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Natural Disasters Intensity Analysis and Classification using Artificial Intelligence

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

Year: 2021

Population growth is disrupting the environment, leading to global warming and increased crop failures. He also notes how some developing countries do not have enough money to damage infrastructure and drive people into depressing situations. None of the regions can be reached, and victims cannot be identified because of their exclusive regional geography. Technology is pursued. These UAE-derived data allow us to recognize the facial expressions of affected people, the depth of the situation, and their desires in published disaster scenarios. These are then processed and a neural community-based fully featured extraction strategy is performed to study this depth. The authors say that plant bug detection using deep learning strategies still faces various problems due to confusion and critical beauty imbalance problems. It is addressed by proposing deep convolutional neural communities. This approach involves a block of convolutional neural communities. The first block recognizes the herbal hazards that are occurring and the second defines the depth shape of the herbal hazards. Meanwhile, the second block further contains three layered mini-convolution blocks, consisting of a photo input layer and an absolute link layer. According to Block-I, the recognition process runs optimally in this phase. There are 3 small batches of 4 layers each. Block II takes the output of the primary block and adds depth to the various herbal disasters. The proposed multilayer deep convolutional neural community was simulated on the computer and the exclusive episodes were calculated. The dataset used by the author is collected from her m PyImage Search readers. The dataset is categorized into four classes: cyclones, earthquakes, floods, and wildfires. Then preprocessing is done to remove noise. To compare performance, the authors used a train-check validation scheme. The entire frame is computed based on the test dataset. Four data variants were created for valid and invalid values from the specified data record of the class. The authors followed the statistics of specificity (SP), sensitivity (SE), precision (RR), and precision (PRE) as criteria for calculating performance. they used F1 ratings

2) Establishing effective communications in disaster affected areas and artificial intelligence based detection using social media platform

Author: Mohsin Raza, Muhammad Awais, Kamran Ali, Nauman Aslam, Vishnu Vardhan Paranthaman, Muhammad Imran, Farman Ali

Year: 2020

During natural hazards, disaster management plays a significant role wherever communication system plays a really important role like giving info to governmental institutes, non-governmental organizations (NGOs), initial responders and rescue staff to isolate people, execute facilitate and rescue service on the affected region. Sometimes the communication get failure, which build the rescue activities troublesome for the social activist, volunteers and organisation. To overcome this result on communication the authors bring the solutions on a way to make the communication effective to the disaster affected and communication outage areas by exploitation a manmade intelligence based mostly detection with social media platform.Here,they used the user central approach that type a adhoc network formation for restoring the mandatory communication of UE\MS once there's a failure in core communication. save for hand} the adhoc network formation they additionally projected novel cluster formation with single and multi-hop communication framework which supplies the communication link to the core network wherever the communication infrastructure collapse. The overall info that is created within the cluster is maximized exploitation hogged optimization. In addition to the other proposed theme they designed a intelligent system which is employed for labelling completely different clusters and their localities into affected and non affected area. the authors proposed a machine learning based mostly disaster severity analysis by exploitation social media platform that's wont to perform pre disaster vulnerability and localize fatal areas. The role of AI is to help government officials and emergency services to spot the threats and overall vulnerability. the acceptable outcomes of the urged machine learning schemes indicate their usage in conjunction with the suggested cluster methods to revive communications in disaster-affected areas and to categorize the disaster's impact for numerous locations in disaster-prone areas.

Artificial neural network for predicting earthquake casualties and damages in Indonesia

Author: Rienna Oktarina, Senator Nur Bahagia, Lucia Diawati, Krisha S. Pribadi

Year: 2022

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This technique, supported the applying of artificial neural networks, it's been accustomed predict earthquakes in Indonesia. This model may be anticipated to be ready to provide the types and numbers of things for help that the wedged folks can want throughout the emergency phase. during this study, supervised learning paradigm and backpropagation learning method are used to build ANN. The applied ANN spec is a multi-layer system with one somatic cell employed in each the input and output layer as a result. The impact of the earthquake, that consists of six factors, is that the study's output variable. whereas the study's input variables (predictors) were comprised of eight. As a guide for the accountable stakeholders' contingency coming up with Associate in Nursingd in lightweight of the consequences that the disaster caused by the earthquake can wear the wedged society, it's needed to conduct an assessment procedure on the particular losses and damages. For instance, working out what number destroyed homes there are will facilitate decide how many tents are required to accommodate the homeless. Another example would be to estimate the quantity of abraded folks when an earthquake disaster so as to manage the capability of the hospitals nearby, or to estimate the quantity of displaced folks in order to see the amount of help provides that should incline to minimise their suffering. therefore it's become crucial to form a model which will forecast the losses and damages caused by an earthquake disaster. The earthquake parameters that were instantly known whereas the earthquake was occurring were utilized as input variables during this investigation. The correctness of the sort of input variables can have an effect on the efficaciousness or length of the coaching process, so deciding the input variables is crucial once developing ANN. The created model may be accustomed estimate the number of earthquake-related building damages and fatalities. Thus, the result quickens the implementation of the provision evaluation, making certain prompt distribution of aid throughout the emergency response section to reduce the suffering of the wedged individuals. In distinction to the RADIUS programme, the ANN model is powerful and needs less input file despite having a better degree of prognostic capability.

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Flood susceptibility modelling using advanced ensemble machine learning models

Author: Abu Reza Md Towfiqul Islam, Swapan Talukdar , Susanta Mahato, Sonali Kundu, Kutub Uddin Eibek, Quoc Bao Pham, Alban Kuriqi, Nguyen Thi Thuy Linh

Year: 2021

Flooding is one of nature's most devastating disasters, as it causes enormous damage to land, buildings and casualties. Due to the dynamic and complex nature of flash floods, it is difficult to predict which areas are prone to flash floods. Thus, advanced machine learning models can be used to identify flash flood prone sites early to manage flood disasters. In this work, we apply and evaluate two new hybrid ensemble models: artificial neural networks (ANN), random forests (RF), and dagging and random subspace (RS) combined with support vector machines (SVM), The other three states represent state-of-the-art machine learning models that model the flood vulnerability map of the Teesta River Basin in northern Bangladesh. Application of these models includes 12 flood impact factors, including 413 current and historical flood points transferred to the GIS environment. Information gain ratios, a multicollinearity diagnostic test, were used to determine the relationship between events and flood impact factors. For validation and comparison of these models, measures such as Freidman, Wilcox on signed-rank test, t-pair test, and receiver operating characteristic curve (ROC) were used for predictive power of statistical evaluation. Area under the curve (AUC) values for ROC were greater than 0.80 for all models. For flood vulnerability modelling, the Dagging model excels, followed by RF, ANN, SVM, RS, and various benchmark models. The approach and solutionoriented results outlined in this document will help state and local governments and policy makers to mitigate flood-related threats and implement effective mitigation strategies to mitigate future damage.

A Machine Learning-Based Approach for Wildfire Susceptibility Mapping. The Case Study of the Liguria Region in Italy

5)

Author: Marj Tonini, Mirko D'Andrea, Guido Biondi, Silvia Degli Esposti, Andrea Trucchia 2

Year: 2020

Wildfire vulnerability maps show the spatial probability that an area will burn in the future based solely on site-specific local properties. Current research in this area often relies on statistical models, often augmented by expertise in data collection and processing. In recent years, machine learning algorithms have proven their prowess in this area thanks to their ability to learn from data by modelling hidden relationships. In this study, the authors present a randomized His forest-based approach that allows the refinement of forest fire vulnerability maps for the Ligurian region of Italy. The area is highly susceptible to forest fires due to its dense and uneven vegetation, over 70% forested, and favourable climate conditions. Vulnerability considers a dataset of fire perimeters mapped over a 21-year period (1997 to 2017) and various geo-ecological predispositions (land cover, vegetation type, road network, elevation, and runoff). was evaluated. The main objective was to compare different models to determine the effects of (i) including or excluding adjacent vegetation types as additional predispositions and (ii) using increasing convolution in the spatial cross-validation procedure. was to evaluate. Finally, two fire season susceptibility maps were created and validated. This result highlights the ability of the proposed approach to identify areas likely to be affected by wildfires in the near future and its usefulness in assessing the effectiveness of fire fighting measures.

A Deep Cascade of Convolutional Neural Networks for Dynamic MR Image Reconstruction

Author: Jo Schlemper, Jose Caballero, Joseph V. Hajnal, Anthony Price, Daniel Rueckert

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Year: 2017

Inspired by recent advances in deep learning, we use deep cascades of convolutional neural networks (CNNs) to reconstruct dynamic sequences of 2D cardiac magnetic resonance (MR) images from under sampled data, We propose a framework to streamline and accelerate the data acquisition process. Especially if the data is collected using aggressive Cartesian under sampling. First, we show that the proposed method improves current 2D compressed acquisition approaches, such as reconstruction speed, if each 2D image frame is reconstructed independently. Next, by jointly reconstructing the frames of the sequence, we show that CNNs can efficiently learn spatio-temporal correlations by combining convolution and data exchange approaches. We show that the proposed method consistently outperforms the state-of-the-art and can preserve anatomical structures more faithfully up to 11-fold under sampling. Moreover, reconstruction is very fast. Each complete dynamic sequence can be reconstructed in less than 10 seconds, and in 2D each image frame can be reconstructed in 23 ms, enabling real-time applications.

PLANET: Improved Convolutional Neural Networks with Image Enhancement for Image Classification

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Author: Chaohui Tang, Qingxin Zhu, Wenjun Wu, Wenlin Huang, Chaoqun Hong,

Xinzheng Niu

Year: 2020

In recent years, deep learning has become a research hotspot and has had a major impact on computer vision. Deep CNN has proven to be the most important and effective model for image processing, but it is prone to over fitting due to lack of training examples and large number of learning parameters. In this work, we propose a new his two-stage CNN image classification network named ``Improved Convolutional Neural Networks with Image Enhancement for Image Classification", PLANET for short. Image training example. Inspired by computer vision “object motion” scenes, Inner Move can improve the generalization power of deep CNN models for image classification tasks. Ample experimental results show that PLANET using his Inner Move for image enhancement outperforms comparison algorithms, and that Inner Move has significant effects over comparative data enhancement methods for image classification tasks.

Western North Pacific tropical cyclone track forecasts by a machine learning model

Author: Jinkai Tan, Sheng Chen, Jun Wang

Year: 2021

In this study, an ensemble machine learning model for tropical cyclone (TC) forecasting in the western North Pacific was developed and evaluated. We first examined predictors, including TC climatology

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and persistence factors extracted from the TC best track dataset, and atmospheric conditions around storms extracted from the ERA interim reanalysis. We then used 30 years of data to build a nonlinear gradient-boosted decision tree (GBDT) model for TC track prediction. Finally, a 10fold cross-validation method was used to compare the GBDT model to a commonly used technique, the Climatology and Persistence Model (CLIPER). Experimental results show that the GBDT model performs well for three prediction times (24, 48, and 72 hours) with relatively small prediction errors of 138, 264, and 363.5 km, respectively. This model gets an excellent TC travel direction aspect. However, the model is still inadequate to generate the acceleration and deceleration aspects of the storm, with average movement velocity sensitivities all below 60%. Nevertheless, this model obtains a much more robust and accurate TC track compared to the CLIPER model whose predictive power at the three prediction time points is 17.5%, 26.3% and 32.1% respectively. The presented study shows that the GBDT model can provide reliable evidence and guidance for operational TC route prediction.

A Wave-Shaped Deep Neural Network for Smoke Density Estimation

Author: Feiniu Yuan, Lin Zhang, Xue Xia, Qinghua Huang, Xuelong Li

Year: 2020

Estimating smoke density from a single image is a completely new problem, but very poorly set up. To solve this problem, we stack several convolutional encoder/decoder structures and propose a wavy neural network called W-Net. Stacking encoders/decoders directly increases the depth of the network, increasing the receptive field for encoding more semantic information. To maximize the degree of feature reuse, copy and scale the output of the encoded layer to the corresponding decoded layer and

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concatenate them to implement shortcut connections to improve spatial accuracy. Since peaks and troughs in W-Net are special structures containing rich localization and semantic information, we also use shortcut connections between these structures and the decoding layer. Estimated smoke density is useful in many applications, such as: B. Smoke segmentation, smoke detection, disaster simulation. Experimental results show that our method outperforms existing methods in both smoke density estimation and segmentation. Satisfactory results have also been achieved in the visual detection of automobile exhaust fumes.

Current reports for prediction and assessment of natural disasters: Earthquakes, tsunamis, volcanic eruptions, hurricanes, tornados, and floods

Author: J.P. Amezquita-Sancheza, M. Valtierra-Rodrigueza and H. Adelib

Year: 2017

Natural disasters (nds) are considered sudden phenomena caused by natural factors on earth. Severe economic and personal loss. earthquake, tsunamis, volcanic eruptions, hurricanes, tornadoes, when floods are one of the most common nds on earth. Often occur suddenly this limits the actions you can take before it happens. As a result, develop methods and systems prediction and evaluation of nd occurrence probability and extent of damage most important to society. Numerous methods have been developed over the last 30 years. Signal and image processing techniques and statistics analysis and advanced measurement equipment introduced to create forecasts and assessments damage and vulnerability system based on measurement data from various nds. Common thread is analyzing and processing large amounts of data. Generally, a prediction or evaluation system for nd is the data

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collection and monitoring, data processing and statistical analysis, and interpreted data monitoring ranging from simple sensors with low sampling rates to cooperative and uncooperative networks of sensors offering enormous volume and a variety of functions data types that require high performance for transmission, storage and management of data. As direct results, processing and analysis measurement data can be demanding and complex. On the one hand, a powerful computer or those networks are needed and on the other hand on the other hand, using conventional signals and images inadequate processing techniques may be required a sophisticated and complex method. From a general point of view from our point of view, these scenarios are, among other things, developing and applying the approach within a large organization data context. This article provides an overview of the prior art various methods, signal and image processing techniques, and statistical analysis used for prediction earthquake, tsunami, volcanic eruptions, hurricanes, tornadoes, etc. Flood. Also, applying big data paradigms to his nd above is short discussed.