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Cloud Enabled Machine Learning Framework for Medicine System

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Abstract

The Medicine Generic App is a cutting-edge mobile application designed to empower users with information about generic medications. Given the rising expenses of healthcare and prescription medications, this app acts as a useful resource for consumers to make informed decisions regarding their medication options. The Medicine Generic App aims to promote generic drug usage, reduce healthcare costs, and improve medication management for users. By providing detailed information and price transparency, this app enables individuals to make informed choices regarding their healthcare, resulting in improved health outcomes and cost savings. This study outlines the key features and advantages of the Medicine Generic App, emphasizing its potential to benefit healthcare consumers and encouraging the use of affordable generic medications.

Keywords: Health cloud, security, privacy, cloud computing, machine learning model, virtual networking

INTRODUCTION

A busy lifestyle is required to keep up with the rapid pace. No matter what their age, more and more people are having health issues. Thus, the healthcare system is now a necessary component of every household. It becomes imperative to provide timely and effective healthcare; as a result, in addition to the generic strategy, digital medicine, an additional quick and efficient technique, must be adopted [1]. Hospitals can use this strategy to give patients fast access to the healthcare services they offer. Features like online video conferencing, emergency alerts for serious illnesses or accidents, uploading medical records with security precautions required during consultations, online prescription ordering, scheduling, information about the closest hospital and ambulance, and a life remainder system to remind patients to take their medications.

LITERATURE REVIEW

The literature review provides a critical analysis of existing research on a specific topic, highlighting key themes, identifying gaps, and contributing to a deeper understanding of the field, which is explained below:

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Digital medicine: An android based application for health care system by Chandran *et al*. [2]

With hectic lifestyles and the demands of a fast-paced world, more individuals, regardless of age, are experiencing health issues. Consequently, the healthcare system has become a vital part of every family. Access to efficient and prompt healthcare has become crucial, leading to the need for a dual approach that complements traditional methods with a faster and more efficient option known as 'Digital Medicine'.

This approach can be adopted by hospitals to offer quick access to their healthcare services, including online video consultations, emergency alerts for critical medical conditions or accidents, secure uploading of medical reports during consultations, online prescriptions, appointment scheduling, information about nearby hospitals and pharmacies, and a reminder system for timely medication intake. It is designed to enable faster and more efficient communication between doctors and patients while providing transparency regarding their locations or distances when using the application.

Analysis of Smart Mobile Applications for Healthcare under Dynamic Context Changes by Banerjee and Gupta [3]

Smart mobile medical computing systems, including mobile medical applications, leverage contextual information from their environment to provide essential and often crucial healthcare services, such as continuous monitoring and insulin delivery for blood glucose management. However, the unsupervised operation of Smart mobile medical computing systems can lead to significant faults if context changes are not accounted for, resulting in potential violations of requirements related to safety, energy sustainability, and reliability.

Examining Smart mobile medical computing systems for violations of testing requirements necessitates careful consideration of the context-specific interactions between the Smart mobile medical computing systems software, defined by distinct operating modes, and its environment, which is described by nonlinear partial differential equations across space and time. The vast number of possible contexts change sequences and the absence of closed-form solutions for the differential equations make requirements analysis for Smart mobile medical computing systems quite challenging. This study introduces a novel technique for analyzing Smart mobile medical computing systems that considers dynamic context changes and the ongoing interaction between the computing systems and the physical environment.

PROBLEM STATEMENT

Current healthcare systems lack efficient data access, collaboration, patient engagement, and scalability, leading to fragmented care, delays, and compromised outcomes [4]. Data fragmentation, limited collaboration, inefficiency, restricted access, data security, scalability issues, patient engagement gaps, delayed interventions, and slow innovation; a cloud-based medicine system addresses these issues by offering secure, collaborative, and scalable data access. It empowers patients, enables remote care, utilizes AI for insights, and streamlines healthcare processes, ultimately improving outcomes and fostering innovation.

OVERVIEW

A generic medicine app is a digital tool designed to assist users in making informed decisions about their prescription medications. It focuses on providing information and guidance related to generic drugs, which are more affordable alternatives to brand-name medications. The main benefit of a medicine generic app is to empower consumers with the knowledge and tools they need to make cost-effective and informed decisions about their healthcare [5]. By encouraging the use of generic medications and assisting users in saving on prescription expenses, these apps enhance healthcare affordability and lead to better health outcomes. Overall, a medicine generic app simplifies the process of exploring, comparing, and managing prescription medications, ultimately promoting a more informed and cost-conscious approach to healthcare.

Existing System

Cloud-based generic medicine systems would involve a mobile app that allows users to search for and access information about generic medications [6]. The app would connect to a cloud database containing details about various generic drugs, including their names, active ingredients, dosage forms, indications, side effects, and possible interactions [7].

The app would provide a user-friendly interface and ensure data security and privacy compliance, given the sensitivity of health-related information. Frequent updates and maintenance of the cloud database are essential to guarantee the accuracy and reliability of the information provided to users.

Proposed System

The cloud-based generic medicine system comprises modules for doctors, hospitals, and patients. Each panel, except for the 'User Panel', has specific access controlled by a username and password. This system will be used by hospitals for regulating the supply of generic medicine. It will also keep daily records of demand and supply. This system will have a purchase feature on dashboards for hospitals [8]. It will also show the list of all suppliers who have that medicine available. Hospitals can place orders through this system to the suppliers directly under government surveillance. Both demand and supply will be managed or done as per government orders.

This system will also notify hospitals and the government about the availability of the medication. Not only availability but also the system will ensure that the hospitals will meet their requirements on time. A cloud-based medicine system offers the advantages of centralized patient data access, scalability, remote consultations, collaboration, real-time monitoring, AI analysis, patient engagement, cost savings, enhanced security, and rapid innovation, as shown in Figure 1.

SYSTEM ARCHITECTURE

Registered users go to the login page and input their credentials (email address and password) (Figure 2).

1. Resister login details by following these principles: disease prediction theories aim to leverage data-driven approaches to identify individuals at risk of developing specific health conditions, enabling early intervention and personalized healthcare strategies.
2. Disease prediction by following these steps: you can integrate hospital search functionality into your project effectively, providing users with a valuable tool for finding healthcare facilities based on their needs and preferences.
3. Search hospital: Use the search bar to find the medicine you need by its name, generic name, or active ingredient.
4. Search medicine: Use the search bar to find the medicine you need by its name, generic name, or active ingredients.

ALGORITHMS

SVM Algorithm

Support Vector Machine (SVM) is among the most commonly utilized supervised learning algorithms, suitable for addressing both classification and regression tasks. However, its primary application is in classification tasks within machine learning.

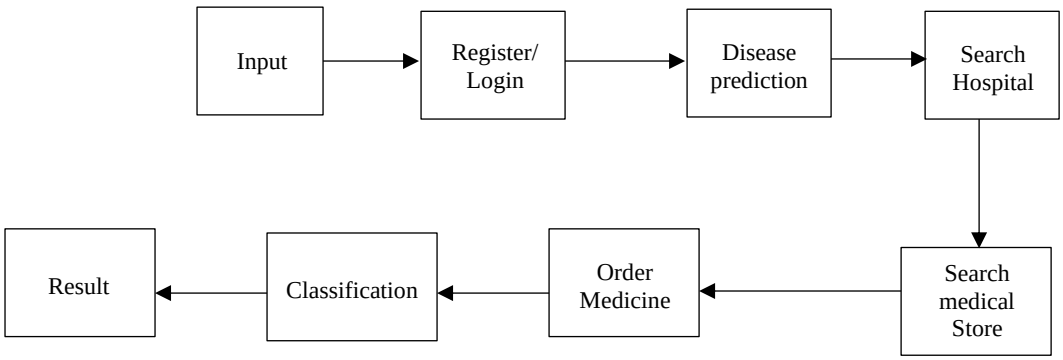

Figure 1. Proposed system.

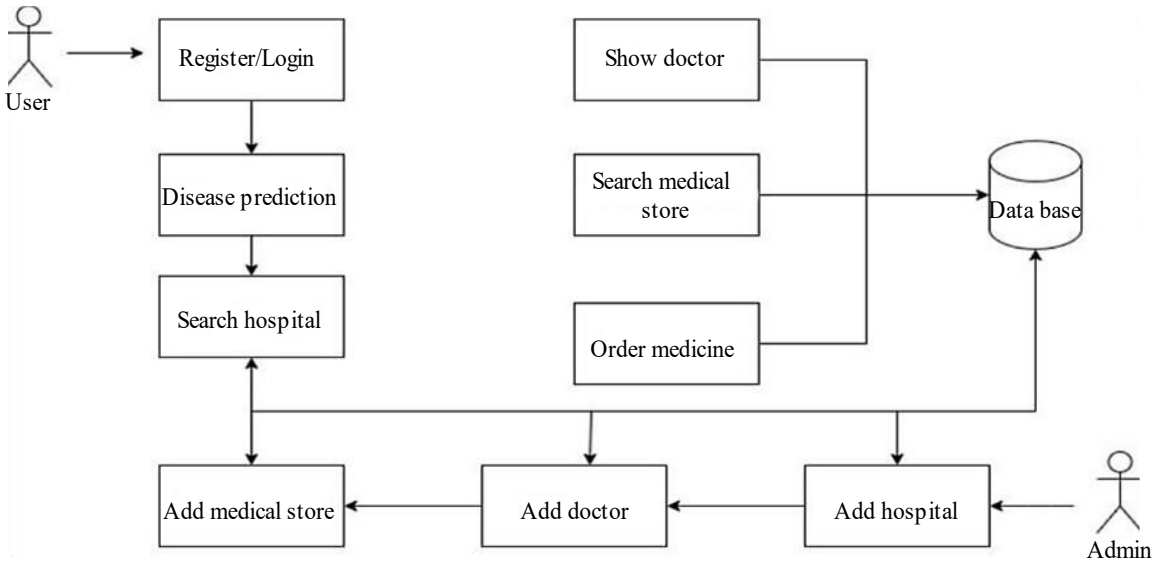

Figure 2. System architecture.

The SVM algorithm steps include the following:

Step 1: Load the necessary libraries.
Step 2: Import the dataset and separately extract the X and Y variables.
Step 3: Split the dataset into training and testing sets.
Step 4: Initialize the SVM classifier model.
Step 5: Fit the SVM classifier model.
Step 6: Generate predictions.

KNN Algorithm

Given two categories, Category A and Category B, we must identify to which category a new data point $x1$ belongs. To address this problem, we can use the K-NN algorithm [9]. Using K-NN, we can effortlessly determine the category or class of a particular dataset.

Step 1: Choose the number *K of Neighbors.*
Step 2: Compute the Euclidean distance for the K neighbors.
Step 3: Select the K nearest neighbors based on the calculated Euclidean distances.
Step 4: Count the number of data points in each category among these K neighbors.
Step 5: Assign the new data point to the category with the highest number of neighbors.
Step 6: Our model is ready.

RESULTS AND DISCUSSION

Utilizing cloud computing and related technologies for implementation, the system will generate output based on requests made by users. For the government, results will be provided in the form of tabular reports that can aid in decision-making and identify areas for improvement in healthcare services. The hospital department will be able to acquire generic medications from approved, registered suppliers, and invoices will be issued as evidence of complete transactions. Registered suppliers will be able to update their stock and add new medications to their inventory, while general users will have access to information that supports the system's goal of transparency.

Working

To successfully implement the system, certain prerequisites must be met. Creating interactive and user-friendly interfaces necessitates the use of an appropriate text editor and familiarity with web technologies like HTML, CSS, and JavaScript, along with a fundamental grasp of Kotlin. For the backend, familiarity with database languages is necessary, and to connect the webpages to the database, frameworks or languages like Kotlin and Java can be used.

The system has been developed using the following steps:

Designing of Webpages

This is the first stage in which webpages are created according to the features that the system will provide to all users [10]. The design should be user-friendly, allowing individuals without specialized training to navigate the system easily, thereby saving them the time and effort of traveling to the relevant hospital or office to seek the information they need.

1. *Designing and Connection of Database:* After the design of the webpages and database is completed, frameworks or appropriate programming languages can be used to establish a connection between the webpages and the database.
2. *Collection and Storage of Data:* For all users, whether government officials, hospitals, suppliers, or the general public, certain information must be collected to grant access to the system. This data can also be utilized for analytical and security purposes.
3. *Providing Credentials for Accessing the System:* Given that the system will contain large amounts of confidential data, there is a risk of data misuse. To prevent data theft, certain users will be given credentials, ensuring that not only is their data protected but also the integrity of the system is maintained.
4. *Designing of Use Cases:* To ensure that the system meets its objectives, specific use cases can be created to illustrate the relationship between users and the system, providing a high-level overview of the interactions between different use cases.
5. *Testing and fixing errors:* After the system is developed, it is crucial to determine whether it meets all the expected outputs based on the designed use cases. If any errors or bugs are discovered during this process, thorough debugging must be conducted to prevent any inconvenience during system usage.

CONCLUSION

The development and implementation of a Generic Medicine Management System using Android offer a promising solution to the challenges of medication management and adherence. This system leverages the convenience and accessibility of Android smartphones to improve the medication-related experiences of users. It addresses issues such as missed doses, incorrect dosages, medication confusion, and medication interactions, with a range of features and advantages. The system's ability to enhance medication adherence, reduce errors, and promote user safety is a significant step toward improving healthcare outcomes and patient well-being. Users can access detailed medication information, set reminders, manage dosages, and maintain medication histories, all within an easy-to-use Android application.

Future Work

Future work, in the context of a medicine generic app, refers to potential developments, improvements, and expansions that can be undertaken to enhance the app’s functionality and address evolving needs. It is important to continuously evolve and innovate to stay relevant and provide more value to users.

Future work for a generic medicine app should align with the app’s mission and user needs, and it should aim to continuously enhance the user experience and the value it provides in helping users make informed decisions about their medications. Regular user feedback and market research can inform the prioritization of these future developments.

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