social media data collected during six disasters (including Hurricane Sandy and the Boston Marathon Bombings) and made publicly available on a crisis informatics platform. We apply established, independently developed AI tools, including a resource specifically designed for the crisis domain, to explore whether they yield useful insights that could be helpful to first-responders. Our results reveal that, while such insights can be obtained with relatively low effort, some caveats and best practices do apply, and sentiment analysis results (in particular) are not always consistent.

5.TOPIC: Edge AI Based Autonomous UAV for Emergency Network Deployment: A study Towards Search and Rescue Missions

AUTHORS: Shreyashri Biswas, Rajeev Muttangi, Harshil Patel

PUBLISHED IN : 2022 Each year natural disasters claim millions of lives across the globe. The numerous tireless rescue missions are the aftermath of natural disasters such as typhoons, hurricanes, blizzards, forest fires, and heavy storms. Unfortunately, the first responders responsible for rescuing the people in distress get paralyzed in their efforts as the wireless network is the first system to malfunction during such adversities. An intelligent system based on Unmanned Aerial Vehicles (UAV) which helps in locating and communicating with the survivors offers a promising

alternative for mission-critical (MC) scenarios. The survivors are located by the autonomous UAV via an edge AI image classifier model. Further, due to the distinctive features such as flexible deployment and rapid reconfiguration, drones can readily change location dynamically to deliver on-demand communications to users on the ground in emergency scenarios. As a result, using UAVs as access point to local area network has been assessed as a practical approach for supplying instantaneous connection in MC situations. The proposed solution here does not require any manual control. It can automatically maneuver, land, and take off using Aruco markers. This work includes a precision landing study and a Received Signal Strength Indicator (RSSI) study of the network provided by the UAV which examines the constraints and applications of the system