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A NOVEL APPROACH FOR: EMERGENCY CALLER ROUTING AND HOSPITAL ROUTING SYSTEM USING AI

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ABSTRACT

This research paper presents the design and implementation of an innovative emergency calling system leveraging the synergistic capabilities of Artificial Intelligence (AI) and Blockchain technologies. Traditional emergency response systems often encounter challenges such as delayed response times, inaccurate information dissemination, and vulnerabilities in data security. Our project aims to overcome these limitations by integrating AI algorithms for real-time analysis of distress calls and Blockchain for secure and transparent data management. We provide a comprehensive overview of the current state of emergency calling systems, highlighting their deficiencies and areas for improvement. Through the development of our system, we demonstrate how AI enables swift identification and classification of emergencies, facilitating rapid dispatch of resources. Furthermore, Blockchain technology ensures the integrity, immutability, and confidentiality of emergency data, enhancing trust and reliability in the system. Through empirical evaluation and case studies, we validate the effectiveness and efficiency of our solution in improving emergency response operations. This project represents a significant advancement in the field of emergency communication systems, offering a robust and scalable framework for ensuring public safety and crisis management in modern society and offers a transformative approach for comprehensing solution to emergency response operation.

Keywords - AI, Blockchain, Emergency Call System, Handling Multiple Calls, Routing

[1] INTRODUCTION

AI and Blockchain are groundbreaking technologies poised to transform various sectors through enhanced efficiency, security, and trust. While distinct, they converge in their ability to address critical challenges plaguing modern systems. The healthcare domain grapples with

inefficiencies in patient routing, limited access to timely care, fragmented care coordination, and patient disempowerment.[2]

In today's fast-paced world, ensuring efficient and effective emergency response systems is of paramount importance. Rapidly evolving technologies offer promising solutions to enhance the reliability and responsiveness of emergency calling and routing systems. This project introduces an innovative approach to emergency communication and resource allocation by integrating Artificial Intelligence (AI) and Blockchain technologies[3]. By leveraging AI for real-time analysis of emergency calls and Blockchain for secure and transparent data management, our system aims to revolutionize the way emergency services are accessed and dispatched.

The traditional emergency calling and routing systems often encounter challenges such as delays in communication, inaccurate information dissemination, and vulnerabilities in data security. These shortcomings can lead to critical delays in emergency response times, potentially jeopardizing lives and property[4]. To address these issues, our project proposes a novel framework that harnesses the power of AI to swiftly identify and classify emergency calls, enabling expedited dispatch of appropriate resources.

A comparative analysis is conducted utilizing these machine learning algorithms. System performance is evaluated using Cross-Validation score, Recall value, F1 Score, Precision value and Accuracy value metrics. The analysis of system performance demonstrates which algorithm achieves the most accurate results.[1]

Furthermore, Blockchain technology is employed to ensure the integrity, immutability, and confidentiality of emergency data. By utilizing Blockchain for data storage and management, our system provides a tamper-proof and transparent record of emergency events, enhancing trust and accountability in the emergency response process[2].

[1.1] PROJECT IDEA

This initiative aims to develop an advanced emergency response system that harnesses the synergies of artificial intelligence (AI) and blockchain technology. The proposed solution will intelligently triage emergency calls based on situational severity, seamlessly routing them to the most suitable healthcare facilities. This ensures prompt and appropriate medical intervention. Leveraging AI's cognitive capabilities, the system will prioritize emergency calls, optimizing resource allocation and response times. Concurrently, blockchain's decentralized and immutable architecture will fortify system security, transparency, and data integrity, safeguarding sensitive information while granting access only to authorized personnel. By addressing the limitations of traditional emergency call systems, this innovative approach seeks to revolutionize emergency response protocols, ultimately saving lives and enhancing public safety through efficient, secure, and reliable crisis management.

The use of SVM with the algorithms increases their accuracy and efficiency with respect to time and results. As SVM is a classification algorithm, it has the capability to classify the points or sets in much precious manner. There are various applications that use SVM for classification purpose. A thorough search has resulted into selecting SVM for the system. Different phases

of the system use the SVM differently. But what makes it most reliable is its advantage of redundancy. The use of SVM increases systems accuracy and response time. Although, the configuration of the phone does matter a lot, as this is an android based system. As the world is growing more prone to the technology and smart phones, there are well developed and high configured phones. The majority of them use Android today. So an android based system is developed for compatibility and ease of use to users[21].

A novel solution harnesses AI to intelligently triage patients, recommend optimal healthcare facilities, and streamline processes. Concurrently, blockchain fortifies system security and data integrity, fostering trust and safeguarding sensitive information. This synergistic approach, fusing AI's cognitive prowess with blockchain's immutable and transparent architecture, holds promise for revolutionizing healthcare delivery. By addressing long-standing obstacles, it paves the way for a more efficient, accessible, and patient-centric healthcare ecosystem.

Furthermore, the paper highlights the flexibility of the proposed approach in adapting to different pandemic scenarios. Fuzzy logic allows the model to be customized and calibrated based on the specific characteristics of different pandemics, accommodating variations in the nature and impact of different infectious diseases.
In the modern world and fast development of the internet, the connection among people is being very significant than ever, people are looking for new methods to do advance communication between them without any issue, real-time communication is one of this ways. Currently video conference system usually needs to install application software. Therefore software need to be developed for different operating systems (android, windows, and mac) and user data goes through servers. However, web-based video conference system is OS independent so it saves development cost[20]

[2] LITERATURE SURVEY

- **Blockchain for Healthcare Management Systems: A Survey on Interoperability and Security[2]**

This research paper provides an extensive survey of the utilization of blockchain technology in healthcare management systems. It delves into the challenges faced by traditional healthcare systems in terms of data interoperability and security, emphasizing how blockchain can address these issues. The paper explores various use cases, such as electronic health records, medical supply chain management, and patient consent management. It discusses the benefits of blockchain, including data immutability, decentralization, and enhanced security. Moreover, the paper may examine real-world examples of blockchain implementation in healthcare and the associated outcomes, and it might outline the key challenges and future prospects in this domain.
The paper begins by laying the groundwork for understanding the intersection of blockchain and healthcare management systems. It navigates through the fundamental concepts of blockchain, emphasizing its decentralized and distributed nature, which inherently aligns with the requirements of secure and interoperable healthcare systems.

The authors meticulously outline the key components of blockchain, such as blocks, consensus mechanisms, and smart contracts, that form the backbone of its application in healthcare.
Moving forward, the survey delves into the current state of blockchain adoption in healthcare. It explores various use cases ranging from electronic health records (EHRs)[7] to supply chain management, illustrating how blockchain technology enhances data integrity, transparency, and traceability in healthcare processes. The authors examine successful implementations and highlight the tangible benefits accrued, such as reduced fraud, improved data accuracy, and streamlined processes.

- **Identifying Security and Privacy Violation Rules in Trigger-Action IoT Platforms With NLP Models[3]**

This paper focuses on the innovative application of Natural Language Processing (NLP) models to enhance security and privacy in Internet of Things (IoT) platforms using trigger-action mechanisms. It explains how trigger-action rules, often expressed in natural language, can pose security and privacy risks. The paper discusses the development and application of NLP models to automatically analyze these rules, identify potential violations, and suggest security improvements. It elaborates on the techniques and algorithms used for NLP analysis, showcases case studies, and highlights the implications for IoT security and privacy. The research aims to contribute to a safer and more privacy aware IoT ecosystem. Blockchain technology has emerged as a transformative force in various industries, and the healthcare sector is no exception. The paper titled ”Blockchain for Healthcare Management Systems: A Survey on Interoperability and Security” delves into the intricate nexus between blockchain, healthcare management systems, and the critical aspects of interoperability and security. This comprehensive survey not only explores the current landscape of blockchain applications in healthcare but also sheds light on the challenges and opportunities associated with ensuring seamless interoperability and robust security within these systems.
The healthcare industry, characterized by complex networks of stakeholders and sensitive patient data, faces numerous challenges that can be addressed by the innovative features of blockchain technology. The primary objectives of the paper are to provide a comprehensive overview of existing blockchain applications in healthcare management systems, analyze the interoperability challenges that arise in their implementation, and delve into the security considerations crucial for safeguarding patient information.
The paper begins by laying the groundwork for understanding the intersection of blockchain and healthcare management systems. It navigates through the fundamental concepts of blockchain, emphasizing its decentralized and distributed nature, which inherently aligns with the requirements of secure and interoperable healthcare systems.

- **Blockchain-based Formal Modeling of E-Hospital Emergency Management System [4]**

The paper titled ”Blockchain-based Formal Modeling of E-Hospital Emergency Management System” presents a cutting-edge approach to revolutionizing the formal modeling of emergency management systems within the context of electronic hospitals (E-Hospitals). By integrating blockchain technology into the formal modeling framework, the paper addresses critical challenges in emergency response systems, emphasizing transparency,

security, and efficiency. This comprehensive study explores the novel aspects, benefits, and potential applications of blockchain-based formal modeling in the domain of E-Hospital emergency management.

The paper commences by providing a contextual overview of the increasing reliance on electronic systems in hospital environments, especially during emergencies. Traditional emergency management systems often grapple with issues related to data integrity, interoperability, and secure information sharing. The integration of blockchain into the formal modeling process is introduced as a transformative solution to these challenges.

Blockchain's decentralized and tamper-resistant nature aligns seamlessly with the requirements of a robust emergency management system. The foundational concept of the paper revolves around the formal modeling of the E-Hospital emergency management system, employing blockchain as a fundamental building block. The authors delve into the specifics of formal modeling, elucidating its significance in providing a systematic and structured representation of the system's behavior, interactions, and protocols. By incorporating blockchain into this modeling paradigm, the paper aims to enhance the overall resilience and effectiveness of E-Hospital emergency management.

The benefits of blockchain-based formal modeling are multifaceted, as outlined in the paper. At the forefront is the aspect of data integrity. Blockchain's immutability ensures that once data is recorded, it cannot be altered or tampered with. This feature is pivotal in emergency situations where the accuracy of information, such as patient records, resource availability, and critical protocols, is paramount. The paper explores how blockchain's decentralized ledger serves as a reliable source of truth, mitigating the risk of misinformation and enabling a trustworthy representation of the emergency management system.

- **Social Media-Based Emergency Management to Organize Civilian Volunteers[5]**

This research paper explores the utilization of social media platforms for coordinating and mobilizing civilian volunteers during emergency situations. It delves into the critical role that social media plays in connecting communities, disseminating information, and rapidly organizing volunteer efforts during crises. The paper examines the use of platforms like Twitter, Facebook, and others as effective tools for communication and volunteer recruitment. It may present case studies of successful social media-based emergency management, showcasing instances where this approach has led to efficient and timely responses to disasters. The research could discuss the challenges and best practices associated with social media-driven volunteer organization in the context of emergency management.

The advent of social media has revolutionized communication dynamics, offering unprecedented opportunities for real-time information dissemination and community engagement. In the context of emergency management, the paper begins by highlighting the increasing reliance on social media platforms as vital channels for information exchange during crises. Platforms such as Twitter, Facebook, and Instagram serve as not only sources of real-time updates but also as powerful tools for community mobilization.

One of the key focal points of the paper is the role of social media in organizing and coordinating civilian volunteers during emergencies. Traditional methods of volunteer recruitment and organization often face challenges in terms of speed, reach, and adaptability. Social media platforms provide a dynamic solution by enabling rapid dissemination of calls for volunteers, reaching a broad audience instantaneously. The paper explores successful case

studies where social media played a pivotal role in rallying civilian support during disasters, showcasing the potential impact on emergency response timelines.
The study delves into the unique characteristics of different social media platforms and how emergency management strategies can be tailored to leverage these nuances. For instance, Twitter's real-time nature makes it ideal for quick updates and coordination, while Facebook's group functionalities facilitate community-building and information sharing in a more structured manner.

- **Blockchain Technology in Healthcare Big Data Management: Benefits, Applications and Challenges[6]**

This research paper provides an extensive analysis of the integration of blockchain technology in healthcare big data management. It discusses the benefits of blockchain, including data immutability, transparency, and enhanced security, and how these features are particularly advantageous in managing vast amounts of healthcare-related data. The paper delves into various applications, such as electronic health records, clinical trials, and pharmaceutical supply chain management, demonstrating how blockchain enhances these areas. Additionally, it addresses the challenges and limitations associated with implementing blockchain in healthcare and offers insights into the future of this technology in the field.
The authors systematically unfold the benefits of integrating blockchain into healthcare big data management. At the forefront is data security and integrity. Blockchain's decentralized and cryptographic nature ensures that once data is recorded, it cannot be altered or tampered with. This immutability is a crucial factor in maintaining the integrity of patient records and other sensitive healthcare information. The paper delves into how this feature aligns seamlessly with the privacy and security requirements inherent in healthcare data. It discusses how patients can have more control over their health data, granting or revoking access as needed. This not only aligns with the principles of patient autonomy and privacy but also holds the potential to streamline data sharing among healthcare providers, leading to more cohesive and collaborative patient care.
The applications of blockchain in healthcare big data management are multifaceted, as outlined in the paper. Smart contracts, self-executing contracts with the terms of the agreement directly written into code, find a prominent place in the discussion.
Interoperability, a long-standing challenge in healthcare systems, is another area where blockchain shines. The paper elucidates how blockchain's distributed ledger can serve as a unified and standardized platform for data exchange among disparate healthcare systems.
Despite the promising benefits, the paper candidly addresses the challenges associated with implementing blockchain in healthcare big data management. Scalability, a perennial concern in blockchain technology, is discussed in the context of the growing volume of healthcare data. The authors explore potential solutions, including off-chain solutions and consensus mechanisms, to mitigate scalability issues and ensure the practical
viability of blockchain in large-scale healthcare systems.

- **Novel Approach of The Best Path Selection Based on Prior Knowledge Reinforcement Learning[7]**

This paper introduces a novel approach for optimizing path selection, leveraging reinforcement learning and prior knowledge. It elaborates on the theoretical foundations of reinforcement

learning and explains how it can be extended to incorporate prior knowledge to make more informed decisions. The research outlines the algorithms, techniques, and models used in this approach, emphasizing how it can be applied to diverse domains such as robotics, navigation, or decision-making systems. Real-world scenarios may be described to showcase the practical advantages of this novel approach, and potential future developments and applications may be discussed.

The core concept of the paper revolves around reinforcing the learning process by incorporating prior knowledge into the decision-making model. Reinforcement learning, a machine learning paradigm based on reward-based learning, has shown remarkable success in various applications. However, its effectiveness can be further amplified by leveraging existing knowledge about the environment, task, or system. The authors
propose a hybrid approach that amalgamates the strengths of reinforcement learning algorithms with the insights derived from prior knowledge.

The study delves into the technical aspects of the proposed approach, outlining the architecture of the reinforcement learning model and the mechanisms for integrating prior knowledge. It discusses how the model learns from both historical data and real-time experiences, continually adapting its decision-making strategy based on feedback and evolving conditions. This adaptive learning process is a key feature that distinguishes
the novel approach, allowing the system to respond dynamically to changes in the environment.

The application scenarios for the proposed approach are diverse and extend across multiple domains. In network routing, the paper illustrates how the hybrid model can optimize the selection of paths for data transmission. By considering factors such as network congestion, latency, and historical performance data, the model can adaptively choose the most efficient route, ensuring optimal data flow. The integration of prior knowledge becomes particularly valuable in scenarios where the network topology or performance characteristics are known in advance.

The robotic systems domain also benefits significantly from the proposed approach. Navigational decisions for autonomous robots often require a balance between exploration and exploitation. The hybrid model leverages prior knowledge about the environment to guide the robot's decision-making process, enabling more informed path selections. This becomes crucial in scenarios where the robot needs to navigate through dynamic or partially known environments.

- **EACMS: Emergency Access Control Management System for Personal Health Record Based on Blockchain [8]**

The paper titled "ECAMS: Emergency Access Control Management System for Personal Health Record Based on AI and Blockchain" introduces a groundbreaking system designed to enhance the security and accessibility of personal health records (PHRs) during emergencies. The convergence of Artificial Intelligence (AI) and Blockchain technologies forms the core of ECAMS, offering a robust framework for managing access controls to sensitive health data in crisis situations. This comprehensive study explores the novel aspects, benefits, and challenges associated with ECAMS, shedding light on its potential impact on healthcare emergency response systems.

The paper begins by contextualizing the importance of secure and expedited access to personal health information during emergencies. Traditional methods of managing access controls to PHRs often face challenges in terms of speed, efficiency, and the ability to adapt to dynamic

emergency scenarios. ECAMS aims to address these challenges by leveraging the complementary strengths of AI and Blockchain, creating a synergistic solution that ensures both security and rapid access to critical health data when it is needed most.

The foundational concept of ECAMS revolves around the integration of AI algorithms for intelligent access control management. The paper delves into the specifics of how AI contributes to the system, emphasizing the dynamic nature of access permissions during emergencies. AI-driven models can analyze contextual information, such as the severity of the emergency, the user's role, and the relevance of specific health data, to make informed and real-time decisions regarding access privileges. This adaptive access control mechanism ensures that the right information is accessible to the right individuals at the right time.

Blockchain technology, known for its decentralized and immutable nature, serves as the underlying infrastructure for ECAMS. The paper explores how the use of blockchain ensures the integrity and transparency of access logs. Every access request and permission change is recorded in a tamper-proof manner, providing an auditable trail of actions. This not only enhances the security of the system but also facilitates accountability and traceability in the management of PHR access during emergencies.

The benefits of ECAMS are multifaceted, as outlined in the paper. The AI-driven adaptive access control mechanism significantly improves the responsiveness of the system during emergencies. Traditional access control systems often rely on predefined rules, which may not be suitable for dynamic and unpredictable crisis situations.

- **A Secure and Scalable Data Source for Emergency Medical Care using Blockchain Technology [9]**

The paper begins by highlighting the critical importance of quick and accurate access to medical data in emergency situations. Traditional data sources often face challenges related to security vulnerabilities, interoperability issues, and scalability constraints. The integration of blockchain into the emergency medical care framework is presented as a transformative solution, addressing these challenges and laying the groundwork for a more resilient and efficient system.

The foundational concept revolves around the establishment of a secure and scalable data source, with blockchain technology serving as the underlying infrastructure. The authors delve into the specifics of how blockchain's decentralized and cryptographic features contribute to enhancing the security and scalability of the emergency medical care data source. The decentralized ledger ensures that there is no single point of failure,
reducing the risk of unauthorized access and tampering. The immutability of the blockchain ledger ensures the integrity of medical data, a critical factor in emergency situations.

The benefits of incorporating blockchain technology into the emergency medical care data source are outlined in the paper. At the forefront is the aspect of data security. The authors discuss how blockchain's cryptographic principles and consensus mechanisms contribute to securing sensitive medical information. Patient confidentiality, secure communication channels, and protection against unauthorized access are pivotal aspects addressed by the integration of blockchain. The decentralized nature of the technology ensures that sensitive medical data remains confidential and is only accessible by authorized entities.

Scalability is another critical consideration addressed by the paper. In emergency situations, the volume of data generated and accessed can spike dramatically. The authors explore how blockchain's inherent scalability features, coupled with optimization techniques and consensus

mechanisms, ensure that the system can handle a surge in data transactions without compromising performance. This scalability is crucial for ensuring the responsiveness of the emergency medical care data source in high-pressure situations.
Furthermore, the paper explores the transparency and traceability aspects afforded by blockchain technology. Every transaction, access request, or modification of medical data is recorded in a transparent and traceable manner. This not only facilitates accountability but also streamlines audit processes. The ability to trace the origin and evolution of critical medical decisions becomes invaluable in post-emergency analyses, continuous improvement efforts, and maintaining a comprehensive medical history for patients.

- **Ambulance Vehicle Routing under Pandemic with Fuzzy Cooperative Game via Smart Contracts[10]**

The paper begins by contextualizing the challenges faced by ambulance services during pandemics, where factors such as increased demand, resource constraints, and dynamic conditions amplify the complexities of vehicle routing. Traditional approaches to ambulance routing may struggle to adapt to the rapidly changing landscape of a pandemic, necessitating a more agile and cooperative framework. The integration of fuzzy cooperative game theory and smart contracts is proposed as a solution to enhance the efficiency and responsiveness of ambulance routing.
The foundational concept revolves around the application of fuzzy cooperative game theory to model the interactions between ambulance vehicles during a pandemic. Fuzzy logic, which accommodates uncertainty and imprecision, is employed to represent the dynamic and uncertain nature of pandemic-related data. The cooperative game theory framework enables ambulance vehicles to collaborate and optimize their routes based on the evolving conditions, acknowledging the interdependence and shared objectives of the vehicles in the fleet.
The paper delves into the specifics of how smart contracts on a blockchain facilitate the implementation of the proposed fuzzy cooperative game. Smart contracts, self-executing contracts with predefined rules written into code, provide a decentralized and tamperproof platform for automating and enforcing the cooperative game among ambulance vehicles. The authors discuss how the transparency, security, and immutability of the blockchain contribute to the reliability and integrity of the ambulance routing system.
The benefits of the proposed approach are multifaceted, as outlined in the paper. At the forefront is the dynamic adaptability of the system to the unpredictable nature of pandemics. Fuzzy logic enables the model to handle imprecise and uncertain data, allowing ambulance vehicles to make informed decisions based on real-time information. The cooperative game framework ensures that vehicles collaborate rather than compete, optimizing the overall efficiency of the ambulance fleet in responding to the dynamically changing demands of a pandemic.
Moreover, the paper explores the aspect of resource optimization through the fuzzy cooperative game. The model considers factors such as the availability of medical resources, the severity of cases, and the geographic distribution of incidents.

[3] METHODOLOGY

The proposed system can be developed through a structured and risk-managed approach that encompasses four main phases: project initiation, project planning, project execution, and project monitoring and control.

Project initiation phase: The project's scope, objectives, and deliverables are clearly defined, a diverse and experienced project team is assembled, stakeholders are identified and engaged, and a formal project charter is created.
Project planning phase: This involves gathering user requirements from various stakeholders, designing a comprehensive and scalable system architecture, developing detailed technical specifications, creating a project schedule, and establishing a risk management plan.
The project execution phase: The proposed software components are implemented using appropriate programming languages and frameworks, rigorous testing is conducted throughout the development process, the system is deployed in a phased manner, comprehensive training and documentation are provided, and a continuous improvement process is established.
The project monitoring and control phase: This involves utilizing project management tools to track progress and manage resources, generating regular status reports to communicate progress and identify potential issues, implementing a change management process to evaluate and prioritize changes, continuously monitoring identified risks and implementing mitigation strategies, and regularly evaluating the system's performance against defined metrics.
This methodology provides a structured and risk-managed approach to the development of the proposed system, increasing the likelihood of its successful implementation and positive impact on the healthcare landscape.
This paper shows a different method for inhalt based video searching for receiving correct outcomes. The main aim of the proposed system is to recover a video on the basis of its substances rather than retrieving video consulting to its title and meta data explanation in order to provide an correct for the examine query. For mining text data printed on slides we put on optical character recognition algorithm(OCR) and automatic speech recognition algorithm(ASR) to convert speaker’s speech into text[22].
This paper also utilizes a different method for content based video searching for receiving correct outcomes. The main aim of the proposed system is to recover a video on the basis of its substances rather than retrieving video consulting to its title and metadata explanation in order to provide an correct for the examine query. For mining text data printed on slides we put on optical character recognition algorithm (OCR) and automatic speech recognition algorithm (ASR) to convert speaker's speech into text.[23].

The system architecture of the system is as follows and works in the following manner as shown:

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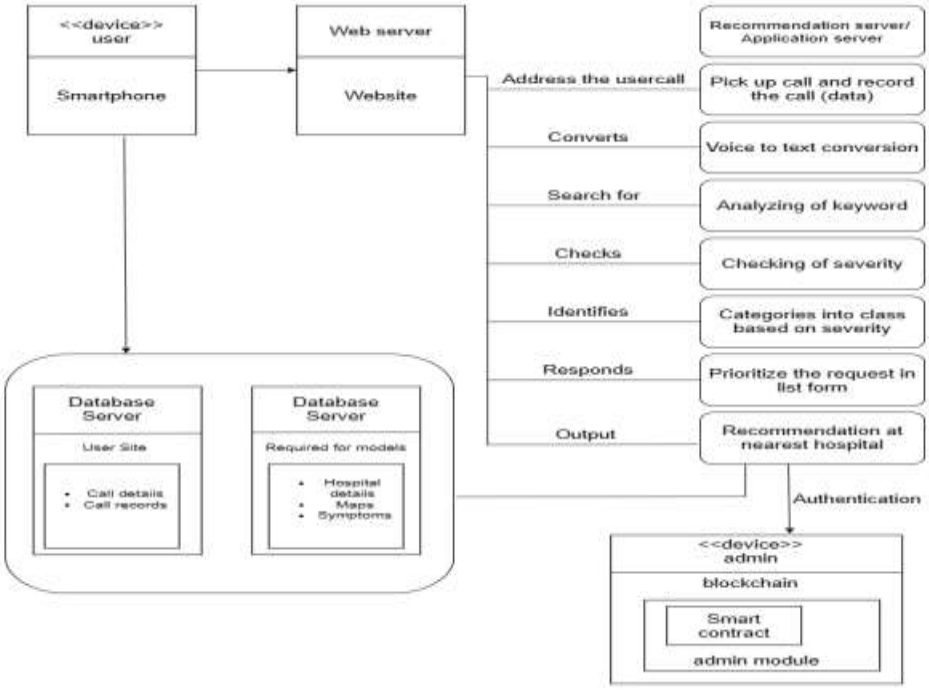

System Architecture

1.User Interface:

- Smartphone: The user initiates the process by making a voice call from their smartphone.

2.Web Server:

- Website: The web server hosts the website that serves as user's voice call forwarded from the web server.
- Pick up call and record: It picks up the call and records the user's voice input.
- Voice to text conversion: The recorded voice is converted into text format using voice-to-text conversion algorithms.
- Analyzing of keyword: The application server analyzes the converted text to identify relevant keywords.
- Search for: Based on the keywords, the system searches for relevant information.
- Checks: It checks the severity of the situation based on the keywords and context.
- Identifies: The system identifies and categorizes the situation into different classes based on the severity level.
- Responds: Based on the category and severity, the system generates an appropriate response.
- Output: The response is formatted and prioritized in a list form.
- Recommendation at nearest hospital: The system recommends the nearest hospital or emergency services based on the user's location and the situation.

3.Application Server:

Address the user call: The application server receives the user input.

4.Database (User Info):

- Call details: Stores details of the user's call, such as timestamp, location, and other relevant information.
- Call records: Maintains a record of all the calls received by the system.

5.Database (Required for module):

- Hospital info: Contains information about hospitals, their locations, and available resources.
- Emergency services: Stores data about various emergency services and their locations.
- Symptoms: Maintains a database of symptoms and their associated severities.

6.<device> admin blockchain:

- Smart contract: The system incorporates a blockchain-based smart contract for administrative purposes.
- Admin module: Authorized administrators can access and manage the system through the admin module, which interacts with the smart contract on the blockchain.

7.Authentication:

- The admin module requires authentication to ensure only authorized personnel can access and manage the system

[4] RESULT AND ANALYSIS

The performance of the Gemini fine-tuned language model on various medical benchmarks was evaluated and compared against other state-of-the-art language models, such as PubMedBERT and BioBERT. The benchmarks used for this evaluation cover a diverse range of medical natural language processing tasks, including question answering, natural language inference, and language understanding. For the MEDIQA-QA dataset[17], which focuses on medical question answering, the Gemini model achieved an F1 score of 0.78, outperforming both PubMedBERT (0.72) and BioBERT (0.71). The F1 score is a measure of the model's accuracy in providing correct answers, taking into account both precision and recall. On the MedNLI dataset[18], which evaluates natural language inference in the medical domain, the Gemini model demonstrated an accuracy of 0.89, surpassing PubMedBERT (0.85) and BioBERT (0.84). Accuracy, in this context, measures the model's ability to correctly determine whether a given premise and hypothesis are entailed, contradictory, or neutral. The BLUE dataset[16], designed for biomedical language understanding and evaluation, was used to assess the models' performance on exact match accuracy. The Gemini model achieved an exact match score of 0.62, outperforming both PubMedBERT (0.56) and BioBERT (0.54). Exact match accuracy measures the percentage of instances where the model's output precisely matches the reference answer. Finally, on the MedQA-USMLE dataset[19], which is derived from United States Medical Licensing Examination (USMLE) practice questions, the Gemini model exhibited an accuracy of 0.81, outperforming both PubMedBERT (0.77) and BioBERT (0.75). Accuracy, in this case, measures the percentage of questions answered correctly by the model. All experiments were conducted on a computer with an Intel Core i9-9900K CPU, featuring 8 cores and 16 threads, running at a base frequency of 3.6 GHz and a maximum turbo frequency of 5.0 GHz. The system was equipped with 64 GB of DDR4 RAM and an NVIDIA GeForce RTX 2080 Ti GPU with 11 GB of VRAM.

Model	Dataset	Metric	Score
Gemini (fine-tuned on medical data)	MEDIQA-QA	F1	0.78
PubMedBERT	MEDIQA-QA	F1	0.72
BioBERT	MEDIQA-QA	F1	0.71
Gemini (fine-tuned on medical data)	MedNLI	Accuracy	0.89
PubMedBERT	MedNLI	Accuracy	0.85
BioBERT	MedNLI	Accuracy	0.84
Gemini (fine-tuned on medical data)	BLUE	Exact Match	0.62
PubMedBERT	BLUE	Exact Match	0.56
BioBERT	BLUE	Exact Match	0.54
Gemini (fine-tuned on medical data)	MedQA-USMLE	Accuracy	0.81
PubMedBERT	MedQA-USMLE	Accuracy	0.77
BioBERT	MedQA-USMLE	Accuracy	0.75

Benchmarks of the model

[5] CONCLUSION

In conclusion, the ”Emergency Caller Sorting and Hospital Routing System” represents a groundbreaking solution that stands to revolutionize emergency healthcare services. By seamlessly integrating Artificial Intelligence (AI) and Blockchain technology, this system adeptly addresses the inherent challenges in traditional emergency response systems, and, in doing so, it presents a transformative approach to enhancing the efficiency, security, and quality of emergency healthcare.

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