Ideation Phase
Define the Problem Statements

Date	22 September 2022
Team ID	PNT2022TMID39414
Project Name	Natural disaster intensity analysis and classification using Artificial intelligence
Maximum Marks	2 Marks

Problem statement:

Litreture survey:

S.no	Title	Problem	Solution
1	**Tropical Cyclone Intensity Estimation Using Multidimentional Convolutional Neural Network From Multichannel Satellite Imagenary**	**There is no standardized method for estimating tropical cyclone intensity**	**Use convolutional Neural networks that analyse the image pattern to estimate tropical cyclone intensity**
2.	**Vulnerability analysis of cyclone hazards and Dimention od disaster risk management in Odisha Along the east coast of india**	**The low pressure system developing over Bay of Bengal and South East Asian region makes a landfall and often these cyclone causes life loss,property loss**	**Asses the vulnerability of the state to tropical cyclone based on Disaster Risk Index and uses time series and spatial analysis,and content analysis**
3	**Desigining Deep-Based Learning Flood Forecast Model With ConvLSTM Hybrid Algorithm**	**Due to flood many life lossess occurs because of not giving any forecast or intimation about flood**	**Builds flood forecsting system using Convolutional Nural Network**

1. **Tropical Cyclone Intensity Estimation Using Multidimentional Convolutional Neural Network From Multichannel Satellite Imagenary**

Author: Tropical Cyclone Intensity Estimation Using Multidimentional Convolutional Neural Network From Multichannel Satellite Imagenary

Estimating tropical cyclone (TC) intensity is the first step in the processes of monitoring and predicting destructive TC disasters. Due to the dilemma of meteorological methods, accurate estimation of TC intensity is a long-term challenge. In recent years, while deep learning methods have been applied to TC intensity estimation, most of them fail to make full use of multichannel satellite imageries to consider the three-dimensional (3-D) structure of TC. In this letter, we propose a novel deep learning model (3DAttentionTCNet) to overcome this shortcoming. The model can automatically extract 3-D environment information related to TC intensity from multichannel satellite observation imageries such as infrared (IR), water vapor (WV), and passive microwave rainrate (PMW) satellite imageries by 3-D convolution. In addition, we employ the convolutional block attention module (CBAM) to simulate visual attention for strengthening the model's attention to core cloud structure and important channels. The experimental results show that the root-mean-square error (RMSE) of the proposed model is 9.48 kts, which is improved by 25% compared to that of the advanced Dvorak technique (ADT) and by 9.2% over that of the traditional deep learning method of TC intensity estimation.

2. Vulnerability analysis of cyclone hazards and Dimention od disaster risk management in Odisha Along the east coast of india

Author: Jitendra Kumar Behera and Gopal Krishna Panda Dept. of Geography, Utkal University Vani Vihar, Bhubaneswar – 751004 Odisha India

Odisha is one of the most vulnerable states for the hazards of the tropical cyclones along the east coast of India since time immemorial. The low pressure systems developing over the Bay of Bengal and South East Asian region makes a landfall along the Odisha coast and travel inland. Very often these cyclonic hazards had turned in to disasters affecting the life, livelihood and property of the people. Strong wind, torrential rain, flooding and unusual storm surges accompanied with the cyclones cause severe devastations with the destruction of dwellings, damage to infrastructure and standing crops besides loss of life along the track of its movement and adjacent areas. Odisha's exposure to these extreme events, people's perception and human response, adaptations, its risk mitigation and management has undergone a sea change in the twenty-first century keeping at pace with the scientific innovations and international guidelines. This study makes an attempt to assess the vulnerability of the state to the tropical cyclones based on a Disaster Risk Index. Time series and spatial analysis is used to study their trend and impacts. Content analysis is used to study the innovative strategies of disaster risk reduction of achieving the zero casualty as per the Sendai framework and community resilience. The findings of the study indicate an increasing vulnerability of the state to more number of severe cyclones. But however, the revised strategies in crisis management and community based disaster preparedness have been the key to the success in reducing disaster risk in the state.

3. Desigining Deep-Based Learning Flood Forecast Model With ConvLSTM Hybrid Algorithm

Author:Mohammed Moishin School of Science, University of Southern Queensland-Springfield, Springfield, QLD, Australia

Efficient, robust, and accurate early flood warning is a pivotal decision support tool that can help save lives and protect the infrastructure in natural disasters. This research builds a hybrid deep learning (ConvLSTM) algorithm integrating the predictive merits of Convolutional Neural Network (CNN) and Long Short-Term Memory (LSTM) Network to design and evaluate a flood forecasting model to forecast the future occurrence of flood events. Derived from precipitation dataset, the work adopts a Flood Index (I_F), in form of a mathematical representation, to capture the gradual depletion of water resources over time, employed in a flood monitoring system to determine the duration, severity, and intensity of any flood situation. The newly designed predictive model utilizes statistically significant lagged I_F , improved by antecedent and real-time rainfall data to forecast the next daily I_F value. The performance of the proposed ConvLSTM model is validated against 9 different rainfall datasets in flood prone regions in Fiji which faces flood-driven devastations almost annually. The results illustrate the superiority of ConvLSTM-based flood model over the benchmark methods, all of which were tested at the 1-day, 3-day, 7-day, and the 14-day forecast horizon. For instance, the Root Mean Squared Error (RMSE) for the study sites were 0.101, 0.150, 0.211 and 0.279 for the four

forecasted periods, respectively, using ConvLSTM model. For the next best model, the RMSE values were 0.105, 0.154, 0.213 and 0.282 in that same order for the four forecast horizons. In terms of the difference in model performance for individual stations, the Legate-McCabe Efficiency Index (LME) were 0.939, 0.898, 0.832 and 0.726 for the four forecast horizons, respectively. The results demonstrated practical utility of ConvLSTM in accurately forecasting I_F and its potential use in disaster management and risk mitigation in the current phase of extreme weather events.