NATURAL DISASTERS INTENSITY ANALYSIS AND CLASSIFICATION USING ARTIFICIAL INTELLIGENCE

LITERATURE SURVEY

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S.NO	TITLE	PROPOSED WORK	TOOLS USED/ ALGORITHM	TECHNOLOGY	ADVANTAGE/ DISADVANTAGE
1	A Deep Learning Approach of Recognizing Natural Disasters on Images.	First, this work introduces to the research community a new dataset for the joint classification of natural disaster types and intensity. Moreover, this study primarily aims to explore natural disasters recognition using a convolutional neural network and transfer learning. An open source tool is used for finding and removing the repeated images for analysis. Wildfire, Earthquake, Flood and Volcanic eruption are taken. In particular, this study attempts to build and train a lightweight convolutional neural network that can jointly recognize natural disaster types and intensity. Based on the intensity, it classifies as Severe, Moderate, Insignificant Lastly, this study attempts to measure the model performance using four performance measures; accuracy, precision, recall, and F1-Score.	• Convolutional neural network • An open source tool for duplicates identification • Transfer Learning • Confusion Matrix	• ARTIFICIAL INTELLIGENCE • APPLIED COMPUTING	ADVANTAGES: It investigated natural disasters and intensity recognition by using a lightweight convolutional neural network and transfer learning. The results revealed that under controlled conditions, the model was able to show excellent performance in classifying natural disaster types and disaster intensity. This study further proved that by leveraging on transfer learning, it is possible to train a lightweight convolutional neural network to jointly recognize the two tasks with a high degree of performance. DISADVANTAGES: The resultant model unable to validate the model performance under uncontrolled conditions.

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2	Tropical Cyclone Intensity Estimations over the Indian Ocean	It is of high importance to estimate the intensity of a tropical cyclone. A standard indicator of the intensity of the storm is the maximum sustained surface wind speed (MSWS). This work proposes a method to estimate MSWS based on other characteristics of a tropical cyclone like date, time, latitude, longitude, pressure drop and estimated central pressure. It uses machine learning algorithms to devise a regression model to estimate MSWS from other characteristics. It further employs machine learning classification algorithms to predict the grade of the cyclone based on these characteristics. It uses 10-force cross validation for each model and found that XG Boost and Decision Tree are giving good Accuracy. Hence XGBoost and Decision Tree can be used for the estimation of MSWS and intensity with excellent performance over the North Indian Ocean. Estimating the intensity of tropical cyclones on a real-time basis is a problem worth studying, considering the human life and economic loss involved.	• Decision Tree • Random Forest • Gradient Boosting Machine • XG Boost • Naïve Bayes • Logistic Regression	• ARTIFICIAL INTELLIGENCE	ADVANTAGES: The study explored various machine learning techniques and reported their performance to estimate the Maximum Surface Sustained Wind Speed and intensity of the tropical cyclone. The research finds that the ML model XGBoost and Decision Tree can be used for the estimation of MSWS and intensity with excellent performance over the North Indian Ocean. DISADVANTAGES: Further study was not made for the classification of Disasters. Only Cyclone category is taken. Different Disasters should be studied for social needs.

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3	Natural Disaster Possibility Prediction Using Image Processing	It was very important to predict the possibility of natural Disaster , because prediction may warn a people on early stage occurrence of disaster . Natural disaster are very abrupt and sudden and can destroy large areas within fraction of seconds. To reduce the impact, short term forecasting s used for prediction of future incidents. Forecasting weather condition are examined using satellite imaging using algorithms. This proposed system is designing a web software to detect natural disaster. It providing a software platform for natural disaster prediction using the concept of image processing. Using image processing finding the soil color, vegetation index and slope of the geographical area. This software help user to search a particular location and check whether the land is prone to natural disaster. Scanned location is analysed using the satellite image with some algorithms for slope, NDVI and soil color. The main objective of this proposed system is to predict the occurrence of natural disaster.	• Image Processing • Slope NDVI • Location API • Cloud Architecture • Google Earth Engine • K-Means and Classification Algorithm • RGB Scale	• ARTIFICIAL INTELLIGENCE	ADVANTAGES: The proposed system helps to reduce the impact of hazards occur during natural disaster. This provides an efficient way to warn and educate people about disaster prone areas. Natural disaster possibility prediction helps to minimize loss of lives and loss of damages to mankind and the nature. Scanned location is analysed using the satellite image with some algorithms for slope, NDVI and soil colour, it helps for a better prediction of possibility of disaster. This application helps constructors and engineers to locate a safe area for construction. DISADVANTAGES: In certain condition it is difficult to capture the well-defined image of a remote area.

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4	Natural Disasters Intensity Analysis and Classification Based on Multispectral Images Using Multi-Layered Deep CNN	The proposed system a multi layered deep convolutional neural network for detection and intensity classification of natural disasters. The proposed method works in two blocks—one for detection of natural disaster occurrence and the second block is used to remove imbalanced class issues. The results were calculated as average statistical values: sensitivity, 97.54%; specificity, 98.22%; accuracy rate, 99.92%; precision, 97.79%; and F1-score, 97.97% for the proposed model. The proposed model achieved the highest accuracy as compared to other state-of-the-art methods due to its multilayered structure.	• Random Forest • Random Subspace • Support Vector Machine • Deep Learning	• ARTIFICIAL INTELLIGENCE	ADVANTAGE: The proposed model will be used as a real time natural disaster detection model and provide some upcoming predictions for future disasters. The model is to detect and classify the type of disaster and The model have a high accuracy rate (99.92). The model was used to prevent natural disasters in the future and model can be used to predict future disasters and take some action against heavy loss of human ecological systems and property. DISADVANTAGE: The model cannot be used for various natural disaster

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5	Disaster Intensity-Based Selection of Training Samples for Remote Sensing Building Damage Classification	In this proposed work, two fully automatic procedures for the detection of severely damaged buildings are introduced. The fundamental assumption is that samples that are located in areas with low disaster intensity mainly represent nondamaged buildings. Furthermore, areas with moderate to strong disaster intensities likely contain damaged and nondamaged buildings. Under this assumption, a procedure that is based on the automatic selection of training samples for learning and calibrating the standard support vector machine classifier is utilized. The second procedure is based on the use of two regularization parameters to define the support vectors. These frameworks avoid the collection of labeled building samples via field surveys and/or visual inspection of optical images, which requires a significant amount of time. The performance of the proposed method is evaluated via application to three real cases. The resulted accuracy ranges between 0.85 and 0.89, and thus, it shows that the result can be used for the rapid allocation of affected buildings.	• Automatic labelling • Building damage • Multi regularization parameters • Demand Parameter • Support Vector Machine (SVM)	• MACHINE LEARNING	ADVANTAGES Our predictions could be used as additional constraints to improve the numerical flood simulation. The relevance of our study is that it contributes to solutions to events from which the disaster intensity can be estimated DISADVANTAGES The Accuracy is not 100%. The model can not be used for various natural disaster

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6	Hurricane Damage Detection using Machine Learning and Deep Learning Techniques	In this proposed work, Disaster detection can be done through social media and satellites. Images obtained from satellites are widely used since capturing and processing of these images can be done in a shorter span of time. Satellite images help to recognize damage pattern caused by the disasters. The images from social media are also useful since they provide information on an immediate basis. Since manual methods are error-prone, deep learning and machine learning are used which used for detecting the damage caused by disasters effectively.	• social-media • satellite imagery • Deep learning techniques • CNN,VGG-16, ResNet • Machine learning techniques • Support Vector Machine, Decision trees, random forest,	• MACHINE LEARNING • DEEP LEARNING	ADVANTAGES: Machine learning helps to extract important information from both social media and satellite imagery. Deep learning is useful in case larger number of images are to be analysed. DISADVANTAGES: The challenge remains to find out the relevance of the data since the data may consist of irrelevant data such as advertisements, posters or cartoons.

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7	Dynamic and Boosting Flood Prediction	Damages that occur due to flash flood to living and non-living are very large. In this work, flash flood prediction model is built. District wise Indian rainfall data collected between the periods of 1901 to 2015 is used for analysis. The pre-processed rainfall data was split into 70% training data and 30% testing data. The dataset is trained with Support Vector Machine, Logistic regression, K-nearest neighbor, and Multi-Layer Perceptron. The performance factors like precision, recall, F1 score, sensitivity, specificity was calculated for each technique. Confusion matrix with TP, TN, FP and FN were calculated. The classification accuracy achieved by LR is 95.3%, SVM is 95.85%, KNN is 95.85%, and MLP is 97.40%. Among the four techniques MLP performed with highest accuracy. The MLP flash flood prediction model predicts whether "flood may happen or not" based on the rainfall range for particular locations.	• Deep learning • Neural networks • Multilayer perceptron • Classification • Floods • Rainfalls • Logistic Regression • Support Vector Machines • K-Nearest neighbor	• MACHINE LEARNING	ADVANTAGE The advantage of the proposed method is that it requires very few variables and very little knowledge DISADVANTAGE This system is applied to one region only.

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8	Natural Calamity Prediction	Disaster detection and prediction has been one of the most active research areas in remote sensing today because saving human lives is our priority once a disaster occurred. To increase the accuracy of detection, machine learning is implemented to improve the efficiency of extracting feature. This proposed system consists of two phases: training phase and testing phase, the differences obtained from pre-disaster imagery (RGB, three channel) and post-disaster imagery (RGB, three channel) are learned as image feature of change detection. Proposed system is to warn the users from the natural calamity. It is more accurate, complexity is reduced, processing time is minimized.	• Convolution Neural Network (CNN) • SDLC or System Development Life Cycle model • Image Processing • Artificial neural layers(CL, PL, FCL)	• DEEP LEARNING • COMPUTER VISION • WAVELET TRANSFORM technology for feature extraction from data. .	ADVANTAGES: The main advantage of the proposed system is to warn the users from the natural calamity. It is more accurate, complexity is reduced, processing time is minimized. CNN architecture is really very powerful in learning features from weakly-labelled data that far surpass feature-based methods in performance and that these benefits are surprisingly robust to details of the connectivity of the architectures in time DISADVANTAGES: Optimization strategies are not used to assign a lot of specific weights to the individual models. Proposed system will certainly endure modification once it's delivered to the client. It may happen because of some unexpected input values into the system. This may cause accuracy of detection or prediction.