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SMART HEALTHCARE SYSTEM

FINAL REVIEW

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Motivation:

With the advent of the modern era we have witnessed many remarkable inventions and progress that has made the human life easy and more comfortable than the past. However, with industrialization there is an alarming increase in diseases and the health conditions seems to be deteriorating day by day due to toxic chemicals, increased radiations and unhealthy lifestyle.

Often these health issues are ignored due to many reasons and which leads to

future problems resulting in early death, deformity and so on. To solve these problems, we have come up with the idea of having a smart health care system that will enable people to have an idea about the diseases that they might be affected with provided they feed the data correctly. By data here we mean the symptoms, the prolonged period and the current condition. So, our system will determine the disease the person can be affected with. This we will be achieving using clustering algorithms, data mining concepts and noSQL databases and for the front-end Xcode will be used to recreate the designs.

This project will also be useful for doctors and analysts as it will be helpful for them to identify the diseases on rise and the measures taken against them. Also, we will be helping the patients further by providing them with some prescribed medicines for their diseases.

Thus, this project is a help to the society and is also a check on some of the incompetent doctors who treat the people improperly and which is one of the dreadful aspects in modern world. Also, this project will be using the latest concepts i.e. ML, Data mining, iOS programming so the accuracy and predictive power of the systems will be high due to the vast dataset and specific algorithms.

Objective:

- To introduce a smarter system of healthcare
- To improve the quality of healthy lifestyle
- To help doctors and analysts as it will be helpful for them to identify the diseases on rise and the measures taken against them

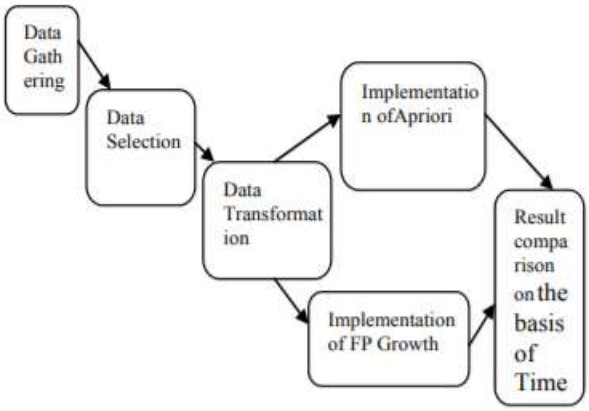
Introduction:

Health is one of the most important assets of our life which directly reflects in any form of progress or development. In today's hustle and bustle of life, most of the people neglect this asset which may be due to lack of time and complexity in the vast data available over the Internet. Data mining has introduced various techniques which would overcome this problem and assist us to emphasize on both health and work simultaneously. In present era, Data Mining is becoming popular in healthcare field because there is a need of efficient analytical methodology for detecting unknown and valuable information in health data. In health industry, Data Mining provides several benefits such as detection of the fraud in health insurance, availability of medical solution to the patients at lower cost, detection of causes of diseases and identification of medical treatment methods. It also helps the healthcare researchers for making efficient health care policies, constructing drug recommendation systems, developing health profiles of individuals etc.

Also, with the rise of the iOS devices almost more than 60 % of the world uses smartphones and 90% among them are smartphone users. So, designing an app for the people having iOS smart phones will be of great use and will have a rising and vast market. Also, with the advent of the efficient databases the process of storing and retrieving data is easier and so with Wamp server we will be able to manage the backend properly.

System model:

The core objective of our project is to develop a web application using data mining concept accompanied by JSP (Java Server pages) technology and noSQL. The whole process can be termed as “knowledge discovery process, (KDD)”. This is because here we need to predict the disease for user input symptoms where the predicted disease is in the form of information or knowledge. Following Fig: 1 shows the steps carried out to predict the probable disease for inputted patient symptoms:



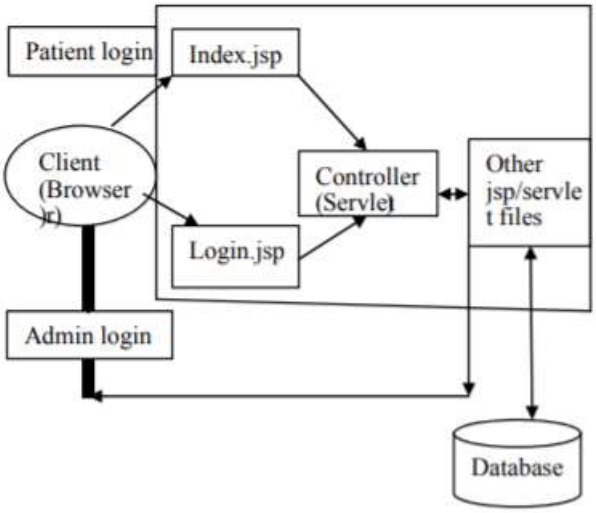
This is the diagram that shows the process of the how we are going to get the affected disease results using our aforesaid tools.

The application consists of two login pages:

Patient login page i.e. the user interface for the patient.

Admin login page i.e. the user interface for the administrator.

This is shown in the picture below.



Whenever a person enters his symptoms the system checks for the keywords in the symptoms and clusters the data and then checks whether the person has a disease or not and also recommends him the medicines that he needs. Also, the app has an internal database that will keep the track of the patient's symptoms and the diseases recognized. Also, we keep a track of the best doctors and treatments for the diseases in another table that help us to recommend the person to the concerned authorities.

The flowchart below shows the execution of our application –

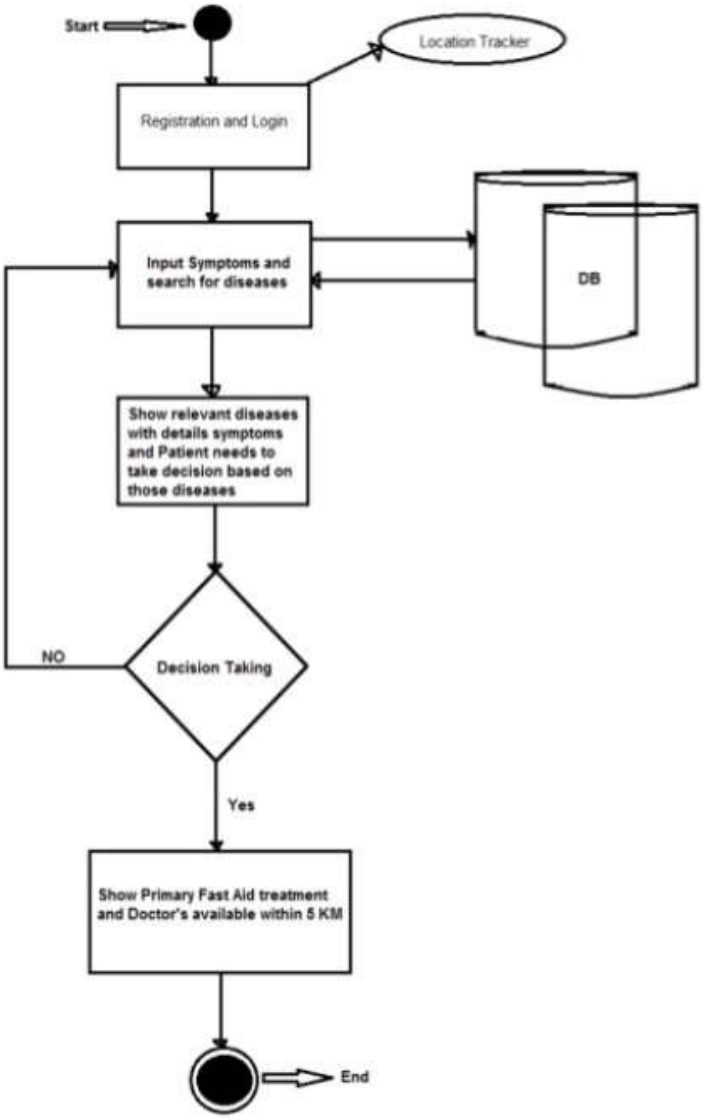


Figure: State Diagram (Working Flowchart)

Entity Relationship Diagram

The following is our entity relationship diagram :

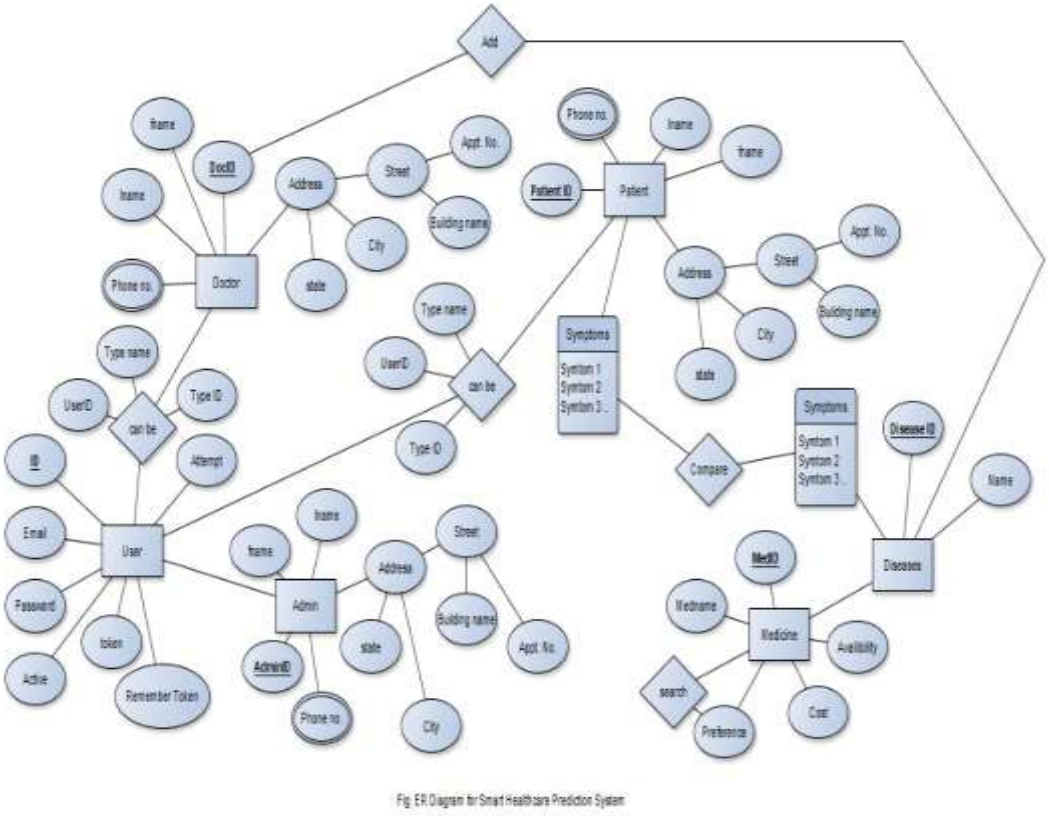
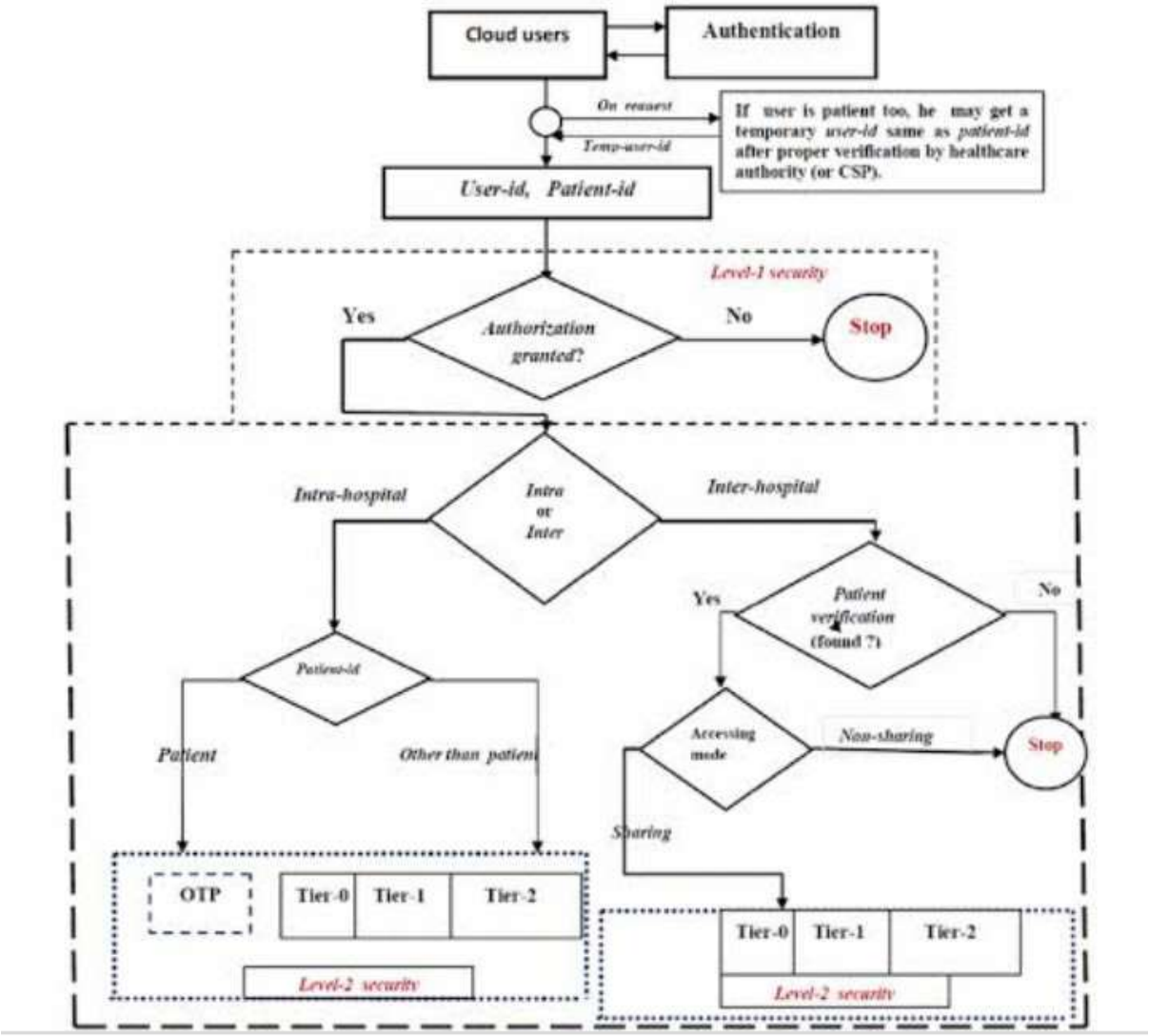


Fig. ER Diagram for Smart Healthcare Prediction System

Thus, we have the tables as Doctor, Patient, User, Admin, Medicine, Diseases.

The relations are can be, add, compare, search. The ellipses enclose the attributes of the table. There is also an internal database that manages all the queries of the patients

This is our required database design. Thus, the flow of control can be shown as-



UML Diagrams

The following are the UML diagrams for our project that explain the work flow, structure, components, tools, and the other requirements for our project.

a) Activity Diagram

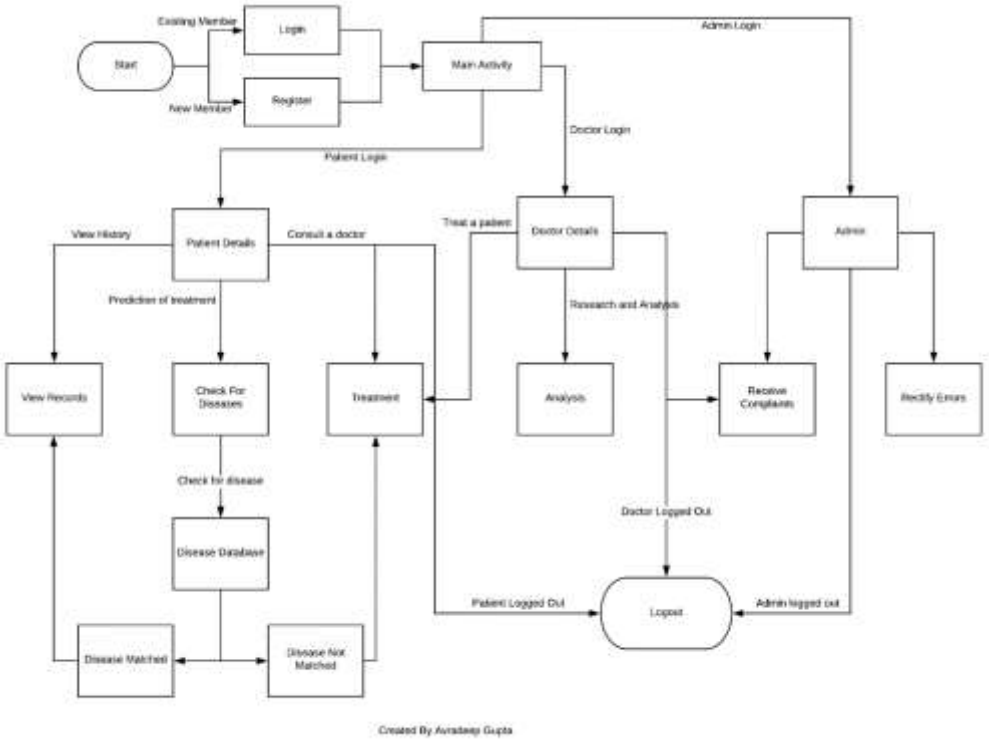
b) Class Diagram

c) Object Diagram

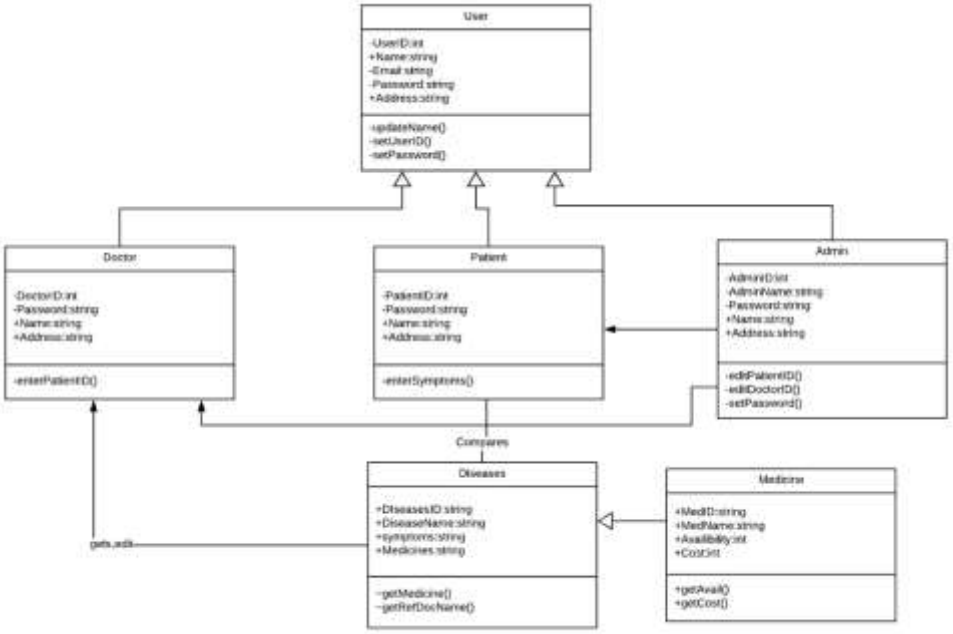
d) Use Case Diagram

e) Component Diagram

Activity Diagram

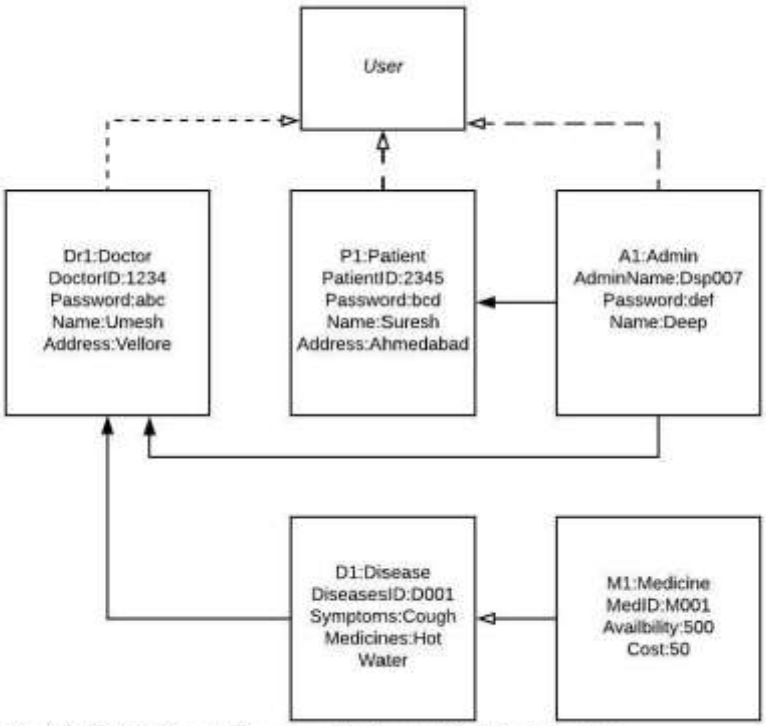


Class Diagram



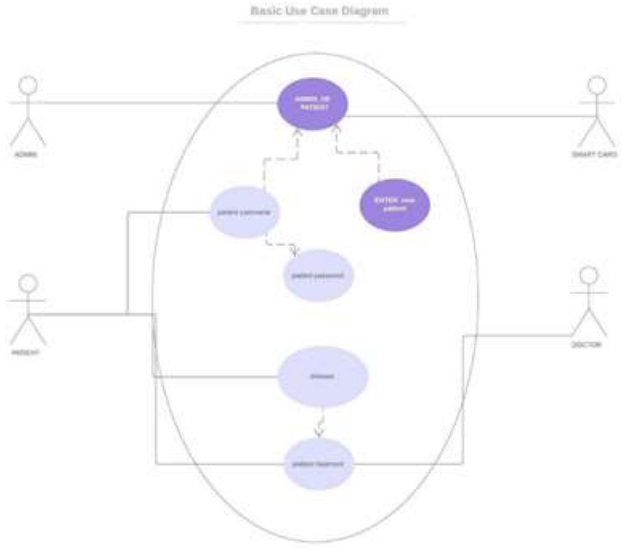
fig(a):UML Diagram for Smart Healthcare

Object Diagram

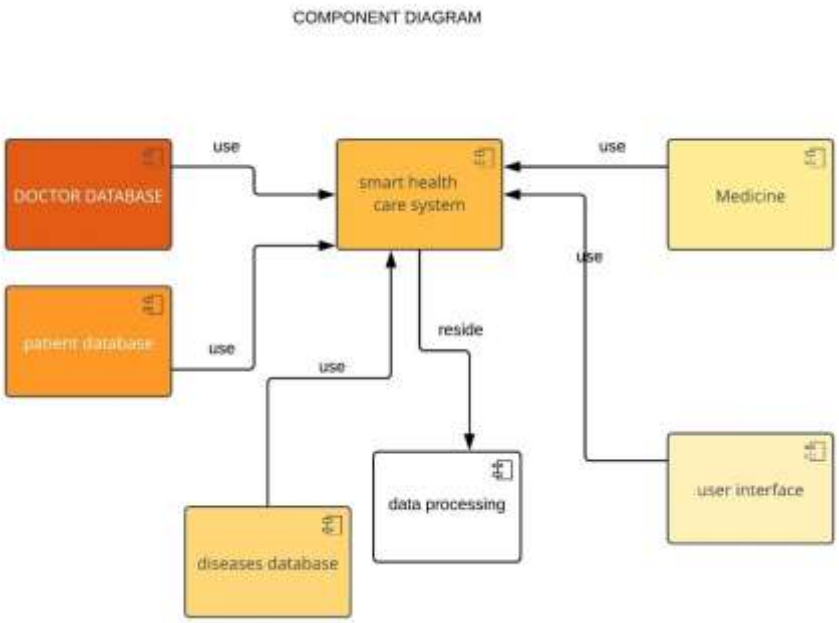


Fig(c): UML Object Diagram for Smart Health 17BCE2036

Use Case Diagram



Component Diagram



Literature Survey

A new class of patient-driven health care services is emerging to supplement and extend traditional health care delivery models and empower patient self-care. Patient-driven health care can be characterized as having an increased level of information flow, transparency, customization, collaboration and patient choice and responsibility-taking, as well as quantitative, predictive and preventive aspects. The potential exists to both improve traditional health care systems and expand the concept of health care though new services. This paper examines three categories of novel health services: health social networks, consumer personalized medicine and quantified self-tracking.

Social networks have become a powerful tool for bringing people with shared interests together to interact. In addition to general social networks (examples: FaceBook, MySpace) and career social networks (examples: LinkedIn, Plaxo), more specific purpose-driven social networks are emerging. In the Finance 2.0 area, social networking has become an overlay or a property of asset and expense management websites like Wesabe, Mint, Zecco, Cake Financial and Expensr. In the health space, over twenty health social networks have launched in the last few years including PatientsLikeMe, CureTogether, DailyStrength, MedHelp, HealthChapter, MDJunction, Experience Project, peoplejam, and OrganizedWisdom. These apps have contributed tremendously to the growth of the E-checkup systems.

Activities such as finding out the potential side effects of a given drug or scheduling an office visit with one's physician, for example, fall into the first category. On the hand, taking a pill (hopefully a right pill) or measuring one's blood pressure are physical activities. Access to the right health information is no substitute for proper physical.

Effective healthcare requires a continuous interplay of information exchange and physical care. With the advent of the Internet and the Web, we have witnessed an explosion of healthcare information.

According to a recent survey, two-thirds of Internet users use the Web to search for health information. While the increasing accessibility of health information is essential to the future of healthcare, it represents only one side of the equation. To achieve the dual purpose of lower cost and higher quality of care, consumer-initiated physical care, especially at the consumer's own home, must also be encouraged and explicitly supported.

To assess risk factors for mortality in cardiac surgical adult patients as part of a study to develop a European System for Cardiac Operative Risk Evaluation (EuroSCORE). From September to November 1995, information on risk factors and mortality was collected for 19030 consecutive adult patients undergoing cardiac surgery under cardiopulmonary bypass in 128 surgical centres in eight European states. Data were collected for 68 preoperative and 29 operative risk factors proven or believed to influence hospital mortality. The relationship between risk factors and outcome was assessed by univariate and logistic regression analysis. Mean age (± standard deviation) was 62.5 ± 10.7 (range 17–94 years) and 28% were female. Mean body mass index was 26.3 ± 3.9. The incidence of common risk factors was as follows: hypertension 43.6%, diabetes 16.7%, extracardiac arteriopathy 2.9%, chronic renal failure 3.5%, chronic pulmonary disease 3.9%, previous cardiac surgery 7.3% and impaired left ventricular function 31.4%. Isolated coronary surgery accounted for 63.6% of all procedures, and 29.8% of patients had valve operations. Overall hospital mortality was 4.8%. Coronary surgery mortality was 3.4% In the absence of any identifiable risk factors, mortality was 0.4% for coronary surgery, 1% for mitral valve surgery, 1.1% for aortic valve surgery and 0% for atrial septal defect repair. The following risk factors were associated with increased mortality: age ($P < 0.001$), female gender ($P < 0.001$), serum creatinine ($P < 0.001$), extracardiac arteriopathy ($P < 0.001$), chronic airway disease ($P < 0.006$), severe neurological dysfunction ($P < 0.001$), previous cardiac surgery ($P < 0.001$), recent myocardial infarction ($P < 0.001$), left ventricular ejection fraction ($P < 0.001$), chronic congestive cardiac failure ($P < 0.001$), pulmonary hypertension ($P < 0.001$), active endocarditis ($P < 0.001$), unstable angina ($P < 0.001$), procedure urgency ($P < 0.001$), critical preoperative condition ($P < 0.001$) ventricular septal rupture ($P < 0.002$), non-coronary surgery ($P < 0.001$), thoracic aortic surgery ($P < 0.001$w). A number of risk factors contribute to cardiac surgical mortality in Europe. This information can be used to develop a risk stratification system for the prediction of hospital mortality and the assessment of quality of care.
Thus, we see that a lot of work is done in the field of medical sciences to ease up the process of treatment and also to reduce the mortality rate. Thus, it is a promising area for future developments.

Modules description:

- Authentication:

A user has to sign up to the app to use all the features. The person has to fill in his general details like e-mail, phone number, address etc. On mobile devices, An OTP is sent to the user's phone number to authenticate the person.

- Medical History:

Once Signed Up, the user has to complete their profile which requires filling of details like age, gender, food allergies, diet, medical allergies etc. A user has to specify whether he/she has diabetes or asthma as well. This helps us in finding the best fit doctor and helps the doctor to treat the patient accordingly and personalised supervision.

- Blood Pressure/Blood Sugar History:

A user can add his Systolic and Diastolic blood pressure daily which can be seen by the doctor with which the person has booked the appointment. This helps the doctor in the patient's examination. Similarly, a blood

Sugar section is provided as well where the user has to feed in the data of the glucose level. If the patient does not have enough equipments/resources he can go to the nearest healthcare centre affiliated to us and it will be updated in the app automatically by the healthcare and the user can view it later.

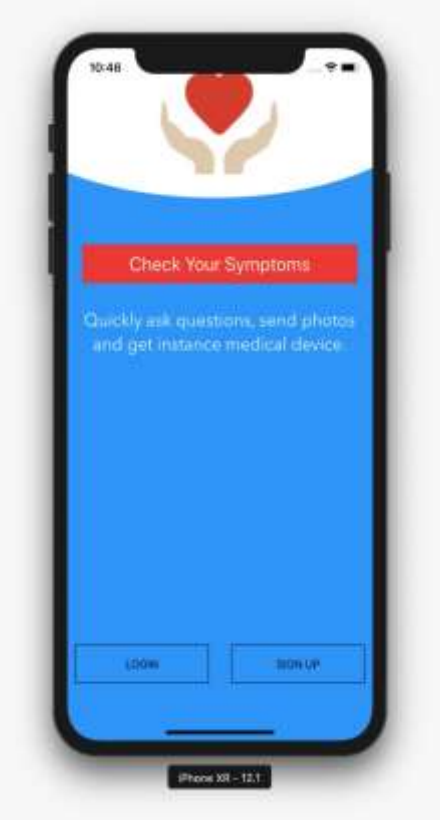
- Past Visits:

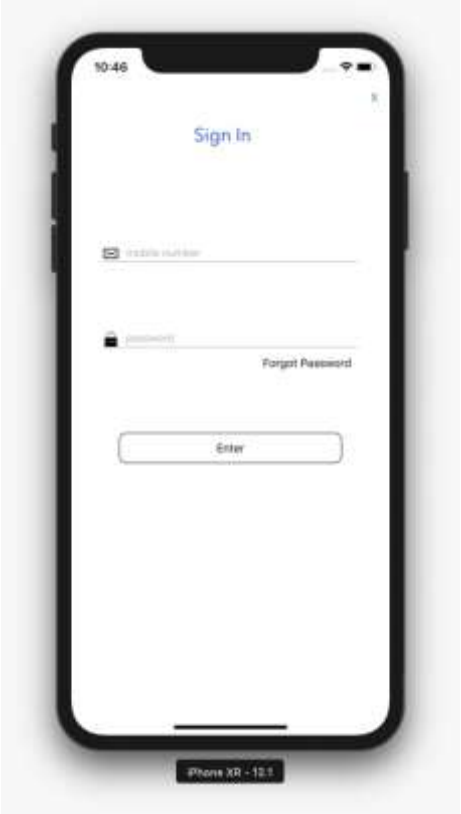
All the past visits of the patient will be visible in this section. Once a user books an appointment with a doctor and the appointment is completed, the doctor has to update whether the patient visited and the medication that was prescribed. All this would be visible under this section.

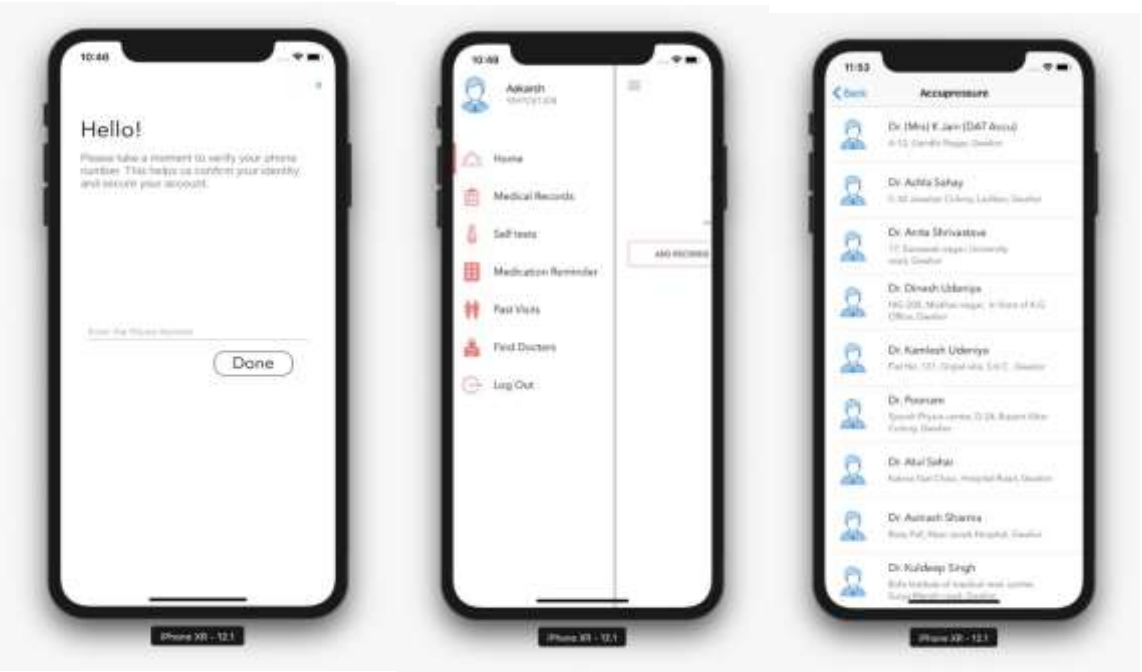
- Find Doctors:

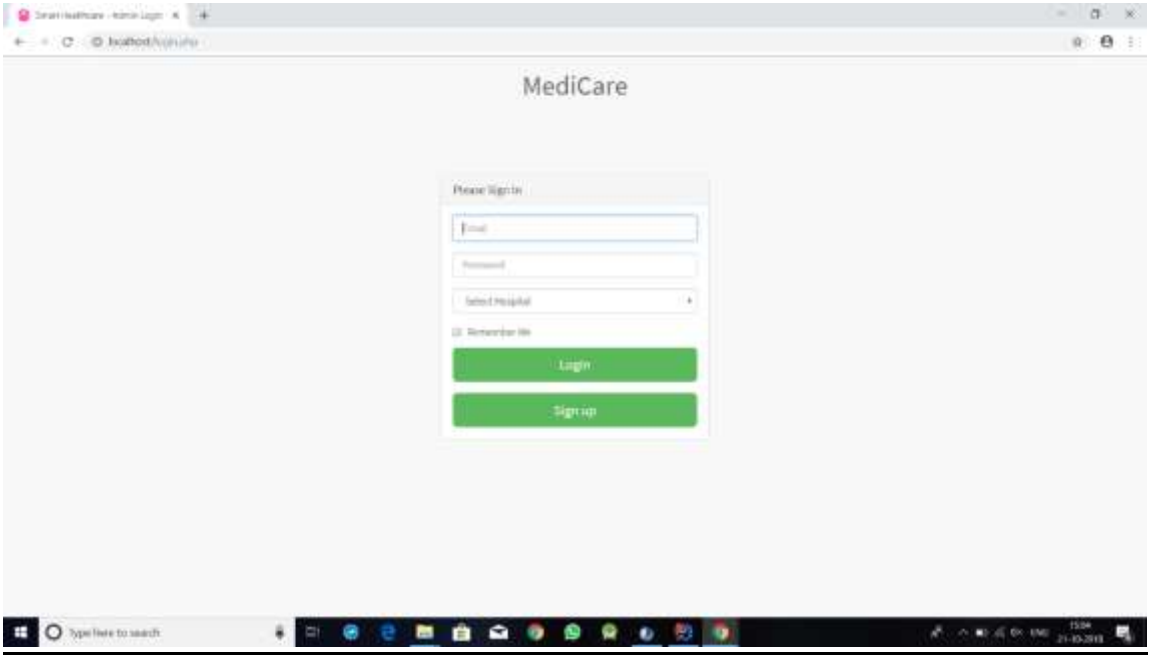
A user can search for Doctors, Dentists, Therapists, And Nutritionists depending on their needs. The name of the doctors is sorted according to the past ratings by the patients and location. This helps the patient to find the best doctor nearest to their locality.

Implementation:

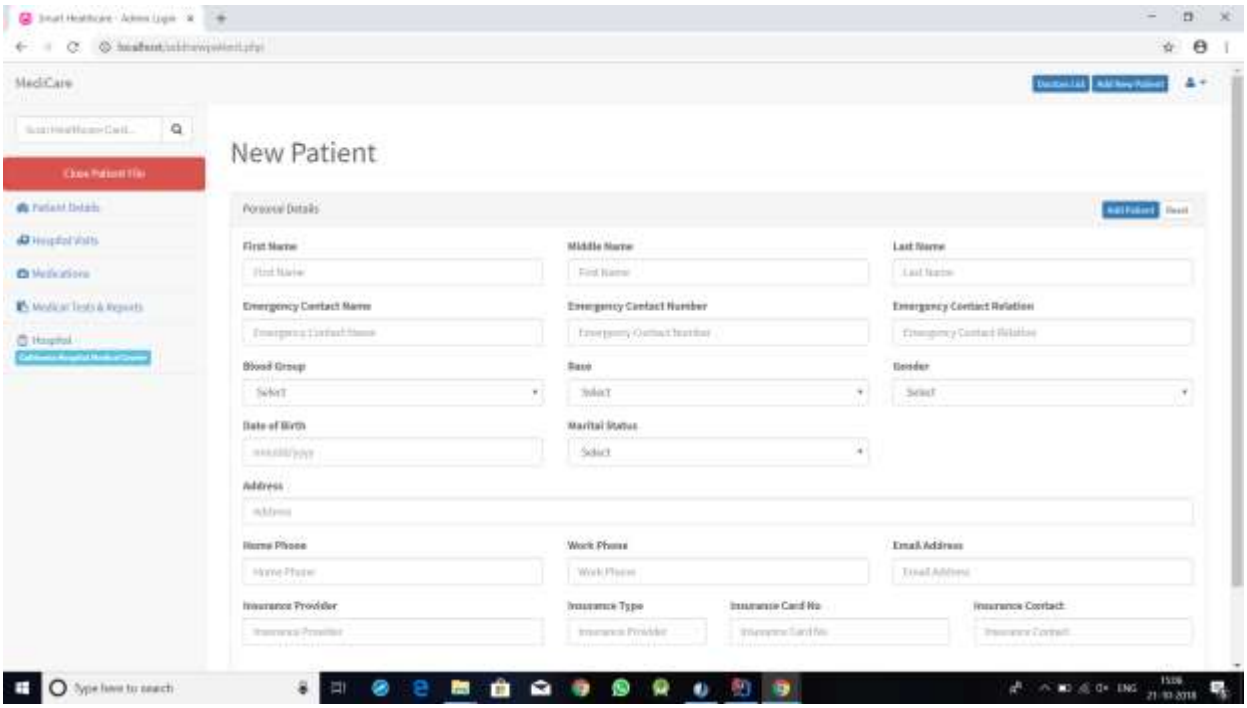





Hello!
Done
Aakarsh
Home
Medical Records
Self tests
Medication Reminder
Past Visits
Find Doctors
Log Out
Acupressure


MediCare
Login
Sign up


MediCare
Welcome to Medicare
PART A
PART B
PART D
PART C


MediCare
New Patient
Personal Details
First Name
Middle Name
Last Name
Emergency Contact Name
Emergency Contact Number
Emergency Contact Relation
Blood Group
Race
Gender
Date of Birth
Marital Status
Address
Home Phone
Work Phone
Email Address
Insurance Provider
Insurance Type
Insurance Card No
Insurance Contact

Sample report of acceptance testing :

Module Name	Test Condition	Test Case	OutputExpected	Actual Output	Result
Login	id, password must match	id exists != NULL password =p0	Authentication Successful	Succesful Login	Satisfied
Register	id,password,email,mobile must not be null	id,pno,email,name!=NULL	Registered	Registered Successful	Satisfied
Patient	Accept all the details of ailments	Accept Details	Details Accepted	Details Stored	Satisfied
Search	check disease name and find doctors	Disease name = found	Doctors shown	Shown Doctors	Satisfied
Doctors	Show list of verified doctors	doctor id must EXIST	List Shown	List Displayed	Satisfied
Logout	if logged in the set logout to 1	if logout == 0 then logout == 1	Logged Out	Successfully logged out	Satisfied
UI/UX flow	Check for the working of all aspects	Test of all units	All units working	Functional	Satisfied
Admin	Can delete doctors	id can be removed	Doctor removed	Doctor removed	Satisfied
History	if pid matched then show medical history	if id==pid then show history	History must be shown	History showed	Satisfied

Conclusion:

In this project we have developed a software that will be useful in making the treatment procedure easier and more efficient and removing the anomalies in the present system. Future developments can be made in this project for auto recognition of users and so on.

Reference:

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