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RESCUE WINGS WEB COMPUTING AND ACTIVE SERVICES SUPPORT SYSTEM FOR DISASTER RESCUE

SAI SHANKARI V[1], Dr. J. SAVITHA M.Sc., M.Phil., Ph.D[2].

Department Of Information Technology, Dr. N.G.P arts and Science College, Coimbatore.[1]

Professor, Department of Information Technology, Dr. N.G.P arts and Science College, Coimbatore.[2]

Abstract: The initiative "Rescue Wings: A Web-Based Computing and Active Services Support System for Disaster Response" involves sending a request to the relevant organization for assistance in rescuing individuals trapped in a disaster. The primary goal of this project is to aid those in distress. Upon receiving a request from the public, the organization assigns workers to assist those affected by the crisis. As workers carry out rescues, updates will be communicated to the public via email. Individuals who develop innovative rescue equipment can register their information and upload a video along with a description of their invention. The administrator reviews the video, and if it meets the criteria, it will be approved; otherwise, it will be rejected. The administrator is responsible for maintaining comprehensive records of the company, workers, and members of the public who request assistance, as well as details pertaining to the submitted videos. As rescue operations progress, updates are shared with the public via email to ensure transparency and keep affected individuals updated. Beyond immediate rescue efforts, the platform fosters innovation by enabling the public to propose videos and descriptions of potential rescue equipment inventions. These proposals are assessed by an administrator, who approves feasible solutions for implementation in disaster response. Additionally, the system keeps thorough records of responders, the organization, and public requests, facilitating an organized approach to disaster management. This initiative aims to enhance the effectiveness of rescue operations, encourage public participation, and harness inventive solutions during crises, ultimately leading to saved lives and improved disaster response capabilities.

Keywords: Disaster Response ,Rescue operations, web-based requests

I. INTRODUCTION

In instances of emergencies, the "Rescue Wings: Active Services Disaster Rescue" initiative is employed to provide prompt help to both victims and responders. The front-end development is conducted using Python, while SQLite manages the back-end operations. This initiative outlines Rescue Wings as a service-oriented framework designed to deliver immediate assistance to victims and rescuers during crises. The system develops personnel to provide active services to users and utilizes these services to capture real-time information about individuals and their surroundings. Employees consistently utilize Rescue Wings' intelligent services, which connect to various public services from government and other civic entities, to effectively perform their responsibilities.

Rescue operations during disasters necessitate highly organized, effective, and prompt measures to preserve lives and lessen damage in urgent situations. In recent years, the incorporation of web computing and active support systems has been crucial in improving disaster rescue efforts. These technologies enable real-time communication, data management, and resource coordination, ensuring rescue teams can respond effectively to emergencies. Web computing provides scalable, cloud-based solutions that allow for the smooth exchange of information, while active support systems, including sensor networks and real-time analytics, deliver actionable insights for decision-making. When combined, these systems enhance situational awareness, streamline resource allocation, and decrease response times. This journal examines the progression and influence of web computing and active support systems in disaster rescue initiatives, highlighting their role in boosting operational efficiency and saving lives during unforeseen events.

II. LITERATURE REVIEW

The increasing fascination with applying AI and machine learning to disaster management systems arises from their capacity to improve response times and the allocation of resources. A variety of studies demonstrate how AI and ML can refine predictive analytics to more accurately anticipate events such as floods, storms, and wildfires.

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For example, machine learning models have been utilized to analyses historical data to forecast the path of disasters, assisting in the development of early warning systems and evacuation strategies. A successful disaster response requires the implementation of internet-based platforms that facilitate real-time coordination, data sharing, and geospatial tracking. By incorporating technologies like Global Positioning Systems (GPS) and Geographic Information Systems (GIS),these systems ensure that essential personnel and resources are managed efficiently. Information from crowdsourcing plays a vital role in disaster management, as AI algorithms analyse social media updates and data from mobile applications to identify areas with the most critical needs and to better understand the extent of the disaster.

However, there are persistent challenges, including concerns about data privacy, the risks of algorithmic bias, and inconsistencies in real-time data during emergencies. Despite these obstacles, current research suggests that integrating AI and machine learning into disaster management systems can significantly enhance decision-making, optimize resource allocation, and improve overall outcomes in disaster response and recovery.

III. PROPOSED SYSTEM

The Rescue Wings Web Computing and Active Services Support System is a comprehensive, state-of-the-art solution designed to enhance disaster response efforts by leveraging advanced web computing, real-time data analysis, and cloud technology. This system collects data from various sources, such as IoT devices, drones, satellites, and social media platforms, to provide immediate situational awareness. The information is processed through a cloud-based framework, supplemented by edge computing to ensure functionality in areas with low connectivity, facilitating prompt and effective decision-making during emergencies. The system's AI-powered decision support tools predict disaster patterns, optimize resource distribution, and help prioritize rescue missions based on urgency. Moreover, it utilizes GIS and GPS technologies for accurate mapping and navigation, allowing rescue teams to quickly reach affected locations.

An encrypted communication layer fosters collaboration among first responders, governmental bodies, NGOs, and volunteers, enabling them to share information and coordinate their efforts efficiently. Additionally, the system includes a volunteer management feature that matches available personnel with tasks depending on their skills and location, while real-time tracking of critical resources ensures that supplies like food, water, and medical kits are continuously monitored. The platform also allows the public to report emergencies via a mobile application, contributing to crowdsourced information about damages or dangers. Furthermore, the design of the Rescue Wings system incorporates robust security features, including data encryption of the ,Multi-factor authentication, and blockchain technology for transparent resource tracking. By integrating these tools and technologies, Rescue Wings aims to improve disaster management, enhancing response times, resource allocation, and overall coordination in disaster response activities.

IV. METHODOLOGY

The approach for a web-based computing and active support system aimed at disaster management includes several essential elements to ensure a prompt and effective response during emergencies. Firstly, this system leverages cloud computing technology to guarantee both scalability and reliability, allowing rapid access to vital information such as weather predictions, emergency contact details, and up-to-date situational reports. This is supported by sophisticated data analytics to swiftly handle large amounts of data and detect patterns or threats that necessitate immediate attention.

Furthermore, the active support system features communication tools that enhance coordination among emergency personnel, local government officials, and those impacted by the disaster. This encompasses GPS tracking, real-time messaging, and automated notifications for evacuation or safety measures. The system integrates real-time data from diverse sources including drones, IoT devices, and satellite imagery to enhance situational awareness, aiding in decision-making and resource allocation. The methodology prioritizes adaptability, redundancy, and accessibility to ensure efficient operation in high-pressure situations, providing prompt and precise assistance for disaster relief activities.

The system's design builds upon its foundational methodology while prioritizing accessibility for users, allowing both first responders and civilians to interact easily with the platform, even in areas with limited connectivity. This is accomplished through mobile applications and streamlined web interfaces that are optimized for various devices, enabling individuals affected by disasters to report their conditions, request assistance, or receive crucial information. The backend of the system utilizes a strong network of servers and decentralized technologies like edge computing to lessen reliance on centralized infrastructure, which could be compromised during significant disasters. By distributing computational resources across numerous nodes, it guarantees quicker data processing and reduces latency during critical scenarios.

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Moreover, predictive modelling plays a vital role in the methodology, employing historical disaster data to anticipate potential impacts, which aids in proactive planning and resource distribution. Machine learning algorithms are applied to evaluate damage trends, forecast population movements, and enhance evacuation routes. Additionally, incorporating artificial intelligence (AI) helps automate tasks such as analysing social media messages for distress signals, prioritizing emergency calls, and providing real-time recommendations based on data trends to aid in decision-making.

V. SYSTEM DESIGN

The architecture for a Web-Based Computing and Active Support System for Disaster Management incorporates various technological components to facilitate efficient disaster response. Central to the system is a user-friendly interface that can be accessed via mobile and web applications, enabling both the public and emergency personnel to report incidents, receive notifications, and communicate in real-time. The system consolidates data from diverse sources, such as IoT devices, satellites, and social media, to deliver a thorough understanding of the situation. A cloud computing framework guarantees scalability and reliability, while edge computing allows data processing in areas with limited connectivity. Sophisticated machine learning algorithms are utilized to analyse real-time information, forecast disaster trends, and enhance resource distribution. The communication layer promotes smooth collaboration among authorities, first responders, and the community, ensuring that critical information is shared promptly. An AI-driven decision support system aids in emergency decision-making by providing insights derived from historical data and real-time information. The backend framework is built for high availability and security, employing microservices for modular scaling and data safeguarding. Lastly, continuous feedback mechanisms and connections with external systems like government and NGO platforms ensure the system remains adaptive and continuously refined to meet changing disaster situations.

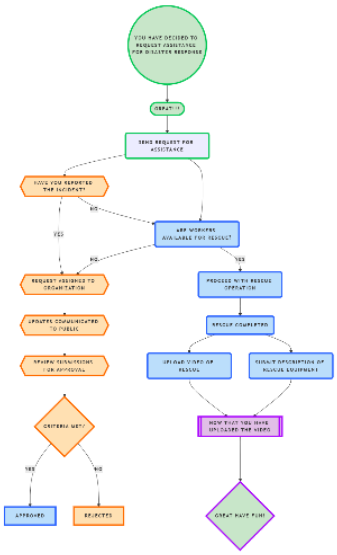

Fig:5.1

VI. RESULT AND DISCUSSION

The deployment of the Web Computing Active Service Support System for Disaster Rescue has demonstrated encouraging results in improving the effectiveness and coordination of disaster response efforts. A major achievement is the enhancement of real-time communication among rescue teams and support organizations. This system facilitates continuous, real-time updates and notifications, guaranteeing that all parties involved are informed of crucial developments as they occur. This capability has proven essential in extensive disaster scenarios, where conventional communication methods often falter or become inundated.

Another significant outcome is the incorporation of geospatial mapping and analytics via GIS. This has allowed for more accurate visualization of areas impacted by disasters, leading to improved resource distribution and route optimization. By showcasing real-time information on injuries, infrastructure damage, and access points, rescuers can make better-informed choices, focusing on regions that require immediate assistance. The system's capacity to track and manage resources—be it medical supplies, rescue teams, or equipment—has resulted in a more effective utilization of available resources, minimizing waste and ensuring prompt access to the most critical areas.

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(1)Enhanced Communication

The system promotes immediate communication among rescue teams, emergency services, and support organizations, ensuring effective coordination.

It minimizes delays in reporting and reacting to urgent situations by delivering instant updates and alerts.

(2)Geospatial Mapping and Resource Distribution

GIS integration allows for precise mapping of disaster-affected areas, aiding responders in visualizing impacted locations and streamlining rescue routes.

Up-to-date information on casualties, damage to infrastructure, and access points provides better resource distribution and prioritization.

VII. CONCLUSION

The project is designed to assist individuals who are in danger. This Python application allows the administrator to maintain comprehensive records of both the companies and their employees. The administrator oversees the companies and addresses inquiries submitted by the public. When the public reports an issue, the company receives details about the incident and assigns workers for the rescue operation. The public is notified by email regarding the status of the disaster. Individuals who create equipment for rescue operations can upload their videos after registering in the scientific community. The administrator reviews the videos, approving those that are valid and rejecting others that do not meet the criteria. The inventors are required to explain their videos and the operational mechanisms of the equipment.

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