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Cloud Based Application for Prediction of Natural Disasters

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Abstract: ***Natural disasters are very dangerous and occurs common throughout the world, Natural disasters often result in injuries, damages and the other physical & mental health effects in India, detection has been one of the most active research in remote sensing today because of saving human life is our priority once a disaster occurred. Disaster leads to a great damage to the society. Artificial Intelligence can be used to analysis the data which can be used in prediction of warning for future events & create awareness for the situation. In Machine learning concept of random forest regression is used so that it can predict accurate result compare to other modules based on the result we have proposed the model for natural disasters detection to early saving life for humans/animals***

Keywords: Natural disasters, floods, cyclone, random forest regression, earthquake

I. INTRODUCTION

The disaster is the impact of both natural and man-made events that influence our life and environment that surrounds us, Any disaster can be classified either as 'Natural' or 'man-made'. The most common natural disasters that are known to the very heavy floods, earthquake, cyclones, volcanic eruptions, and droughts which cause loss to property and life

A. Earthquakes

Earthquake is one of the most hazardous natural disasters. Earthquake vibrations occur in a variety of frequencies and velocities. The actual earthquake process may be last for a few seconds for a major earthquake.

Earthquakes are recorded in seismograph networks, seismograph works as a instrument used to measure the moment of earthquakes, each seismograph measures the movement of ground vibration and the vibrations are recorded in the graph sheet , these vibrations measures the magnitude depth various levels based on certain/average level of magnitude it will detects earthquakes

B. Cyclones

Cyclone is a region of less atmospheric pressure and high temperature over the water body/rivers resulting in cyclones.

Cyclones are the rotation of cloud in the water body, cyclones are the event which called different names in different places/locations . cyclones occurs in the Indian ocean and south –pacific zones .

In the Northern & Atlantic part we call hurricane

Cyclones are classified in 3 types majorly

1) *Tropical Cyclone:* Cyclones which occurs at the speed of less than 74 miles per hour
2) *Severe Cyclone:* Cyclones which occurs at the speed of between the 75 to 120 miles per hour
3) *Super Cyclone:* Cyclones which occurs at the speed of greater than 120 miles per hour

C. Floods

Floods are the most damage caused to human life when compared to the other natural disasters,

Floods are occurs most of the excess of rivers it causes flooding

Flood is a state of high water level along a water body channel or on the river. Floods may happen gradually and also may take hours or even happen suddenly without any warning due to heavy rains etc.

D. Artificial Intelligence and Machine Learning

Artificial intelligence (AI) is the demonstrates of human intelligence processes by machines and feeding the experience of human to machines in the form of data, greatly help to identify emergency and disaster management efforts not only in India but also throughout the world, especially computers. These machines include learning reasoning and self-correction

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Examples of AI technology:

1) Machine Learning
2) Natural language processing (NLP)
3) Robotic
4) Self-driving cars

Machine learning and Artificial intelligence, when combined they can help responders:

- Track and predict disaster trajectory

II. DATASET COLLECTION

A. *Flood Dataset*

The floods dataset are collected from the
Kerala which includes average rainfall of overall districts, we also get the dataset from Regional Meteorological Centre from India. For other parameters like temperature, cloud, windspeed, humidity conditions we got data from https://mausam.imd.gov.in/,
In the dataset contain the rainfall index of the kerala state from 1900-2018 and records weather flood took place in the month or not.[17]

B. *EarthQuake Dataset*

National center of seismology are the nodal agency of the Government of India for monitoring of earthquake activity in the country. National center for seismology maintains National Seismological Network of one hundred fifteen stations each having state of art equipment and spreading all across the country. National Center for Seismology monitors earthquake activity all across the country [10]
https://seismo.gov.in/

C. *Cyclone Dataset*

The National Hurricane Center (NHC) conducts a post-storm analysis for every tropical cyclone in the North hemisphere we call hurricane and southern hemisphere or Indian ocean we call the cyclones. https://www.kaggle.com/noaa/hurricane-database

III. METHODOLOGY

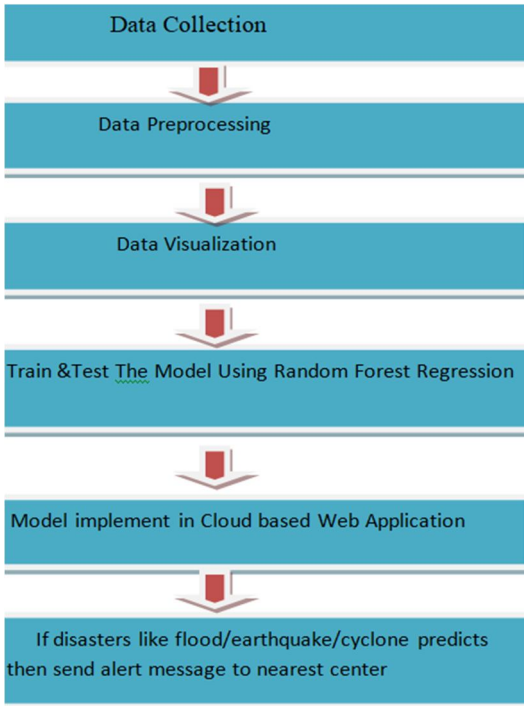


Fig. 1. Methodology For Prediction Natural Disasters

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Natural Disaster application is developed for prediction of floods, cyclones, earthquakes, first we need collect the pre-disasters dataset for prediction of future events if it meets certain threshold conditions,
After training & testing model we need to deploy in cloud platform for real-time prediction of disasters, Weather crossing visual platform which gives the real time values like temperature, humidity, cloud cover, etc.. and geocode api which used to convert the location to the latitude and longitude values. Then we building model & implemented in heroku platform.

A. Data Preprocessing

A real-world data typically contains noises, missing values, and errors in which cannot be directly used for the machine learning models. Data preprocessing is required for the cleaning the data and making it suitable for a machine learning model which also increases efficiency of a machine learning model and the accuracy

B. Importing Libraries

To perform data preprocessing in using Python, we need to import some predefined Python libraries. These libraries are used to perform jobs.

C. Split the Dataset into the Training set and Testing set

Our dataset is divided into a train set and test set. by doing this we can increase the performance of our machine learning model.
Train set is used to train our model and Test set used to check weather our model working correct or not

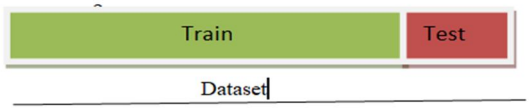


Fig. 2.Train and Test Data Split

D. Building the Model

After the completion of data pre-processing &training and testing of dataset then we have to build the model by using algorithms
Decision trees are fall under the category of supervised machine learning means decision trees construct the model for prediction /decision of given record. Decision tress are fast and accurate
Linear regression is used the finding the co-relation b/w the independent variables and dependent variables
Random forest regression is the combination of many decision trees means it takes average of the all decision trees. random forest is to perform both classification and regression & it improves the accuracy of the model and prevents the over fitting issues

IV. RESULTS

A. Earthquake Prediction

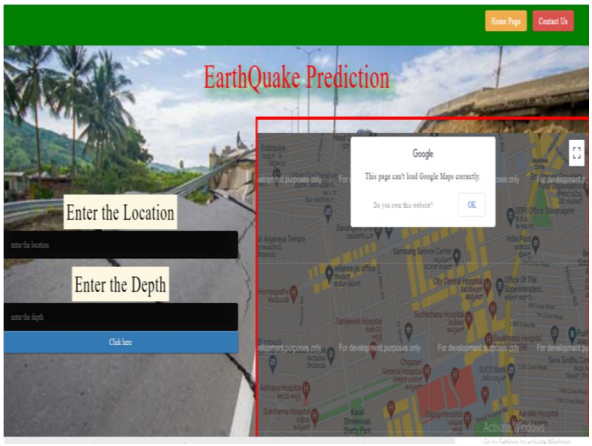


Fig. 3. Earthquake Prediction Model

If we enter the location and depth of earth surface then our model is to predict whether earthquake may occurs or not.

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B. Cyclone Prediction

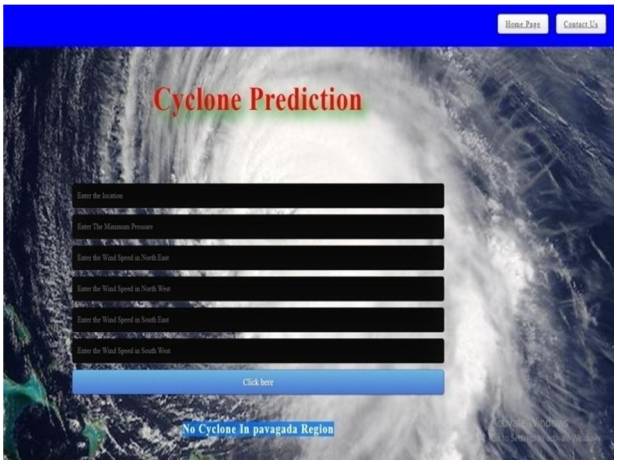


Fig. 4. Cyclone Prediction Model

If we enter the location which will be convert into latitude and longitude by using geo-code api and enter the pressure and wind-speed of from northern hemisphere and southern hemisphere then model is predicting the cyclone occurrence in the region otherwise no cyclones

C. Flood Prediction



Fig. 5.:-Floods Prediction Model

Similarly we build the model for flood prediction if we enter the location and rainfall then we used the weather crossing visual api to fetch real-time data like temperature ,cloud wind speed and pressure etc.. then model is prediction weather any chances of real-time flood prediction.

V. CONCLUSIONS

The introduction of contemporary technologies like cloud computing, artificial intelligence and machine learning is going to be helpful for prediction of natural disasters. this paper includes an overview of machine learning approach for prediction of natural disasters. We proposed the model that predicts a natural disaster based on a machine learning approach, our model used the concept of random forest regression & we also observe random forest regression algorithm which gives results/accuracy is high compare to other machine learning algorithms.

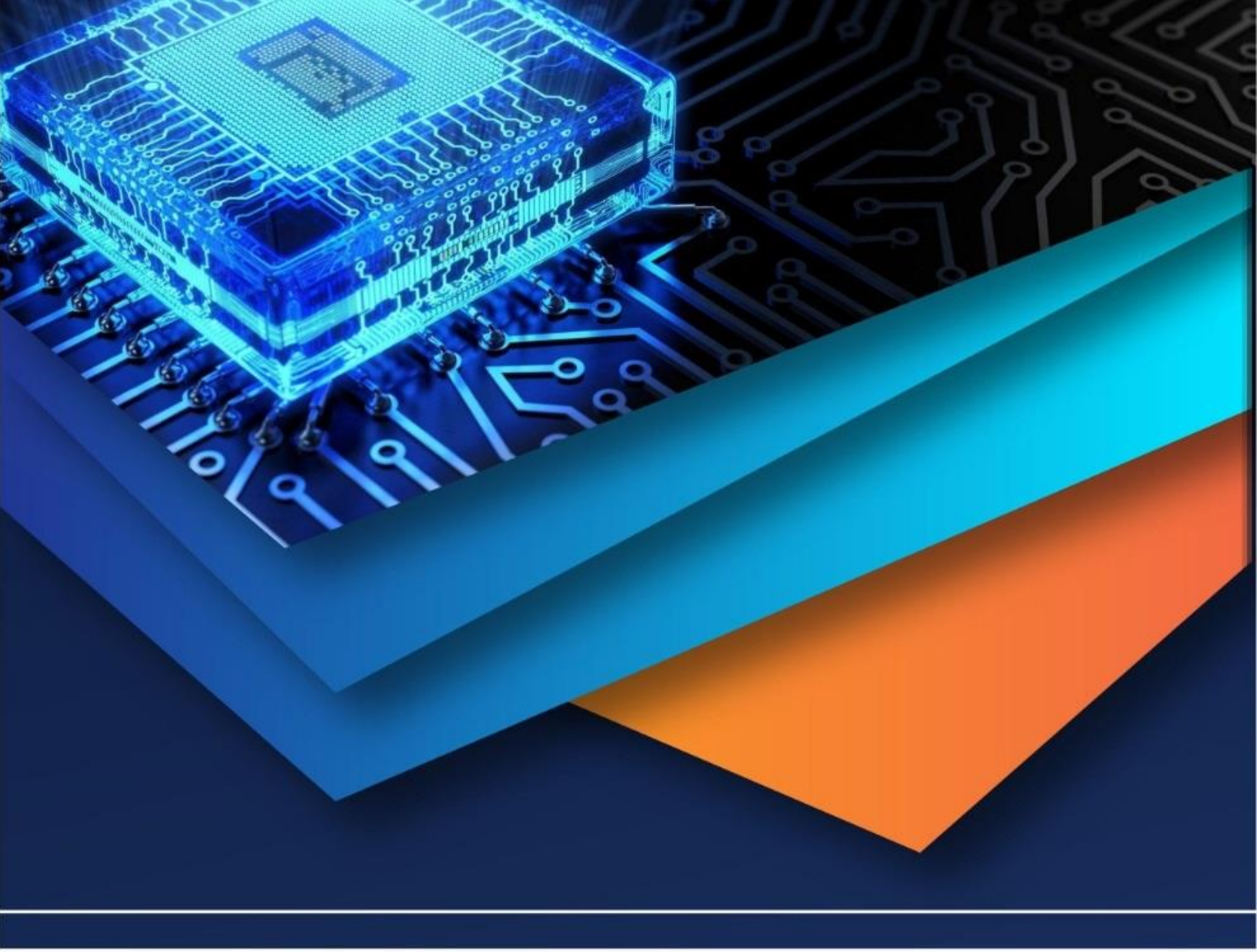
In Additionally, the datasets analyzed by the Artificial intelligence -powered systems can facilitate understanding the magnitude and the other parameters of natural disasters like Windspeed, depth, temperature etc.. from the various natural disasters like floods, earthquakes and tsunamis, which may facilitate prediction of accuracy of the model is very high in future/upcoming days

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