



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

# IJIRSET

International Journal of Innovative Research in  
**SCIENCE | ENGINEERING | TECHNOLOGY**



# INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 4, April 2024

**ISSN** INTERNATIONAL  
STANDARD  
SERIAL  
NUMBER  
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

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# Android Based Disaster Management Application Using ML

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**ABSTRACT:** Disaster management is a critical aspect of ensuring public safety and minimizing the impact of natural or man-made calamities. Leveraging machine learning (ML) within Android-based disaster management applications can significantly enhance the efficiency and effectiveness of response efforts. Parts of the Western Ghats also suffer from low-intensity landslides. Floods are the most common natural disaster in India. Therefore, developing a system which can monitor as well as providing instructions on basis of current disaster using Supervised learning, reducing time for quick actions, Google map API for locating nearby locations, Disaster prediction using data analytics. The mobile application will have four tabs: Alert buzzer, weather forecast, the menu tab and the communication forum. Furthermore, the system notifies the users through SMS and even through the forum whenever there is the alert notification posted on the application Using system can help a great deal in the planning and implementation of disaster mitigation schemes.

**KEYWORDS:** Machine Learning, Linear Regression, Random Forest, API's, NDRF-National Disaster Response Force, SDRF-State Disaster Response Force.

## I. INTRODUCTION

Disaster management is the act through which communities are connected and encouraged to overcome adversity towards hazards and to contend with disasters. Disaster management is not about addressing or directing threats; instead, it accentuates creating plans to lessen the outcomes of natural or man-made disasters. Disasters have two types, natural and man-made disasters. The disasters took away the lives of many people. And Government of India is constantly trying to help out with disaster situations to decrease the unfavorable effect of disasters

## II. RELATED WORK

IoT has emerged as a game-changer in disaster management, revolutionizing how we prepare for and respond to natural and man-made disasters. Numerous studies have explored its multifaceted applications across various disaster phases. In "Internet of Things for Disaster Management: State-of-the-Art and Prospects,". (2017) highlight how IoT enables real-time monitoring and data collection, enhancing disaster response by providing critical information to authorities. This real-time data empowers decision-makers with insights into evolving situations, such as flood levels, air quality, or seismic activity, enabling more effective resource allocation and evacuation planning. Moreover, IoT extends its impact beyond response to the entire disaster management lifecycle. The paper "A Survey on Internet of Things for Disaster Management" by Khan et al. (IEMECON) 2017.[1]

environment sensing using smartphones reveals a rapidly evolving field with significant implications for environmental monitoring and data collection. Researchers have increasingly leveraged the sensors embedded in modern smartphones, such as GPS, accelerometers, and light sensors, to conduct a wide range of environmental studies (ISTT) 2016.[2]

The cost-benefit analysis of an Integrated Government Radio Network for Public Protection and Disaster Relief (PPDR) in Indonesia is a critical research topic with substantial implications for the country's emergency response capabilities. This literature survey aims to provide an overview of existing research and insights into this subject (IEEE) 2012.[3]

The Bidou Integrated Disaster Reduction Application Platform represents a significant advancement in harnessing the capabilities of the Bidou Navigation Satellite System (BDS) for disaster management and mitigation. This platform combines the precise positioning and communication features of the BDS with a comprehensive suite of disaster-related data and tools. Through a thorough literature survey, it is evident that this platform has gained prominence due to its potential to enhance disaster preparedness, response, and recovery efforts.[4]

the growing interest in leveraging advanced technologies to enhance flood prediction and mitigation strategies. Researchers have recognized the significance of combining big data and crowdsourced information to improve the accuracy and timeliness of flood forecasts. Numerous studies have explored the integration of diverse data sources, including satellite imagery, weather data, river sensor networks, and social media posts, into machine learning models.[5]

"Location-Based Early Disaster Warning and Evacuation System on Mobile Phones Using OpenStreetMap" reveals a significant body of research and development in this critical area of disaster management. Researchers and practitioners have recognized the potential of mobile phones and OpenStreetMap (OSM) for enhancing disaster preparedness and response.[6]

The use of Stackelberg games in the context of disaster-recovery communications is an emerging area of research. Stackelberg games are a type of non-cooperative game theory where one player, known as the leader, makes decisions first, and the other player, the follower, responds to those decisions.[7]

Disaster communication systems play a pivotal role in ensuring connectivity during emergencies. In recent years, Device-to-Device (D2D) multi-hop relaying services have emerged as a promising solution to enhance the reliability and reach of such systems. A literature survey reveals that researchers have been actively exploring D2D multi-hop relaying in disaster scenarios.[8]

### III. METHODOLOGY

Developing an Android-based disaster management application that incorporates Machine Learning (ML) techniques like Linear Regression and Random Forest, along with integrating APIs for data retrieval and collaboration with NDRF (National Disaster Response Force) and SDRF (State Disaster Response Force), requires a systematic approach. Here's a methodology to guide you through the process:

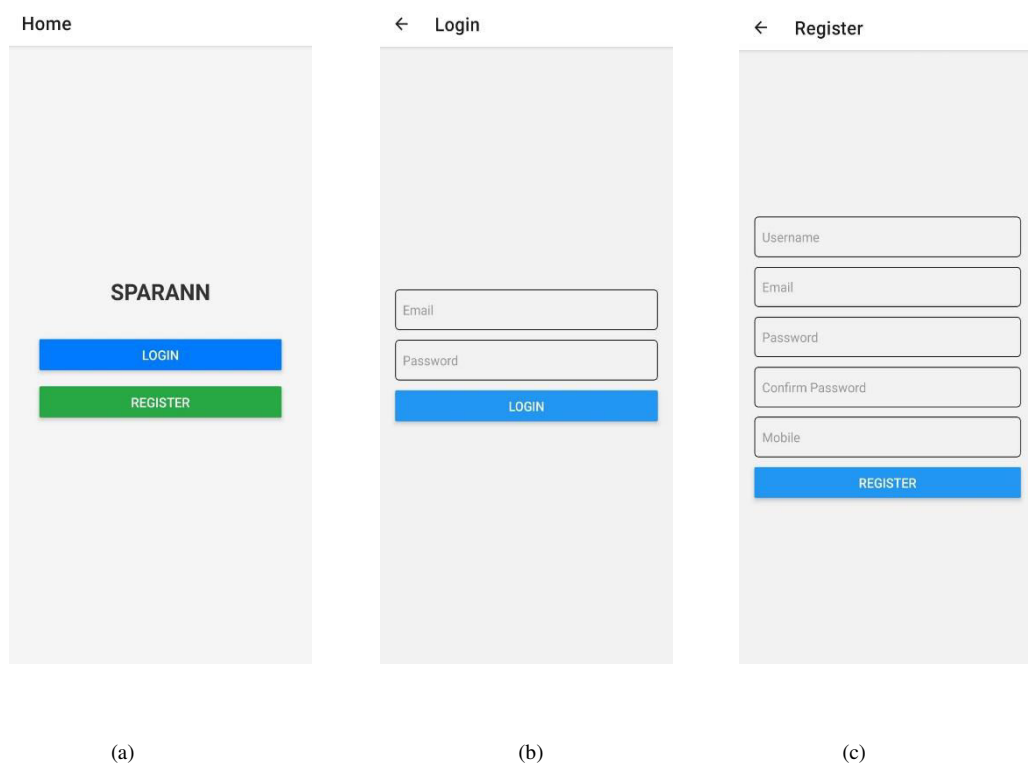
- **Understanding Requirements:** Define the scope of the application, considering various types of disasters (natural or man-made) and the specific functionalities required. Identify the target users, such as civilians, emergency responders, or government authorities. Determine the data sources required for disaster prediction, response, and recovery phases.
- **Data Collection and Integration:** Gather relevant datasets related to past disasters, including factors like location, weather conditions, population density, infrastructure, etc. Integrate APIs from reliable sources for real-time data on weather forecasts, seismic activities, flood warnings, etc. Collaborate with NDRF and SDRF to access their databases and receive updates on ongoing disaster situations, resources available, and deployment plans.
- **Feature Engineering:** Define features to be used in ML models, such as geographical location, historical disaster data, population density, infrastructure resilience, etc. Preprocess and clean the data to handle missing values, outliers, and inconsistencies. Extract relevant features from the integrated APIs and databases.
- **Model Development:** Implement Machine Learning models like Linear Regression and Random Forest to predict various aspects of disasters, such as severity, impact areas, evacuation routes, resource allocation, etc. Train the models using historical data and validate their performance using cross-validation techniques. Optimize hyperparameters to improve model accuracy and generalization.
- **Android Application Development:** Design the user interface (UI) with intuitive navigation and features for disaster preparedness, early warning, real-time updates, and emergency communication.



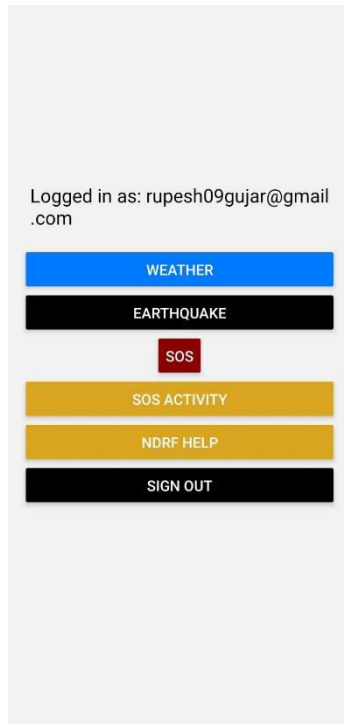
- Implement functionalities to display disaster predictions, risk assessments, evacuation routes, safe zones, emergency contact information, etc. Ensure the application is responsive, accessible, and compatible with different Android devices and screen sizes.

#### IV. EXPERIMENTAL RESULTS

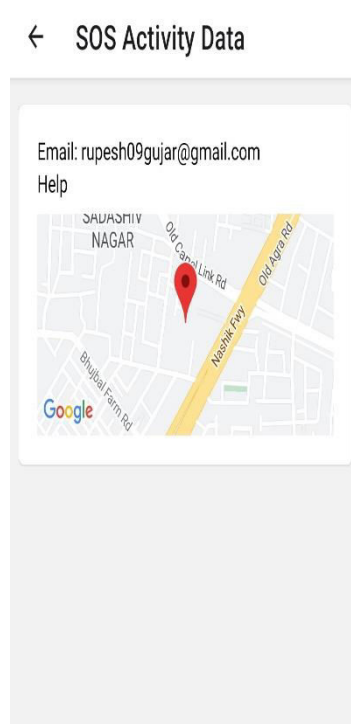
Figures shows the results of android application. Figs. 1 (a) shows the Main UGI. (b) shows the Login page. (c) shows the Registration page.



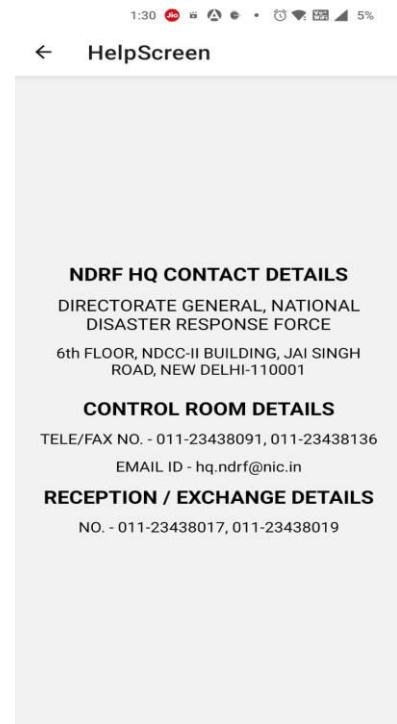
Figures shows the results of disaster management Fig. 2. (a) shows the Help Activity Action's page. (b) shows the SOS Activity. (c) show Help Line of NDRF



(a)



(b)



(c)

## V. CONCLUSION

Machine learning brings revolutionary changes in prediction area, so in these pro- posed models effectively improved the success ratio of system. Machine learning (Supervised learning) effectively achieving the prediction about disaster according to provided dataset. Thus, due to these people get early information regarding disaster so due to these it will reduce the economic as well as most important human life, in day today life we are seeing the disasters can causes deaths and also impact on basic needs. Here we also able to send the alert manually for instant situation in this case if system unable to predict so we called it as a Manual way in above report. All citizens now able to direct contact with higher authorities of disaster man- argument due to this less time require to send the requirement of people to author-cities on single click now citizen able to send the requests by using communication bridge (Stream Chat API). So, Application will able to achieve the aim of project that forming the communication bridge as well as predicting disaster it will happen by using machine learning.

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