

CLOUD BASED HEALTHCARE & ELECTRONIC RECORD MINING

Ruchita Narad, Suchitra Sasmal, Indrayani Fadnaik

B.E. 4th year , Computer Technology

K.D.K. College Of Engineering

Nagpur, India -440009

Abstract—Background/Objectives: EHR means the digital version of the patients medical report, in store the data in real time, it contains medication and treatment history which includes the broader view of patients care and it also contains patients medical history, diagnosis, medications, treatment plans, immunization data, allergies, radiology images, laboratory and test results. Methods/Statistical Analysis: The main intention of EHR is to have access to evidence based tools that health providers can make use to make decision and disease diagnosis about the patients care delivery. The current population of India (2014) is 1.27 billion. About 72.2% of the population lives in some 638,000 villages and the rest 27.8% in about 5,480 towns and urban agglomerations. Findings: In our proposed work we develop Electronic Health Records (EHR) to integrate with the health care providers all over India and to implement it with the cloud infrastructure. The main challenges that are addressed in this works are, handling heterogeneous data, data storage, use of data analytics tool for decision making, data privacy and the data security. Application/Improvements: This can be used to integrate the healthcare management system. Once implemented it provides remote medication, vaccination management, disease diagnosis, remote diagnosis and remote real time monitoring and personal health record.

Keywords: Clinical Data, Cloud, Feature Selection, Medical Diagnosis.

I. INTRODUCTION

The government has initiated various steps in implementing the EHR for our Country. It electronically stores the medical records of users and uploads them on a secure cloud based account. From the perspective of Indian Medical care system, patients visit several doctors, throughout their life time right from visiting a primary health center to community health. Health records get generated with every clinical meet during the inpatient or emergency visits. However, most health records are either lost or remain in the supervision of health care providers and gets destroyed. As per the maintenance period of medical records generally followed by hospitals is 5 years for out-patient records and 10 years for in patient records. Medical records are however retained permanently. This is pertinent to health care setups

with a proper medical record department only. Medical record is the record of the hospital and is not

part of patient or clinical department or doctor. The patient also has no proprietary right on his own clinical record today. The patient today carries with him is the discharge summary of his clinical investigation reports and usually radiology films or images. Also, important clinical data is not available for research and for reference to aide in clinical decision support. And also suffers in the study of disease trends and statistical analysis of clinical nature today.

II. OBJECTIVE

The main objective of our project is to provide a platform for users to do following:

- To align with federal and state government health initiatives, particularly the e-Health systems.
- To assist Uniting Care Health to realize its strategic goals, especially those in relation to patient safety and satisfaction .
- To promote further e-Health development and advancement across Uniting Care Health by rolling out a state-of the art e-Health solution.
- To establish Uniting Care Health as a national leader in eHealth and advanced healthcare.

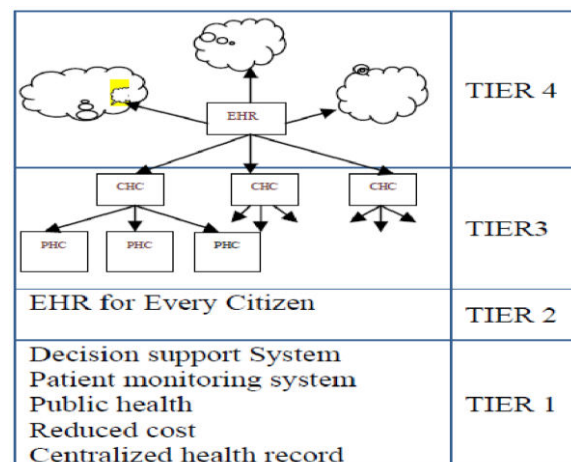
III. EXISTING SYSTEM

In the recent years the data are electronically available like the travel tickets available as e-tickets, retails available as e-retails etc. So why don't we have the medical data of a person electronically. The idea is to make health records and medical history of people easily accessible to them anywhere anytime, through desktop or any mobile device. Having such an Electronic Health Record (EHR) could be lifesaving in many critical situations. Also an EHR provides the benefit of not having to store bulky hardcopies of the whole family. The paper based records are low in cost but have limitations such as difficult to access, time consuming to update, not secure, impossible to share and maintain for long life time. The practice of keeping electronic health and medical records is evolving in the developed countries like USA, UK etc. The country like Australia is dedicated to the development of a lifetime electronic health record for all its citizens. But the question arises how viable is this idea in a country like India. This can be possible if all sections of the society, especially the poor ones, through government's support. Once the practice of EHR is implemented in government hospitals, this initiative will be beneficial for the masses.

A. Data Collection

The data set primarily includes data items to capture patient clinical information and emergency contact

information, doctor information, insurance information, reason for visit, patient history like present, past, personal, family, obstetrics and



gynecology, surgical, immunization, allergy history, clinical test results, blood group type , diagnosis test undergone, test results, medical summary, treatment plan for medication referral etc. We follow the standard template for the storage of the medical record. The Figure 2 shows such format which is again approved by the government.

B. Disadvantage of Existing System

1. Security

Multiple cloud providers as well as many healthcare organizations will take part in eHealth Cloud. Different parties will interact with different resource pool. There-fore, a proper security mechanism is a challenge to maintain data persistence, integrity, confidentiality and availability.

2. Data Management

A lot of structured and non-structured data will generate continuously in eHealth Cloud. Database should be replicated to different locations and geo-graphical distances for higher reliability and better access. All data should be error free because it matters a lot to the users of it. In spite of any hardware or

software failure data should be persistence constantly.

3. Scalability

Always the users and connecting devices are increasing. So the system should be able to scale itself to the requirements so that no failure is occurred in case of traffic. Moreover, there may open new window to be added to the system for better service.

4. User Experience and usability

People of various walks of life are the users of e-Health Cloud. Different kind of specialists, people from various educational background, cities, and towns will come under the umbrella. So, proper and adequate preimplementation training along with postimplementation training is important.

IV. PROPOSED SYSTEM

The proposed system shall prove to be beneficial in the following ways:

A. Digital Medical Records The manual files are prone to human errors. They can carry irregularities in recording the information. If the system is computerised, the digital medical records shall be high on the correctness parameter with minimal scope for human generated errors. There shall be no need of carrying bulky files around anymore during an appointment with the doctor. Just a unique universal patient ID number would be all that is required.

B. Ease of Access Through digitisation, the medical records can be put onto a server open to be accessed by those in need. This will ensure full time availability

of reliable data irrespective of any geographical constraints. Just a device connected to the internet would be all that is required.

C. Data Repository The bulk of handwritten case files stored in the hospital record rooms can prove to be a great source of knowledge that could be employed by the practitioners, if digitised and stored in a data warehouse. Appropriate data mining procedures will then be able to extract useful information from records which are presently seldom referred.

D. Ease of Management Having a sound, technically advanced system shall benefit in easing the management of the different departments involved in a healthcare institution. Those involved can concentrate more on their efficiency instead of worrying about the minor issues like locating files and storehouse keeping which shall then be taken care of by the computer system.

E. Quick Reference The full time availability of information about patients suffering similar medical conditions i.e. problems, symptoms, complications etc along with the details of their physicians can actually help in better diagnosis both for the doctors as well as the patients. They can even interact with each other on request through video conferencing, phone calls or emails and thus suggest available optimal treatment paths along with the possible complications and the success rate in cases of an emergency. Even an expert

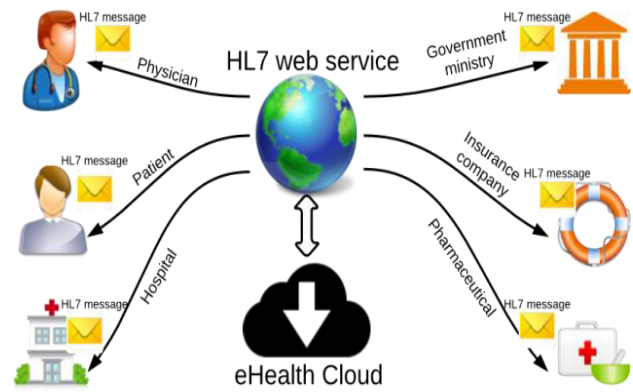
could be engaged for his or her opinion on a case easily.

F. Standardisation The use of technology shall be able bring about standardisation in the use of healthcare facilities to help ensure easy interfacing and connectivity to build a worldwide system and pool the information from many different regions together without any conflicts.

G. Verification Having the medical records available over the internet shall help in easy verification by the agencies such as insurance companies, police, courts of law, those responsible for the medical charge reimbursement and related issues. This shall even keep a check on the employees seeking false medical leaves from their employers.

H. Transparency The use of information and communication technology shall help in bringing about transparency in the system. As the stored information is open to all, it will help in easy cross-referencing. Any malpractices shall easily be brought to notice and add an element of accountability to the conduct of all those involved.

v. ARCHITECTURE



VI. EXPERIMENTAL SETUP

The collected large data sets are stored in server database. The architectural set up in such a way to manage the large amount of data. The iWeb on demand infrastructure cloud server makes hosting simple and effortless. In India, the Public Health Centres (PHC) is the state government undertaking health care facilities.

Format for Medical Records
(As specified by Medical Council of India under regulation 3.1)
Name of the patient:
Age:
Sex:
Address:
Occupation:
Date of 1st visit:
Clinical note (summary) of the case:
Provisional Diagnosis:
Investigations advised with reports:
Diagnosis after investigation:
Advice:
Follow up
Observations:
Date:
Signature in full
.....
Name of Treating Physician

Figure 2. Medical record standard template.

They are also funded by government. At present there are 23,109 PHCs in India. In our research the patient's data can be collected from every PHC located in every district's. Every PHC are connected to the Community Health Center present in every district. Every district or city can have more than one Community Health Center also. But there is a necessity to encourage and motivate to normalize, incorporate and information exchange among the service providers. The Figure 1 shows the basic architecture for the method proposed. It is divided into four tier architecture. The top layer is the centralized EHR which is connect to internet via cloud. The third tier is the interconnection between the Community Health Centers to the primary health centers. The tier two provided the EHR for the entire citizen in India which in turn is used to provide various applications like Decision support system, Patient monitoring system, Public health, reduced cost and centralized health record which in turn is present in the tier 1.

The huge amount of data collected is managed by the big data analytics. The data collected are mined using data mining algorithms. The data has to undergo some of the preprocessing techniques. After the preprocessing step the feature selection technique is used to extract relevant feature which in turn used the wrapper method which is more efficient and less costly. After the filtering process the ranking methods are involved to find the priority of the features present. Then the data is hosted in cloud to integrate the health care system. The indexing is done to provide the authentication using cloud. The main advantage of this work is to standardize the treatment procedures in India. Once it is implemented the treatment cost for the patients will be reduced in a random manner. Also the cloud infrastructure is developed to provide the data globally. The iweb cloud server is used to store the data in cloud. It is based on windows platform.

A. Simulation

The R tool is used for the simulation. It is mainly chosen hence it provides the automation of the work. It is used to simulate the medical data set to do the classification of the data using feature selection and feature extraction to remove the irrelevant data and redundant data. This tool is used for the data analytics process. It provides an efficient way to do the analytics for the prediction and diagnosis process.

B. Implementation of Algorithms with Real Time Data

After the collection of the real time data set the feature selection and feature extraction technique is applied to remove the irrelevant data. The data are stored with the standard medical format. Then the real time data is implemented with the feature ranking in order to find the priority of the features present in the medical record format.

C. Analysis

The study and analysis on the existing methods for the clinical data set is considered. In the traditional method every patient has the hospital ID for every hospital. They need to carry their reports whenever they need diagnosis by their medical experts. So it is difficult to access the details of the clinical data in the emergency cases because the data is not available globally. In this research work it stores all the history of the patient electronically and it will be stored with the unique id. So he/she will be able to take the treatment wherever during a medical expert refers another medical expert. Also the test for diagnosis.

VII. CONCLUSION

From a recent magazine report of analytics it is estimated that the health care industry could save billions by using big data health analytics to mine the information in Electronic Health Records, insurance claims, prescription order, clinical studies, Government reports and lab results. Analytics are majorly used to systematically review clinical data to provide decision based on the available data. Interesting thing is that instead of seeing only 20 patients a day doctors are available to see 75 to 100 people and get ahead of the wave. The main future of health care is to provide such physician support tools. Also to concentrate on areas such as to develop programs to prevent falls by patients in the hospital, predict the length of hospitals stays, create early warning system to spot complications after a procedure and reduce the number of people being readmitted for the same condition. The work is carried out to standardize the health record of the people for India. This work will finally have the EHR for India and finally provides many merits such as patient

treatment cost will be reduced, patient data are managed efficiently, authentication of data is provided, indexing the authentication using cloud etc. Only the authorized experts can view the patient's details, since the data is very sensitive.

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