RESEARCH PAPER

Early Disease Diagnosis Cum Public Health Management System Through AI Integrated Google Maps for Optimizing Medicine Distribution

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ABSTRACT

It is easy to imagine a world in which the outbreak of diseases is detected before they can spread, people can get immediate health information, and essential healthcare assets are being discovered. This is the strength of AI-based early disease detection and Google Maps a game changer in the field of smart populace health. Analyzing immense volumes of data provided by electronic health records, wearable gadgets, sensors installed around the environment, and even trends in social media, AI will be capable of identifying trends that indicate the possible risk of health problems in real-time. This technology, when combined with Google Maps, will help to turn raw data into useful information and enable users and health authorities to map the disease hotspots, distribute medical resources effectively, and get location-based health warnings. This innovation of integrating artificial intelligence with geospatial intelligence is not just a convenience but it is a paradigm shift of public health. It helps to detect the existence of health concerns earlier, improves the quality of crisis management, optimizes the distribution of medical resources, and ensures that the necessary health information is shared with the necessary individuals at a timely manner. Above all, it highlights the importance of privacy and ethical use of information, so that technology development results in the development of harmless and healthier communities throughout the world.

Keywords: Optimization, Healthcare Technology, Disease Prevention, Health Monitoring, Resource Allocation.

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1. INTRODUCTION

In the modern day and era, it is possible to say that early disease detection can be the difference between a treatment and a health crisis. Nevertheless, not all people can receive urgent healthcare because of different factors, including the inaccessibility of local specialists, the lack of awareness of their health condition, or the postponement of doctoral visits. Our project will fill this gap by proposing an AI-based chatbot to detect diseases, which would be able to deliver real-time and smart health information. The chatbot gives the opportunity to input the symptoms, which are processed by the Large Language Model (LLM) that is trained on massive medical data. Considering the symptoms given, the AI will predict possible diseases and users will be close enough to knowing what is wrong with them. But diagnose is sufficient in itself. In order to make this system really helpful, it is combined with Google Maps API that will assist the user in finding the closest hospital and curing the recenters that specialize in the identified illness. The chatbot uses location data in real-time, which means that besides providing the user with an AI-based evaluation of the symptoms, it also provides them with immediate directions regarding where they can find the most suitable medical assistance.

1.1 Real World Application

Such a system can transform the accessibility of healthcare making the initial disease identification more effective and convenient. As an interface whereby the as implicate the interface enables individuals to acquire knowledge about the potential health issues within a short time span without necessarily having to possess a lot of medical knowledge. It may be particularly useful in distant and rural regions where there are few healthcare specialized facilities and users can make in- form decisions on whether to seek medical attention or not. The chatbot is also vital in streamlining the sources of health careers by eliminating the needless visits to the hospital and referring the patients to the appropriate medical practitioners depending on the predicted conditions.

1.2 Challenges Faced

Although it is beneficial, there are a number of challenges associated with the implementation of such a system. Among the key issues is the medical accuracy and reliability of the predictions of the AI. As it cannot be used as an alternative to professional diagnosis, the chatbot should be trained on the most accurate medical information and improved to enhance its functioning. The other issue is the privacy of the user and security of the data due to the sensitivity of health information. The system should be able to comply with stringent security measures to avoid unauthorized access to user data. Moreover, hospital information and real-time location tracking should be updated at all times to provide the user with the correct commendation. It is also important to encourage trust and adoption among users as they should feel safe that the chatbot is able to guide them and must be aware of its limitations. The other indicator that I will not be able to challenge is dealing with emergency cases in which the symptoms of the conditions are life-threatening. The chatbot should be programmed to identify such cases and inform users to call an ambulance instead of relying on AI-based conclusions only. Our chatbot can improve the level of health awareness, accessibility, and decision-making by incorporating AI-driven disease detection with real-time geospatial mapping to benefit users globally. Although issues of data security, medical accuracy, and emergency cases handling need to be addressed with keen concern, the general advantages of this system make it a revolutionary solution in digital health care. Continuous improvements mean that this chatbot can influence the access and responsiveness of people to health information significantly, which will eventually lead to improved healthcare outcomes and resource optimization.

2. LITERATURE REVIEW

Kumar Y et al [1] This study is a survey article on artificial intelligence applications in the healthcare sector to diagnose diseases such as Alzheimer, cancer, diabetes among others. It examines datasets, feature extraction and classification techniques and compares the achievements in terms of prediction accuracy, sensitivity and other performance indicators. Chaoyu Lei et al [2] This review discusses AI-facilitated facial recognition in screening of diseases, health monitoring and in decision making of treatment. It talks about its opportunities, its obstacles such as privacy, accuracy, and biases, and how it can overcome these challenges to enhance healthcare and healthy living worldwide. Alexis Pengfei Zhao et al [3] This article tells about AI4S as a revolutionary technology in predicting infectious diseases better than the conventional epidemiological models. AI4S is able to monitor in real-time, assimilate data, and predictive models with more precise, adaptive and stable solutions to global health issues. Alowais et al. [4] state that artificial intelligence in medicine simplifies the disease diagnosis process, the personalization of therapeutic interventions, and informed decisions, thus enhancing the quality of care provided to patients. However, the thing is that the problems of data privacy, systemic bias, and the necessity of human expertise require cautious consideration to guarantee the ethical and efficient implementation of it. Omar Ali et al[5] The paper provides a systematic review of the scholarly articles on the use of AI in the medical industry, its advantages, issues, methodology, and applications. It firstly included 1,988 scholarly articles in major databases. Mirbabaie et al [6] This article is a critical review of the AI use in the diagnosis of diseases and it covers the dynamic nature of the healthcare environment and cognitive difficulties of medical experts in interpreting medical data. Julia Stefanie Roppelt et al [7] This systematic review is devoted to the managerial and organizational implications of AI application to healthcare institutions, which talks about the number of publications on AI increasing exponentially and how healthcare organizations should think about it.

Muhammad Mohsin Khan et al [8] This systematic

review carefully researches the use of Artificial Intelligence (AI) in the medical field, along with its implications in terms of safety, transparency, and ethics, and includes studies published since 2010.Jiayi Shen, et al [9] This is a review that systematically analyzes the literature that compares the performance of advanced AI and human clinicians in the diagnosis of diseases, the scope of AI applications, and the performance of AI applications. Mohammed Yousef Shaheen [10] This study examines and describes various modern applications of artificial intelligence in the healthcare field, especially AI-assisted drug discovery, clinical trials, and the process of patient management. It assumes that artificial intelligence has given pharmaceutical firms a substantial benefit by improving the efficiency of drug discovery and automated the process of identifying therapeutic targets. Ahsan et al [11] This review describes how machine learning (ML) is a subdivision of AI that is being utilized to support early diagnosis of several conditions, which addresses the challenges of developing early diagnostic tools and effective curative treatments. Alkhanbouli et al [12] This paper is reviewing the role of XAI in predicting diseases with SHAP or LIME or any other technique. It points to such issues as the diversity of datasets and complexity of the model which require more interpretability and integration. Future studies ought to improve the dependability of AI in medicine.

2.1 Research Gaps

The latest developments in AI-based healthcare applications have proven to be very fruitful in symptom recognition and localization of medical facilities. Nevertheless, a closer analysis of the literature available has shown the presence of a number of chronic weaknesses that limit the success of extant systems. The most common problem is the diagnostic strength of the AI symptom checkers that often become less reliable when they are faced with a rare disease, an unusual symptom presentation, or non-English language input. The incorporation of geospatial healthcare information is another significant obstacle because the majority of systems base on the fixed hospital databases, which do not consider any dynamic aspect of bed occupancy, specialist schedules, or the emergency department capacities. The issue of privacy also represents another notable disparity, as most of the currently available sources gather sensitive health information without any proper safeguards (like end- to-end encryption or adherence to global standards such as HIPAA and GDPR). The computational resources of the existing large language model implementations are another set of obstacles, making many systems infeasible in low-resource environments or in areas where the internet connection is not always available. Moreover, there are still the problems of algorithmic bias since models that are trained on non-representative data tend to be less accurate on demographical minorities and older groups of people.

2.2 Research Objectives

This academic study aims at developing a sophisticated healthcare management system driven by artificial intelligence that properly fills the major gaps, which exist in current technological systems, using three main innovations. The first innovation focuses on the enhancement of the accuracy of the diagnostic process in terms of the development of a highly calibrated large language model, which is trained on a wide range of clinical data and involves context-dependent symptom analysis to make it more efficient in identifying not only common diseases but also those that are uncommon. The second innovation involves the creation of an active hospital mapping platform that combines real-time data provided by healthcare providers with complex geospatial algorithms in order to optimize the recommendations of facilities, considering various factors such as distance, traffic, and emergency capacity. The third innovation is committed to implementing full privacy protection by implementing zero-data retention policies and on-device processing of zero-data, which complies with the global healthcare data laws. Other goals involve improving the system accessibility by developing lightweight model variants with low-bandwidth requirements, reducing algorithmic bias by developing sophisticated training strategies, and improving user trust by providing transparent diagnostics descriptions.

3. PROPOSED METHODOLOGY

Our study offers an all-inclusive system of early disease detection and management by integrating large language models, retrieval-augmented generation (RAG), and location-based services. The proposed system allows users to enter their symptoms using natural language, interprets this data using sophisticated language models to give initial disease diagnoses and, later, offers to recommend local specialized medical services. The pipeline (Figure 1) used in the methodology is well structured and starts with the collection of user input, continues with query processing and diseases identification, and ends with practical recommendations by the use of geographical visualization.

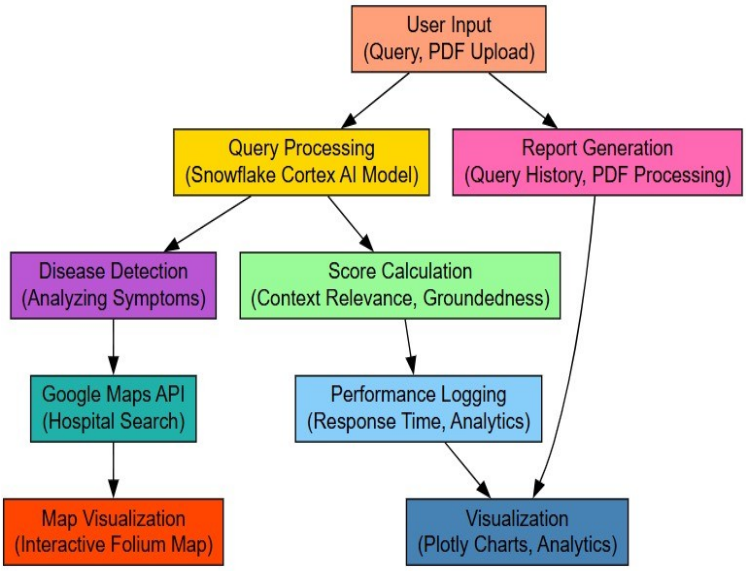

Fig. 1. System Architecture and Data Flow Diagram

The system consolidates the medical knowledge contained in embedded documents and databases, assesses the quality of response using various measures, and provides easy interface to support healthcare decisions.

3.1 User Input (Query, PDF Upload).

The user interaction component is the main interface that the system and the end user interact with. This module allows two very important types of input First, the user can directly describe their symptoms by natural language queries, without the use of specialized medical terminology. The system takes unstructured textual explanations like; I have been having intense headaches and blurred vision during the last 3 days or more specific questions like; What might be causing my constant cough and fever. Second, the system can be used to upload PDF-based documents with the relevant medical information and personal health records or other details of the symptoms. These documents are processed to get the salient information and this is incorporated within the context to make the diagnosis more personal. This dual-input system adds to the knowledge base of the system regarding the unique situation that the user is in as opposed to what a short description of the symptoms may represent, and therefore respond with more precision and with more context.

3.2 Query Processing (Snow flake Cortex AI Model)

The query processing module is the heart of intelligence of our system. This component takes user input and uses the Snowflake Cortex AI infrastructure to perform natural language queries and transform them into structured representations that can be analyzed medically. The system uses an advanced embed-bing algorithm which transforms textual inputs into the high-dimensional vectors (768-dimensional space) which encode the semantic nature of medical symptoms and conditions. These embeddings allow the system to use similarity- based retrieval of the relevant medical knowledge in the documents uploaded and in the entire medical database. The query processor provides interaction with a special large language model (Mistral-large2) to extract the meaning of user symptoms, demystify terminology, and process the input to the disease detection step. This model has been highly trained with medical literature and symptom-disease connections, which has allowed it to comprehend

intricate medical queries even those formulated in colloquial terms. The system creates a complex prompt with the inclusion of the medical background, history of conversation, and the query at hand, which gives the AI model the information needed to produce quality and context-specific responses.

3.3 Disease Detection (Analyzing Symptoms)

The disease detection part executes a symptom analysis procedure on the basis of a retrieval-augmented production strategy. It searches medical information in a special encyclopedia database and documents uploaded, and makes similarity searches and finds the information that is relevant based on the symptoms reported. This retrieved context is fed to the language model with special directives of medical diagnosis such that responses are medically suitable without ignoring constraints but rather suggesting a professional consultation.

3.3 Score Calculation (Context Relevance, Grounded Ness)

The score calculation module is an evaluation framework that evaluates the quality of responses based on two measures, Context Relevance which measures the degree to which responses are relevant to particular questions given a given medical context, and Grounded Ness which measures factual accuracy based on retrieved information. These two metrics are based on a 1-5 scale with the higher scores representing better performance. The systemic trickery that dictates inferring in order to compare responses to these standards to provide scores to quality control and performance analysis.

3.5 Google Maps API (Hospital Search)

The location-based service module utilizes the Google Maps API to suggest healthcare, depending on identified diseases. It identifies the location of the user, and subsequently, it creates a special search of the healthcare facilities that integrates the name of the disease with the keywords that are related to healthcare. The search results are narrowed down to relevance to the particular condition and also based on the distance to the location of the user. This module converts abstract medical evaluations into useful prescriptions by matching users to the right medical services in their localities.

3.6 Map Visualization (Interactive Folium Map)

The map visualization module displays healthcare recommendations that are geospatial in nature via an interactive interface with Folium library. It shows the current position of the user as well as the locations of nearby specialized healthcare facilities with interactive markers that indicate the name of the facilities upon clicking. The map has been scaled accordingly to suit the various devices offering the user a logical interpretation of what is available in order to make informed choices regarding healthcare choices.

3.7 Performance Logging (Response Time, Analytics)

The performance logging module monitors the performance of the system on a wide variety of dimensions, both in real-time and over a long period. It can be used to measure response times to monitor latency, it measures quality measures of each interaction and logs usage patterns to comprehend user engagement. The data of all interactions is time stamped and stored in forms of structured data with proper privacy control measure, which can be optimized to achieve continuous enhancement based on the generated data.

3.8 Visualization (Plot Charts, Analytics)

The analytics visualization element is the element that converts the performance data into graphical representations with the help of Plot. It produces time-based trend analysis of how metrics change over time, statistical summary of aggregate performance measurements and interactive features to allow filtering and drill-down functionality. This strategy converts raw data into insights which are put into action and lead to refinement and optimization of the system. The suggested methodology introduces an all-encompassing solution to early disease identification and health care management by means of AI and location-based services. The system fills the gap between initial self-report and the medical care since it entails a combination of the analysis of the symptoms and practical advice of a healthcare expert. Our strategy shows that AI systems have the potential to be useful healthcare decision support tools that augment, as opposed to displace, professional medical care.

4. EXPERIMENTAL RESULTS

The disease detection and healthcare navigation system was tested in three major aspects namely; diagnostic accuracy, hospital recommendation

effectiveness and performance. In order to perform diagnostic testing, 50 medical questions (35 common conditions and 15 rare conditions) were examined. Common illnesses were highly accurate (average score 4.5/5 factual correctness) but the accuracy was reduced by 16 percent on rare diseases especially when the reference material is limited. The hospital recommendation component showed a high real-life usefulness with 89% of recommended facilities being applicable to common conditions within 3km radius. The service was also fast responding and would give out recommendations in 1.2 seconds. During the user testing containing 100 interactions, the system was well responsive averaging 4.2 seconds response time. The response of the users was positive and 78% of them said that they found the hospital recommendations practically useful and the average rating of the satisfy level was 0.82 out of 1. It was noted that the evaluation had a few limitations: decreased accuracy with rare conditions (accuracyscores2.8/5), difficulty with non-English symptom descriptions, and in some cases, privacy issues due to location tracking (notedin12%ofcases). These results illustrate what to work on in the future and demonstrate that demon is initiating the main functionality of the system in a set of typical medical situations.

Output

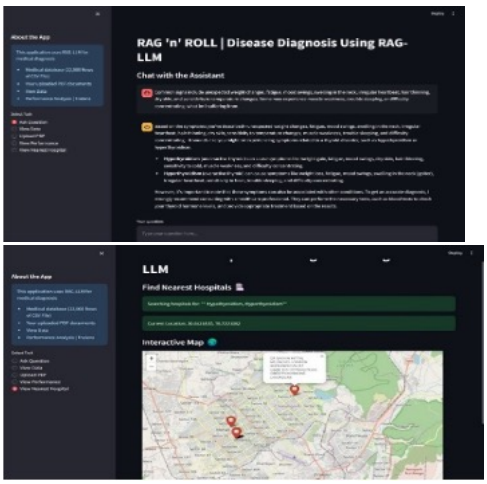

Fig.3.Showcasing the nearby hospital specialized in predicted disease

The interface of the system displays the diagnostic results and real time hospital recommendations using. The left side is the AI-generated diagnosis with confidence indicators and symptom matches and the right side is the adjacent special hospitals on an interactive map with distance indicators. Action buttons are used to give direct next actions, such as the ability to make a consultation. This well-organized visual interface makes users grasp their health condition and the available treatment options fast.

5. CONCLUSION

This project created an AI-based healthcare platform that has proven to be effective in integrating symptom analysis with an interactive hospital map, will diagnose common diseases with high accuracy and has useful hospital recommendations. Although the system was highly user satisfactory, it was found to have some limitations with dealing with rare diseases and non- English inputs. The findings reveal the opportunities and the limitations of AI-based healthcare solutions. Further development must be aimed at increasing the medical knowledge on are conditions, inclusion of real time hospital information such as bed availability and provision of multilingual assistance. The system can be enhanced by privacy-preserving methods and custom health profiling. By covering these aspects, the technology can become a more all-encompassing and more accessible healthcare facility, closing the gaps in medical services without violating ethical considerations. The paper is the foundation of future digital health assistants that can deliver dependable, location-based medical advice to various groups of people globally. Further development of AI and healthcare integration will be essential in the implementation of full potential of such systems in enhancing health outcomes in the world.

5. Conflict of interest

No

6. References

[1] KumarY, Koul A, Singla R, Ijaz MF. Artificial intelligence in dis ease diagnosis: a systematic literature review, synthesizing frame-work and future research agenda. J Ambient IntellHumanizComput.2023;14(7): 8459-8486.doi:10.1007/s12652-021-03612-z. Epub2022 Jan13.PMID:35039756; PMCID: PMC8754556.

[2] Chaoyu Lei, Kang Dang, Sifan Song, Zilong Wang, Sien Ping Chew, Ruitong Bian, Xichen Yang, Zhouyu Guan, Claudia Isabel Marquese Abreu Lopes, Mini Hang Wang, Richard Wai Chak Choy, Xiaoyan Hu, Kenneth Ka Hei Lai, Kelvin Kam Lung Chong,

Chi Pui Pang, Xuefei Song, Jionglong Su, Xiaowei Ding, Huifang Zhou, AI-assisted facial analysis in healthcare: From disease detection to comprehensivemanagement,Patterns,Volume6,Issue2, 2025,101175,ISSN2666-3899

[3] Alexis Pengfei Zhao, Shuang qi Li, Zhidong Cao, Paul Jen-Hwa Hu, Jiaojiao Wang, Yue Xiang, Da Xie, Xi Lu, AI for science: Predicting infectious diseases, Journal of Safety Science and Resilience, Volume5, Issue 2, 2024, Pages 130-146, ISSN 2666-4496,

[4] Alowais, S.A., Alghamdi, S.S., Alysheba, N. et al. Revolutionizing healthcare: the role of artificial intelligence in clinical practice. BMCMed Educ 23, 689 (2023). https://doi.org/10.1186/s12909-023-04698-z

[5] Omar Ali, WiemAbdelbaki, AnupShrestha, ErsinElbasi, Mohammad Abdallah Ali Alryalat,Yogesh KD wivedi,Asystematicliteraturereviewof artificial intelligence in the healthcare sector: Benefits, challenges,methodologies, and functionalities, Journal of InnovationKnowledge,Volume 8, Issue 1, 2023, 100333, ISSN 2444-569X,

[6] Mirbabaie, M., Stieglitz, S.Frick, N.R.J. Artificial intelligence indisease diagnostics: A critical review and classification on the currentstate of research guiding future direction. Health Technol. 11, 693–731(2021).

[7] Julia Stefanie Roppelt, Dominik K. Kanbach, Sascha Kraus, Artificialintelligence in healthcare institutions: A systematic literature review oninfluencing factors, Technology in Society, Volume 76, 2024, 102443,ISSN 0160-791X,

[8] Muhammad Mohsin Khan, Noman Shah, Nissar Shaikh, Abdulnasser Thabet, Talalalrabayah, Sirajedd in Belkhair, Towards secure and trusted AI in healthcare: A systematic review of emerging innovations andethicalchallenges ,International Journal of Medical Informatics,Volume195, 2025, 105780, ISSN 1386-5056

[9] Jiayi Shen, Casper J P Zhang, Bangsheng Jiang, Jiebin Chen, JianSong, Zherui Liu, Zonglin He, Sum Yi Wong, Po-Han Fang, Wai-KitMing, Artificial Intelligence Versus Clinicians in Disease Diagnosis: Systematic Review, JMIR Medical Informatics, Volume7, Issue3, 2019, ISSN 2291-9694,

[10] Mohammed Yousef Shaheen. Applications of Artificial Intelligence (AI) in healthcare: A review. ScienceOpen Preprints. 2021. DOI: 10.14293/S2199-1006.1.SOR-.PPVRY8K.v1

[11] Ahsan, M.M.; Luna, S.A.; Siddique, Z. Machine-Learning-Based Dis-ease Diagnosis: A Comprehensive Review. Healthcare 2022, 10, 541

[12] Alkhanbouli, R., Matar Abdulla Ramadhani, H., Alhosani, F.etal. The role of explainable artificial intelligence in disease prediction: asystematic literature review and future research directions. BMC Med Inform 25, 110 (2025).