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Disaster Prediction Using Appropriate Machine Learning Techniques

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***Abstract*—This paper provides the insights of disaster forecasting methods, focusing on the strengths, limitations, and applications of other models and ideas to predicting natural disasters. Disasters and pandemics are most unlikely events which concerns many nations. Till date multiple ways are used to detect or predict natural disasters. Various machine learning techniques are used in detecting, preventing or mitigating disasters. We focus on predicting natural disasters beforehand to reduce its effects using XGBoost algorithm. The study shows the challenges of accurate forecasting and early warning systems.The paper also highlights about user friendly and interactive integrated website for disaster prediction. The paper gives the overview of the successful development and implementation of various models to predict earthquake, tsunami, flood and landslide.**

***Index Terms*—Disasters, Machine Learning, Natural Disasters, XGBoost**

I. Introduction

Natural disasters like earthquakes, tsunamis, floods, and landslides can seriously affect people's lives, infrastructure, and economic stability. In places where these disasters occur frequently, the lack of accurate and timely predictions can lead to life threat, extensive property damage and long-term socio-economic consequences. That's why it's essential to develop a strong system that can accurately predict these disasters, helping us reduce their negative effects.

The main focus of our project is to develop and integrate four distinct ML models, each specializing in predicting a specific type of disaster: earthquakes, tsunamis, floods, and landslides. These models analyze a wide range of data, including historical, environmental, and real-time inputs, to identify patterns and give the prediction. By running this data through ML algorithms, our system can generate accurate and timely predictions.

A primary objective of our project is prediction of a particular type of disaster occurring in a specific location and timeframe. This involves analyzing various relevant datasets for each type of disaster and identifying indicators that suggest an increased likelihood of an event. By providing precise predictions, our system aims to facilitate good planning and preparedness, enabling people to take necessary precautions well in advance.

Developing early warning systems for disasters is a one of the goal of our project. That's why our integrated platform is designed to issue real-time alerts and notifications based on predictions generated by our ML models. These early warning systems can greatly improve disaster response efforts, ensuring that people have the necessary time to evacuate.

Another important objective of our project is to improve the efficiency of disaster response. Our platform aims to streamline these processes by providing a centralized interface where relevant authorities can access real-time data, share information, and work together effectively. This integrated approach ensures that everyone involved has the right information and can act quickly. Our website also includes a dedicated section for pre and post-disaster management. This section provides valuable guidelines to help people prepare for potential disasters and effectively manage recovery efforts.

Through this, we aim to demonstrate the effectiveness of using ML techniques in disaster prediction and highlight the importance of technological innovation in enhancing disaster prediction. We want to contribute our knowledge in disaster prediction and emphasize the power of technology in protecting lives and property.

II. Literature Review

The research environment currently being explored by the paper "Machine Learning in Disaster Management: Recent Developments in Methods and Applications" has a number of constraints [1]. A critical development in disaster preparedness is the integration of big data and ML/DL technology in catastrophe mitigation [2]. These techniques enable thorough analysis and prediction of natural disasters, from early warning systems to post-disaster collaboration. The review identifies