E- DOC Healthcare System

Vishal Gautam, Akash Pandey, Shubham Kumar, Suyash Lomate
Department of Computer Engineering, NBN Sinhgad School of Engineering
Pune, Maharashtra, India

Abstract— In this growing age of technology it is necessary to have a proper health care management system which should be portable so that every person can carry it for personalized health care management. The idea of our project is to provide an organization with a setup that will be helpful to that specific organization as well as the patient associated with the organization as well. The patient will have an application specifically designed for them which will help them to contact with a doctor, interact with him and even make use of Artificial Intelligence for diagnosis of common diseases. The organization on the other hand has management of the system and all the things will be managed with the help of the admin and the receptionist at the organization level [15].

Keywords— mahasbtc, SILVIA, naïve bayes, machine learning, health monitoring.

I. INTRODUCTION

Due to advancement in technology the growth and development of nation is faster and also technology has provided comfort to human being this has made life simple but it is true that every changes made by human being against the nature will have some effect on life so here also it has majorly effected the life of human being and leading to increase in diseases and various heath related problem. Due to all these problems it has become necessary that people should have a regular health checkup so that they are kept updated about their health and can be save from any critical diseases which may occur to them. But as the technological advancement is increasing day by day people have no time due to their work or other things and they are not able to give time to their health issues and most of the time neglect it. Due to the workload and the negligence person don't get time to visit the doctor and can't be up-to-date regarding his/her health. Also many times it happens that person will have time but their family doctor is not available due to some or the other work. So in order to fulfill this gap and provide communication among patient and doctor even if they are located at two different places even far away from each other but they can connect and patient can get consultancy from Doctor [1].

Nowadays the major problem in any developing country is health of the people because there is mainly working class crowd in the cities who are so busy with their work that they avoid going to Doctor even if their health condition is not good, if even lead to another problem, so in order to provide proper information about their health at any point of time and at any place a complete independent health care system should be develop by using which they can consult and communicate with their doctor and can upload information about their health i.e. their blood report, heart rate value and so on either by sending photos, etc so that the doctor can view and provide possible remedy. So in order to provide people with better experience of getting treatment from their doctor at any time from any place a mobile application is needed using which they can get medical advice from their doctors and in emergency only they are required to visit hospital will help in saving lots of travelling time. The hospitals, small clinics ,etc can provide their patients with a application made specifically for their regular patients which can use the exclusive service of the application by paying a sum of money charged by the hospitals, clinics, etc.

The world has achieved a great level of advancement in developing a mobile based system which are reliable and easy to carry with us [15]. Hangouts is Google based product which supports conferencing system, multiple users can communicate using this system [6]. Teamviewer application helps in sharing desktop screen among two or more people. It helps in sending document via shared screen [7].Mahasbtc website provides available blood data of all the Blood Bank across the Maharashtra. The data available is static and stock data is updated after each day [8]. Doctor spring helps patient to communicate with doctor when he is available online via video chat [13]. There is a great set of equipment present which could be used to measure different body conditions and give the value accordingly which could be entered by the patient if the doctor needs some. SILVIA for Android is an artificial intelligence system that runs natively on Android phones and tablets, so that you can talk with your device like you would talk to another person. SILVIA for Android is smart, fun, and practical, and is based on Cognitive Code's patented SILVIA technologies so advanced that SILVIA is being used for training and simulation applications by the U.S. Military [14].

The above system is designed to provide a system which is helpful for creating a health management system for patients belonging to a particular hospitals, clinic, etc so that they can provide optimum services to their patient and as well as manage them well. It is nothing but a health care management system where patient or user of the system will be able to keep track of his/her health by regularly concerning to a doctor which will be a general physician which can help to identify general health problems and help provide remedies for it to the patients via texting and the patient if very far can consult him and send his test reports like blood report, etc. with the help of the application provided to him/her by the

hospital/clinic and can view it any time as it is saved on the server, whereas the doctor can check the files send to him by the patient any time and provide him with prescription. The patient application has a feature which is available for every patient for diagnosis of common diseases which makes use of "naïve byes" algorithm for implementation of Artificial Intelligence system in the patient's application which takes in input in the form of symptoms and provides with output the probability of the most possible disease the patient is suffering from. There is a set of symptoms which can be taken as input and a set of diseases which can be identified as it is not possible to create a system say to diagnose cancer, Aids, etc these diseases need proper checkups and tests. The link of Mahasbtc can be seen on the patients application which can be used by him her to look for any blood availability of any specific blood group in Maharashtra. The patient application also has an "alert system" which could be used by patients so that they could be reminded of taking a medicine at the time specified by them. The receptionist is provided which will manage and add patients as and when they come for registration. The server is provided with an admin which will add all the doctors, add the receptionist and add relevant information about them like name, designation, skype ids and other information about the doctors and provide them with login ids and passwords which the doctors will use to access their accounts in the web application designed for them and communicate with the patients and the receptionist can login to his/her account and can make use of the functionalities of the web application designed for them.

II. PROPOSED SYSTEM

The above mentioned systems are individual and can be used collectively for health management system. The MediAssist Edge had all those features which is required for health care using computer technology but it was not available on mobile phones [15]. So we take into account all the above mentioned technologies and try to merge them to make a mobile application. The base paper we referred to is "Health management using Artificial Intelligence" but it has certain problems which have been removed from our project like it provides automation, easy management, mobility, ease of use to patient, better utilization of resources and is supportive to both patient and the hospital/clinics. The idea of giving an application to all is good but will not work because no one even a doctor will give his/her advice for free.
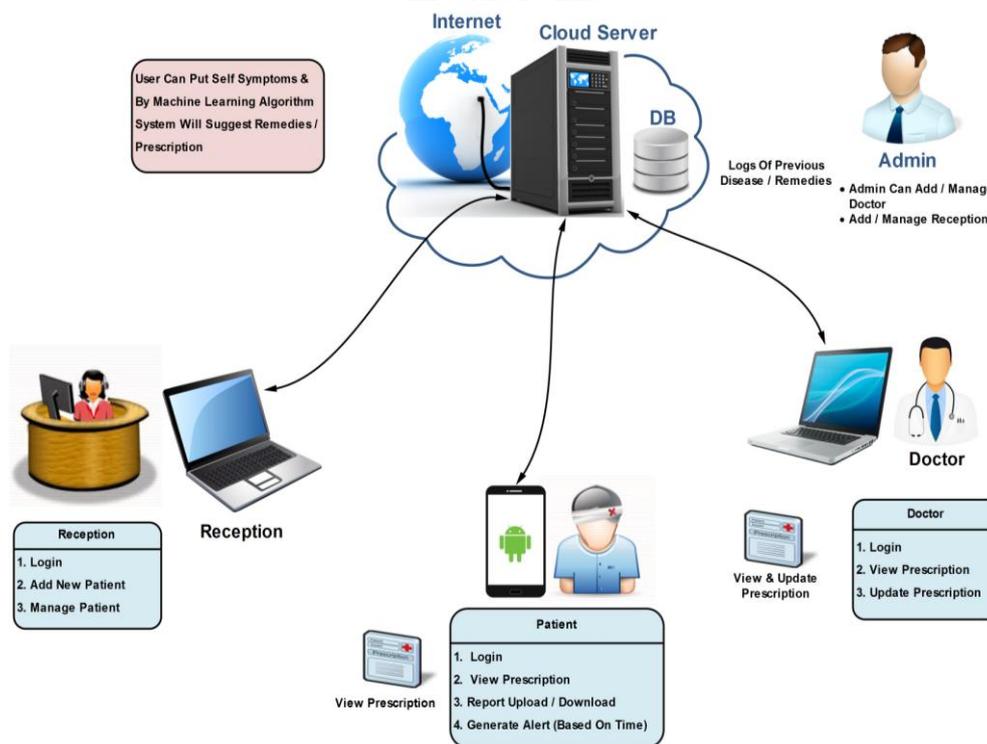
III. MODULES

Fig no: 1.0 System Architecture

There are basically five modules in the system namely:
1. Patient's Android Application
2. Doctor's Web Application
3. Receptionist Web Application
4. Admin
5. Artificial Intelligence
6. Server with the database

The explanation of each is given below:
1. **Patient's Android application**: This android application will be developed using android adt-bundle. The android app will have features like contacting with doctor, uploading files, alert system, diagnosis of common diseases using

Artificial Intelligence and viewing prescription. The patient application is very important part of the system. The patient can view the prescription and the files uploaded anytime he/she wants to.

2. **Doctor's Web application**: It will be developed using NetBeans 7.1. This application will be used by the doctor's to communicate with patients, giving them prescription, updating the prescription if needed and viewing files(reports) uploaded by the patient using patient application.

3. **Receptionist Web Application**: It will also be developed using NetBeans 7.1. It will have functionalities like adding/registering the patient and managing the patient's account.

4. **Admin**: Admin will be present at the server. The admin will have control over all of the system from the hospital's /clinic's end. The whole setup of the system is done by the admin like registering the doctor and the receptionist. The doctor and the receptionist will be automatically send emails with their login ids and automatically generated passwords.

5. **Artificial Intelligence**: The Artificial Intelligence part is one of the key features which will be used in the patient android application for the diagnosis of common diseases. It will take symptoms as input and give the most probable disease as output. For implementation of Artificial Intelligence we are making use of 'Naïve Bayes' algorithm. The symptoms are stored in a sequential database which is static in nature. Through data mining of the database the probability of occurrence of the diseases will be given as output.

6. **Server with the database:** The server we are using here is "GlassFish" server and this will be implemented using Netbeans 7.1 with the database connectivity to a relational and dynamic database which here is "mysql".

Working:

The server side is present in the hospital or clinic wherever the system needs to be set up. The server is setup in the hospital and the server we are using is "glassfish server". The "glassfish server" is setup using netbeans 7.1. The admin starts by setting up the whole system, he adds the doctor's and receptionist's account and send an email to their respective email with the username and password for their web applications. The admin has the following functions of adding, managing and deleting the accounts of the doctors and receptionist. The receptionist on the other hand is responsible for adding patient and managing the patient account. As discussed above that the receptionist and the doctor will receive the password for his/her web application on the email registered with his/her name with the login details.

The patient first gets itself registered himself on the hospitals/clinic database and then a login id and password is created for the patient which is used by the patient to login to the hospitals/clinic android application provided for the patients, the login and password will be used by the patient to access the exclusive services of the application which are consulting a doctor, viewing and uploading documents in pdf, image, etc. formats, he can also view prescription given to him by the doctor and can make use of the alert based system as well.

This application is basically an android application which we will create by using Android adt-bundle. The patient app has an "alert system" which can be used for alerting the patient to take the medicine at a specific time (as set by the patient).The patient application also has an Artificial Intelligence system which is implemented by using "naive bayes" algorithm which takes a specific set of symptoms to diagnose some common diseases. The database which is used to save symptoms and disease relationship is sequential and static database which will be used to diagnose the disease. The server will have the algorithm of "Naive Bayes" present which use data mining technique for the diagnosis of the diseases.

The algorihm is as stated below:

ALGORITHM:

The Bayes Naive classifier selects the most likely classification Vnb given the attribute values a1, a2… an. This results in:

$V_{nb} = \text{argmax}_{v_j \varepsilon V} P(v_j) \prod p(a_i|v_j)$

We generally estimate $P(a_i |v_j)$ using m-estimates:

$P(a_i|v_j) = n_c + m_p / n + m$

Where:

n = the number of training examples for which $v = v_j$

nc = number of examples for which $v = v_j$ and $a = a_i$

p = a priori estimate for $P(a_i |v_j)$

m = the equivalent sample size.[16]

The Artificial Intelligence part will work even if a person has downloaded the application without even being a patient from the android store. The doctor is online/offline can be viewed through the application. He/she can even leave a message for the doctor if they want.

The doctor can use the login id and password provided to him through the email and can access the functionalities of the web application which provides him the functions of chatting with the patient he wants to, provide him with the prescription if needed, he can download and view the files that have been uploaded by the patient and these files are stored on the server and can be anytime viewed by the doctor or the patient. The doctor's web application and the receptionist web application is developed using "Netbeans 7.1".

IV. CONCLUSION

Health care management system is developed for the purpose of betterment for peoples health. The mobility is an important factor of this application. It provides easier method to the user to communicate with the doctor and get

relatively better and faster consultancy. The Application focuses towards mobile based, video conferencing, and Artificially Intelligent bot. This application has enormous future scope and further it can be extended to make it more efficient, reliable and faster.

Artificial Intelligence technology has vast scope and can be made such that it can near to the actual consultant.[15].

ACKNOWLEDGMENT

REFERENCES

[1]   Amiya Tripathy , Ajit Varghese, Nikita Chabhaiya and Bejoy Anthony,"MediAssistEdge – Simplifying diagnosis procedure & improving patient doctor connectivity", Don Bosco Institute of Technology, Under Graduate project report 2014.

[2]   Bing Nan Li, Ming-Chui Dong, Sam Chao, "On decision making support in blood bank information systems". Expert Syst. Appl. Vol. 34, Issue 2, pp. 1522-1532, 2008.

[3]   Priyanka V. Mhamunkar, Krishna S. Bansode and Laxman S. Naik, "Android Application to get Word Meaning through Voice", International Journal of Advanced Research in Computer Engineering and Technology, Vol. 2, Issue 2, February 2013.

[4]   J. Allen, "Photoplethysmography and its application in clinical physiological measurement", Physiological Measurement, Vol. 28, pp. R1–R39, 2007.

[5]   Daniel Lakens, "Using a Smartphone to Measure Heart Rate Changes during Recalled Happiness and Anger", IEEE transactions on affective computing, Vol. 4, Issue. 2, April-June 2013.

[6]   https://www.google.com/

[7]   http://www.teamviewer.com/hi/company/company.aspx [Date of Access: June 15, 2014]

[8]   http://mahasbtc.com/ [Date of Access: June 15, 2014].

[9]   http://socialblood.org/ [Date of Access: August 05, 2014].

[10]   http://www.ignaciomellado.es/blog/Measuring-heart-rate-with-asmartphone-camera [Date of Access: October 02, 2014].

[11]   Denis Laure, Ilya Paramonov, "Improved Algorithm for Heart Rate Measurement Using Mobile Phone Camera", Proceedings of the 13th Conference of Open Innovations Association FRUCT and 2nd Seminar on e-Tourism for Karelia and Oulu Region, 2013.

[12]   Qeethara Kadhim Al-Shayea, "Artificial Neural Networks in Medical Diagnosis MIS Department", Al-Zaytoonah University of Jordan Amman, Jordan, IJCSI, Vol. 8, pp. 150 – 154, 2 March 2011.

[13]   http://www.doctorspring.com/ [Date of Access: June 15, 2014].

[14]   http://silvia4u.info/silvia-for-android/ [Date of Access: October 15, 2014].

[15]   2015 International Conference on Technologies for Sustainable Development (ICTSD-2015), Feb. 04 – 06, 2015, Mumbai, India (Mobile Based Healthcare Management using Artificial Intelligence)

[16]   Naive Bayes Classifier example Eric Meisner November 22, 2003.