Mobile Assisted Remote Healthcare Service

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ABSTRACT: *The role of E -healthcare has been well recognized for the betterment of the nation. Healthcare industry is so immense with patient data adding to the medical records each day. In this paper, a healthcare application is implemented using mining technique. Advancement in data mining has paved way for the emergence of various applications in healthcare sector. A knowledge based model is implemented for better decision making which predicts a disease based on the symptoms using mining concept. Apart from diagnosis, first aid is also advised for the patients based on the severity of the disease. This application also proves useful for quick guidance of ANM and ASHA who treat patients in remote areas. EMS has created a revolution and made possible to find a specialized, distance-close doctor holding a good reputation which is never an easy task for patients in unknown areas. Hence features such as locating nearby hospitals, availing ambulance service and booking an appointment with the doctor is also implemented and made possible by the emerging online medical databases consisting of doctor's information and patient's review. Two main aspects of any E-healthcare systems are the service quality and patient's trust which includes confidentiality, integrity, authenticity, non-repudiation and data management. This paper addresses privacy related issues and offers access control to the users.*

Key words: data mining, E-healthcare, knowledge based, medical database, decision making, privacy, access control.

ABBREVIATION: EMS - Emergency Medical Service, ANM - Auxiliary Nurse Midwifery, ASHA – Accredited Social Health Activist

1. INTRODUCTION:

The Digital revolution has flooded the world with small devices communicating wirelessly and in no time across the globe. The system incorporates Information and Communication Technology (ICT) overcoming the drawbacks of traditional healthcare approaches in remote healthcare sector which is an emerging application area. It allows remote patient assessment and for patients to view their medical records anytime and also acts as question answering system [12]. E-healthcare while making an efficient use of ICT allows for complete patient privacy as patients have the authority to allow or deny access to the records [1]. These electronic health records are used by expert systems which analyze large data sets from various studies to provide medical prescription precisely [3].

Processing these large datasets required quality mining algorithm which are proposed by Vishal R.Agarwal [4].

This recommender system can assist health assistants and patients who lack medical knowledge as well as people in remote or rural areas in the diagnosis of a disease and prescription of first aid. Because of efficient strategies for distinguishing data, information mining has turned out to be prominent in healthcare domain which has been utilized by medical practitioners enabling disease prediction using recorded databases [2]. Hence Data mining technique is used for the efficient disease prediction and data management.

It is not possible to find an appropriate doctor in unknown areas of the world where patients rely on other people or electronic media [9]. Hence helping patients in such hard situations using medical recommendation system to locate the nearby hospital, book an appointment with the appropriate doctor and also to avail ambulance service during emergency. In this paper, integration of knowledge management and ICT is proposed. Healthcare delivery is a knowledge driven process and knowledge management improves the process performance [13].

Hence the objectives of this paper are as follows:

- Disease diagnosis and first aid measures
- Location of nearby hospitals [10]
- Assistance to the user to avail ambulance service
- Privacy preservation of patient's data

Section 2 consists of related work. In section 3, architecture of the proposed system is described keeping in mind the various surveys that were undertaken over the existing healthcare systems [11] [15]. The following section consists of details regarding the implementation of the proposed system. Section 5 contains the result and snapshots of the work.

2. LITERATURE REVIEW:

Any health app can fit into one of the following four categories.

1. Reference and information gathering
2. Clinical decision making system
3. Online consultation
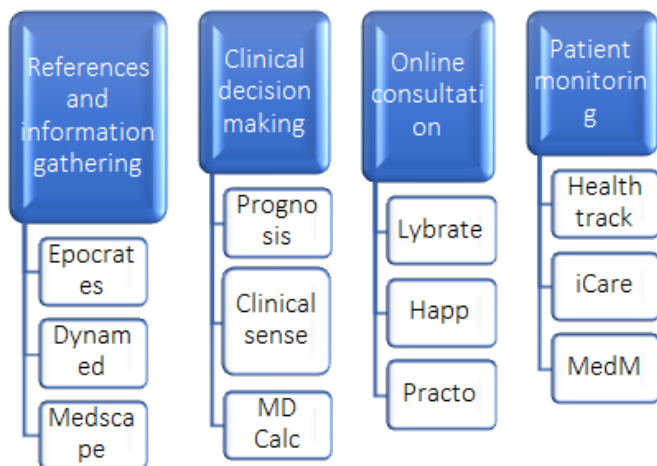4. Patient monitoring

Fig1-Existing applications

1. Health apps such as Epocrates , Dynamed and Medscape serve the purpose of reference for medical drugs.
2. The second category applications such as Prognosis, Clinical sense and MD Calc are used for making clinical decisions.
3. The third category which includes Lybrate, Happ and Practo are used to consult the doctors through audio, video and chat.
4. The fourth category applications like iCare, Health track and MedM are used to monitor the patients.

In reference to the second category of android applications, ihealth monitoring app was proposed and implemented in a regional language for efficient usage by the locals in the absence of nearby doctors [5]. Several apps also used machine learning based on different training sets to predict diseases like diabetes, tuberculosis, etc [6] [14]. On contrary to apps based on medical care, healthcare apps also came into play. Various systems were implemented to monitor individual diet habits and food intake [8]. Due to the introduction of such progressive apps for individual healthcare the need for data privacy arose. Hackers started targeting patient data and medical records of various important personnel. Hence various cryptographic and hashing algorithms were proposed and applied to securely store patient data and various digital signatures were used to securely access those data [1]. In order to save the time of patients during emergency various online reservation systems emerged to facilitate patients for securing appointments and ward reservation [7]. Such apps also required the need to find quality doctors which required various recommendation models to assess doctor profiles, their track records and efficiently match them with patients need [9]. Few expert systems also came into play which eliminated the need for a doctor. These systems used various learning algorithms like decision trees, adaptive learning in order to diagnose the patients according to input symptoms [2].

This paper proposes a scheme to make clinical decisions which differs from the other applications by using knowledge base with the assistance of medical practitioners and health assistants to make preliminary diagnosis and prescribe appropriate recovery measures to the patient.

3. PROPOSED SYSTEM:

The mobile assisted healthcare diagnosis app is implemented in Android 7.1.1 version where firebase or Google cloud is used as database. Firebase is a cloud service provider and backend as a service company based in San Francisco, California. The company makes a number of products for software developers to build mobile or web applications. It helps developers to build real time apps for ios, android and web that can store and sync with data in real time. There are lots of services provided by the firebase service provider. These are firebase analytics, firebase auth, real time database, firebase storage, firebase cloud messaging, firebase hosting, firebase remote config and firebase test lab for android. The figure shows the schematic diagram of the android architecture. It is divided into four layers. The lower layer consists of kernel and on top of it are the libraries which are accessed by several application frameworks. The top most layer is the application layer.
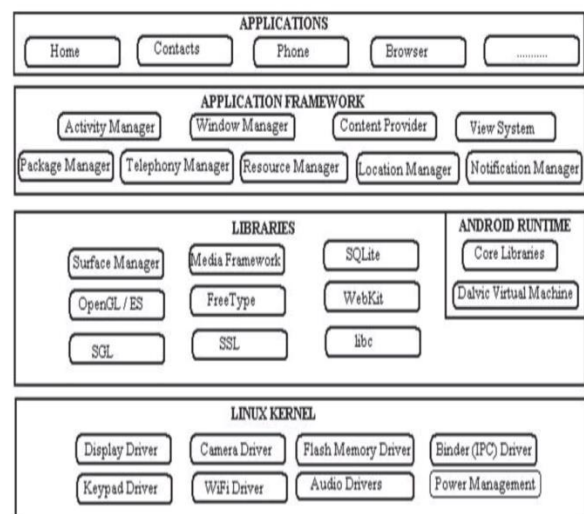

Fig2- Android architecture

Here a data model has been designed which is a combination of heterogeneous data related to disease, information and symptoms of the diagnosis of the patient. The knowledge based disease symptom data model is stored in a graph database where S1,S2,...,Sm are the symptom nodes, I1,I2,...,In are the information nodes and D1,D2,...,Dp are the disease nodes.
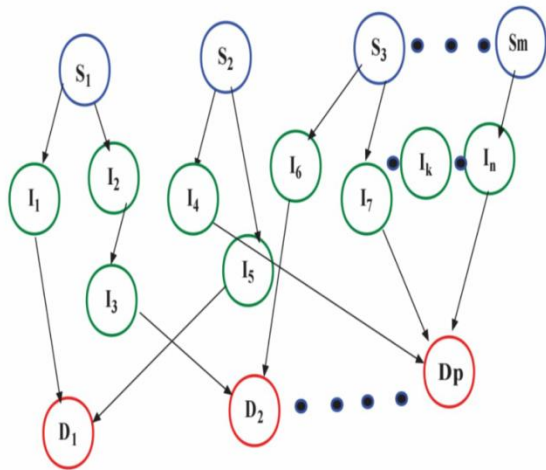
Fig3-Disease symptom relationship model

Initially, the patient or health assistant (HA) enters multiple symptoms through the mobile device for the patient's sickness. Then the query formulation module extracts the sub graph from the knowledge base based on the given symptoms. The subgraph poses a set of questions for the patient to answer which are formulated with the help of information nodes from the graph. This helps in identifying the illness by preliminary diagnosis decision making module. If the disease diagnosed is severe the patient is directly referred to a doctor through the online appointment platform. Our disease symptom database currently contains 13 diseases which are diagnosed through the maximum common sign of the symptoms in the diseases namely, 1) diarrhea, 2) influenza, 3) tuberculosis, 4) dehydration, 5) dengue, 6) diabetes, 7) ebola virus disease, 8) encephalitis, 9) stomach cancer, 10) hepatitis, 11) pneumonia, 12) jaundice, 13) urinary tract infection
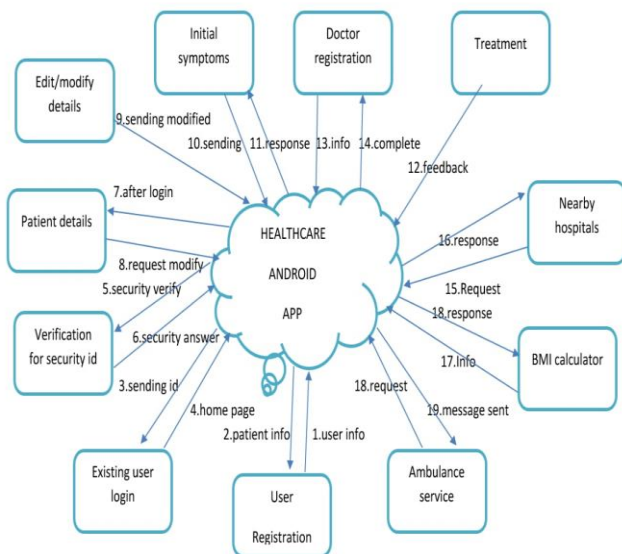
Fig4-Flow diagram

4. CONCLUSION

Hence in this paper mobile assisted healthcare service for android devices has been designed. Knowledge based disease symptom database has been used for diagnosis and recovery measures for illness. The knowledge database will be extended in the future for much more diseases and implement more features as the scope of the application increases.

5. RESULT

Fig5-login page

Fig6-Homepage

Fig7– Symptoms list

Fig9– Disease diagnosis

Fig10– Recovery measure

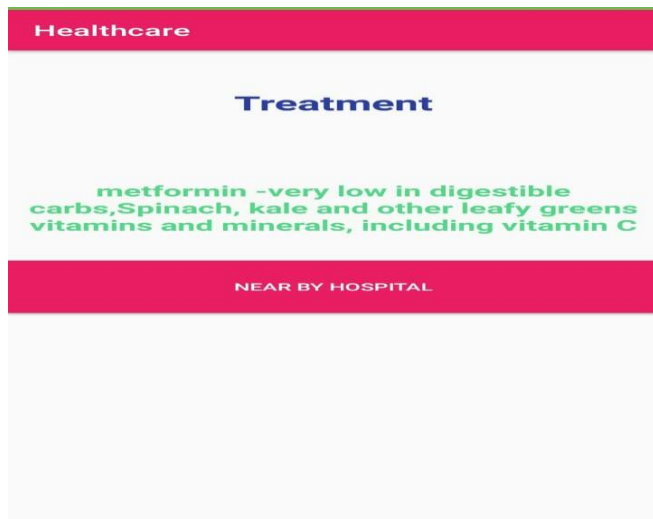Fig8– Selected symptoms

Fig11– Another sample

Fig12– Sample treatment

Fig13- Nearby hospitals

REFERENCES:

[1] Muneeb Sahi, Haider Abbas, et al., "Privacy preservation in E-healthcare environments: state of the art and future directions".

[2] M. Deepika , K. Kalaiselvi, "A empirical study on disease diagnosis using data mining techniques".

[3] Po Yen Wu, Chih Wen Wang, et al., "Omic and Electronic health records big data analytics for precision medicine".

[4] Frank Fox, Vishal R.Agarwal, et al., "A big data quality framework for process mining of electronic health record data".

[5] Tasfi Shermi, khondaker Abdullah, et al., "Virtual eye doc: an android based app in Bengali language for eye health and vision examination".

[6] Nabila Shanaz Khan, Mehedi Hasan Muaz, et al., "Diabetes prediction mHealth application using machine learning".

[7] Ahmed Imtiaj, Muhammad Kamrul Hussain, "A smartphone based application to improve the healthcare system of Bangladesh".

[8] Agapito G, Simeoni M, et al., "DIETOS: a recommender system for adaptive diet monitoring and personalized food suggestion".

[9] Hongxun Jiang, Wei Xu, "How to find your appropriate doctor: an integrated recommendation framework in big data context".

[10] Rashmi A.Nimbalkar, R. A. Fadnavis, "Domain specific search of nearest hospital and healthcare management system".

[11] Prof Dr. Pramod Patil, et al., "Knowledge based smart healthcare system: A survey".

[12] Hongxia Liu, Hu Qingcheng, "A knowledge based health question answering system".

[13] Sumayya Banna, "Knowldege management in health: An Australian viewpoint".

[14] Ajinkya Kunjir, Harshal Sawant, et al., "Data mining and visualization for prediction of multiple diseases in healthcare".

[15] Sujatha.R, Sumathy.R, et al., "Asurvey of health care prediction using data mining".