Medicine Prescription System by using Machine Learning

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Abstract

The health care system which is using a Database is a well-known method for storing information. In regular database systems, sometimes because of existence of huge data it is not possible to fulfill the user's criteria and to provide them with the exact the information that they need to make a decision. However, this analysis accuracy is reduced when the quality of medical data is incomplete. The Healthcare system is far from optimal and tedious to undergo. These huge record sets can be processed and learned for better and automated medication. So this can be done with machine learning systems to evaluate the patient, diagnose them and to prescribe them with medicine. Moreover, different regions exhibit unique characteristics of certain regional diseases, which may weaken the prediction of disease outbreaks. With big data growth in biomedical and healthcare communities, this can be overcome by providing more accurate analysis. So using machine learning algorithms effective prediction of diseases can be done and providing with precise medicine for the disease.

Keywords- Disease Prediction, Medicine Prescription, Machine Learning

I. INTRODUCTION

In the present generation data is of different forms like emails, video, audio, and transactions etc., Velocity: This shows how fast the data is generated day to day and how fast they must be processed to meet the demand. But these data must be linked, matched, cleansed and transformed into required formats before actual processing. According to recent Cisco1 and IBM2 reports, we now generate 2.5 quintillion bytes of data per day, and this is set to explode to 40 yottabytes by 2020—(i.e.)5,200 gigabytes for every person on the earth.

Health care system built using machine learning is developed with huge number of patient records. With enormous growth over the Big data in recent years made it possible to manage huge collection of record sets. Hadoop, it is easier for organizations to get a grip on the large volumes of data being generated each day, but at the same time can also create problems related to security, data access, monitoring, high availability and business continuity.

So with these huge record sets a machine can be built which can learn those data, cluster them, classify them and extract them whenever in need. So by using various machine learning algorithms we can train a System with those data. So it does something more than a normal database system which can only be referred rather than making a study over those data.

Preventable medical errors (PMEs), which means errors which can be avoided by proper monitoring of the disease. A recent survey has said that around 250,000 errors are done in major countries around the world. The important fact about this survey is that these are preventable. So effective measures must be taken to avoid these errors. So a proper system which can maintain the records of patients, so that it can be an effective measure to avoid errors and to concern it in any case whether in the case of disease prediction or in drug prediction.

But how a system can be trusted entirely for the prediction of the human diseases and prescribing solution. So the entire activities of the system must be under the surveillance of an expert Doctor who have a detailed knowledge in the field of medicine.

II. RELATED WORKS

Many organizations and many IT sectors carried out a significant research over the disease prediction system for making use of the huge data collection of various disease to make an effective usage of the record.

Lumiata Incorporation is one of those organization who is doing a survey over the field of healthcare to bring a useful outcome over those data. The company uses Artificial Intelligence to enable health organizations to manage risk and prioritize care.

Atomwise is another company uses deep learning Neural Networks to help discover new medicines. Atomwise achieves the best results for new drug hit discovery, binding affinity prediction and toxicity detection. Atomwise predicts drug candidates for pharmaceutical companies, startups and research institutions. But this organization deals with only with the drug prediction sides and detection of new drugs based on the survey of the diseases and the drug predicted for it. However these system are expert in drug analysis not on diagnosis of the disease.

III. PROPOSED SYSTEM

A. Architecture Diagram

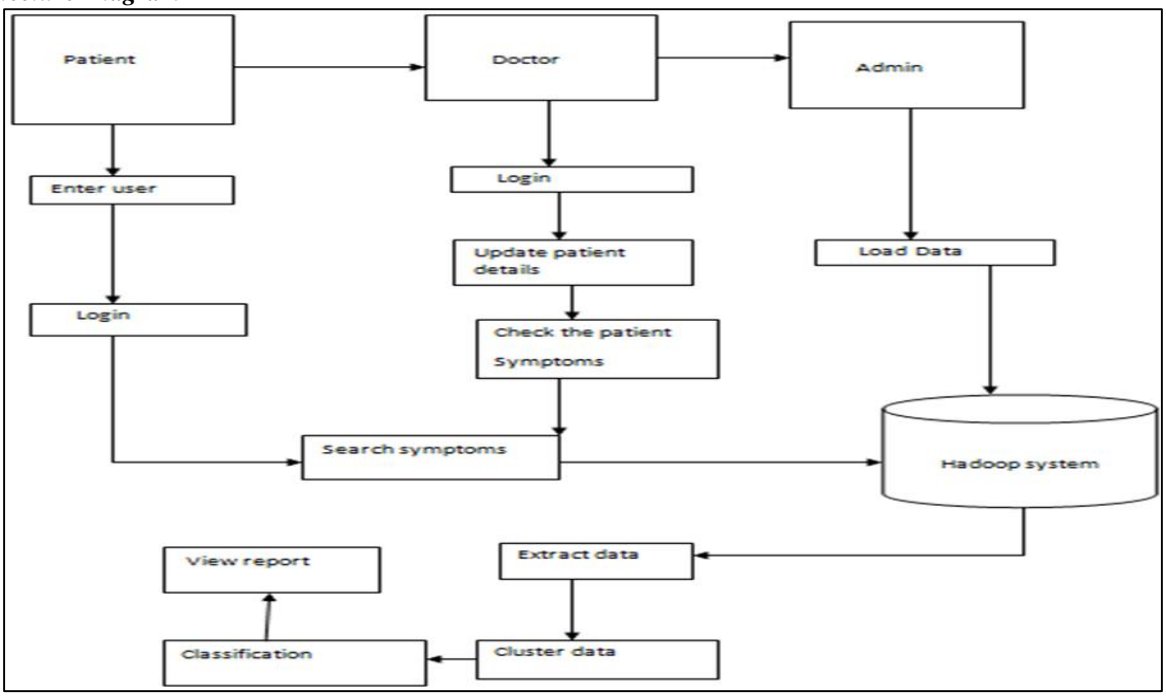


Fig. 1: Architecture Diagram

The architecture diagram involves the process of interaction between the patient, admin and a doctor. The patient visits the hospital for taking the necessary treatment of the infected diseases. In order to do this, the patient approaches the hospital admin for the basic procedures to proceed with the treatment. The admin registers the patient details and symptoms that they are suffering from. It generates a unique ID after the submission of the registered form. The PHR's are stored in the cloud database where it is provided with the security to the patient's records as they contain the sensitive information. With reference to the ID the patient consults the doctor where the particular patient record is retrieved from the database. Finally, the doctor predict the disease and diagnose it with the help of Big Data.

B. Data Flow Diagram

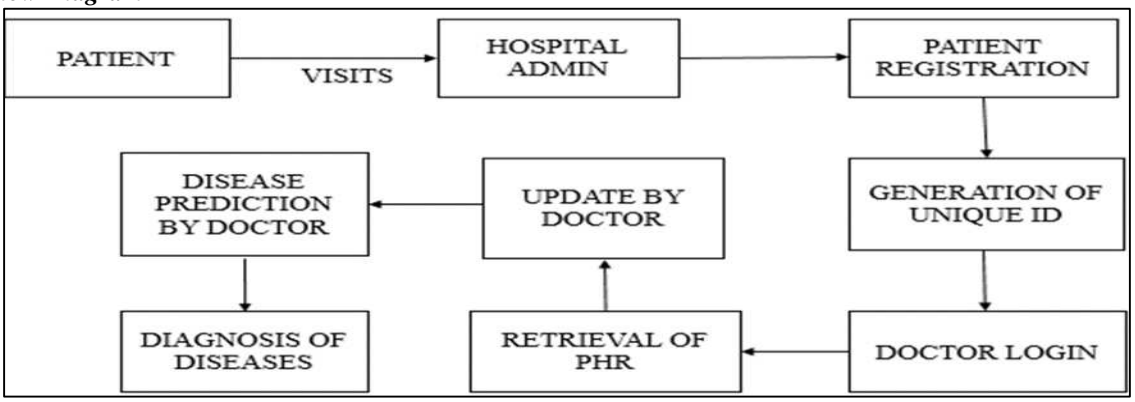


Fig. 2: Data Flow Diagram

C. Modules Description

1) Admin

The role of admin is to maintain all PHR's of the patient on the regular basis. Hospitals admin's are responsible for the day-to-day operation of a hospital, clinic, manages care organization or public health agency. To coordinate the actions of all the departments and ensure they function as one, hospital admin's must hold a wide set of skills and knowledge.

2) Doctor

Hospital doctors examine, diagnose and treat patients who have been referred to the hospital by GPs and other health professionals. They apply their medical knowledge and skills to the diagnosis, prevention and management of disease. In relation to the project, the doctor is provided with the login details where he/she can personally use their account for diagnosing the patients. So we can carry our process with the presence of a doctor who tries to manage the accuracy of the project with his/her knowledge.

3) Encryption

The translation of data into a secret code. To secure the data encryption is the effective way and it is more secured. To decrypt the file there should be a key or a password to decrypt it. So encryption should be done to all the data to keep it secured. So by using different keys for the encryption various system can be secured with various keys which should be behind the firewall. So by this manner we can secure the data from anyone who tries to intrude it or read those data. Patient data will be stored securely in an encrypted manner.

4) Pre-Processing

In this module, the doctor diagnoses the existing patients where they are informed to take the prescribed test. When the patient visits the doctor again he/she just provide the unique ID by which the doctor gets the information about the patient and the input values are provided from the test reports.

5) Disease with Drug Prediction

A situation can occur where doctor will not be available at the time of need and especially in the rural areas. So we have a built a web application where the user can use it anywhere any time when they need doctors help. Here we have built an AI system where we can give our symptoms so that it can give us the disease and the drug prescription for the disease. Various details are given to this application so it can process those data for optimal outcome. Mostly the application gets the symptoms and issues of the user. Once the input is given the processing of the data takes place to identify the disease and to give the drugs for the appropriate disease. So here to get the accurate disease prediction we use the intelligent data mining algorithm which are associated with the patient's details. So with these result the user can take immediate action and for further treatment can consult the doctor. The system allows user to view doctor's details too. So it is very useful in case of emergency. The experimental results showed that our method has good prediction performance.

D. Naive Bayes

The Naive Bayesian classifier is based on Bayes' theorem with independence assumptions between predictors. A Naive Bayesian model is easy to build, with no complicated iterative parameter estimation which makes it particularly useful for very large datasets. Despite its simplicity, the Naive Bayesian classifier often does surprisingly well and is widely used because it often outperforms more sophisticated classification methods.

- P(c|x) is the posterior probability of class (target) given predictor (attribute).
- P(c) is the prior probability of class.
- P(x|c) is the likelihood which is the probability of predictor given class.
- P(x) is the prior probability of predictor

E. Naive Bayes Classifier

Use the rule…..

$$P(Y|X_1,\ldots,X_n) = \frac{P(X_1,\ldots,X_n|Y)P(Y)}{P(X_1,\ldots,X_n)}$$

This is used to generate classified classes with labels.

F. Naive Bayes Training

1) Training in Naïve Bayes is Easy

Estimate P(Y=v) as the fraction of records with Y=v

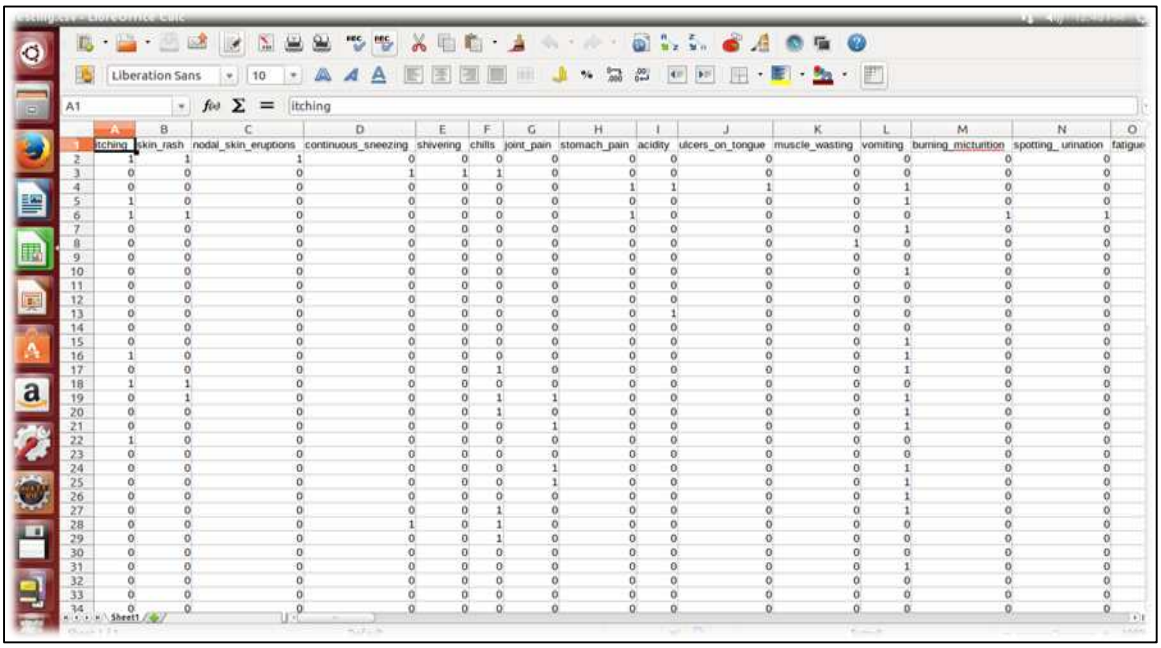
$$P(Y=v) = \frac{Count(Y=v)}{\#\ records}$$

Estimate $P(X_i=u|Y=v)$ as the fraction of records with Y=v for which $X_i=u$

$$P(X_i = u|Y = v) = \frac{Count(X_i = u \wedge Y = v)}{Count(Y = v)}$$

(This corresponds to Maximum Likelihood estimation of model parameters)

IV. OUTPUT & RESULTS



itching	skin_rash	nodal_skin_eruptions	continuous_sneezing	shivering	chills	joint_pain	stomach_pain	acidity	ulcers_on_tongue	muscle_wasting	vomiting	burning_micturition	spotting_ urination	fatigue
1	1	1	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	1	1	1	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	1	1	1	0	1	0	0	
1	0	0	0	0	0	0	0	0	0	0	1	0	0	
1	1	0	0	0	0	0	1	0	0	0	0	1	1	
0	0	0	0	0	0	0	0	0	0	0	1	0	0	
0	0	0	0	0	0	0	0	0	0	1	0	0	0	
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1	0	0	0	0	0	0	0	0	0	0	1	0	0	
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0	1	0	0	0	1	1	0	0	0	0	1	0	0	
0	0	0	0	0	1	0	0	0	0	0	1	0	0	
0	0	0	0	0	0	1	0	0	0	0	1	0	0	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	1	0	0	0	1	0	0	
0	0	0	0	0	0	0	0	0	0	0	1	0	0	
0	0	0	0	0	0	1	0	0	0	0	1	0	0	
0	0	0	0	1	0	1	0	0	0	0	0	0	0	
0	0	0	0	0	0	1	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	1	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Fig. 3: Data Set

This is the Data sets which is generated in the hospitals and classified on the basis of the real time data so machine can be fed with real time data and it can learn and apply those data to learn which we do regularly by visiting the doctors. So with this huge data sets we can train the machine to predict the drug for any diseases by giving the symptoms to the system. So by referring those data disease can be predicted. And also with medicine prescription data set we can prefer the drug to the specific disease.

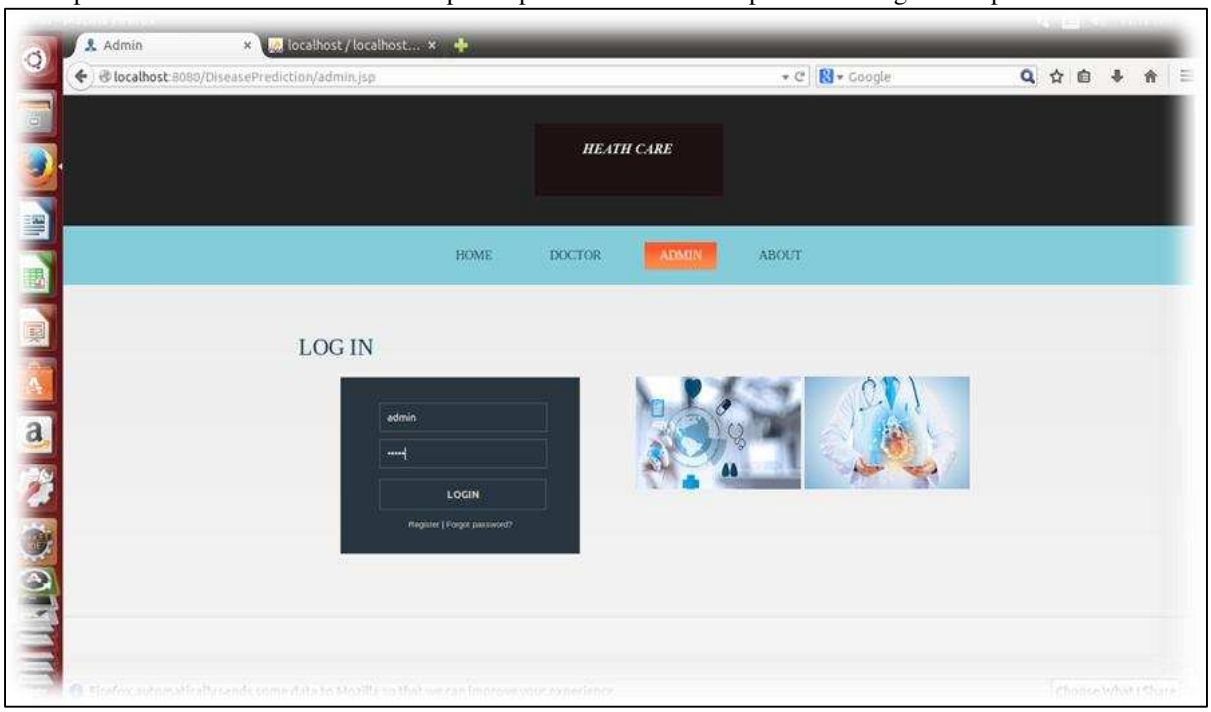

Fig. 4: Login Page

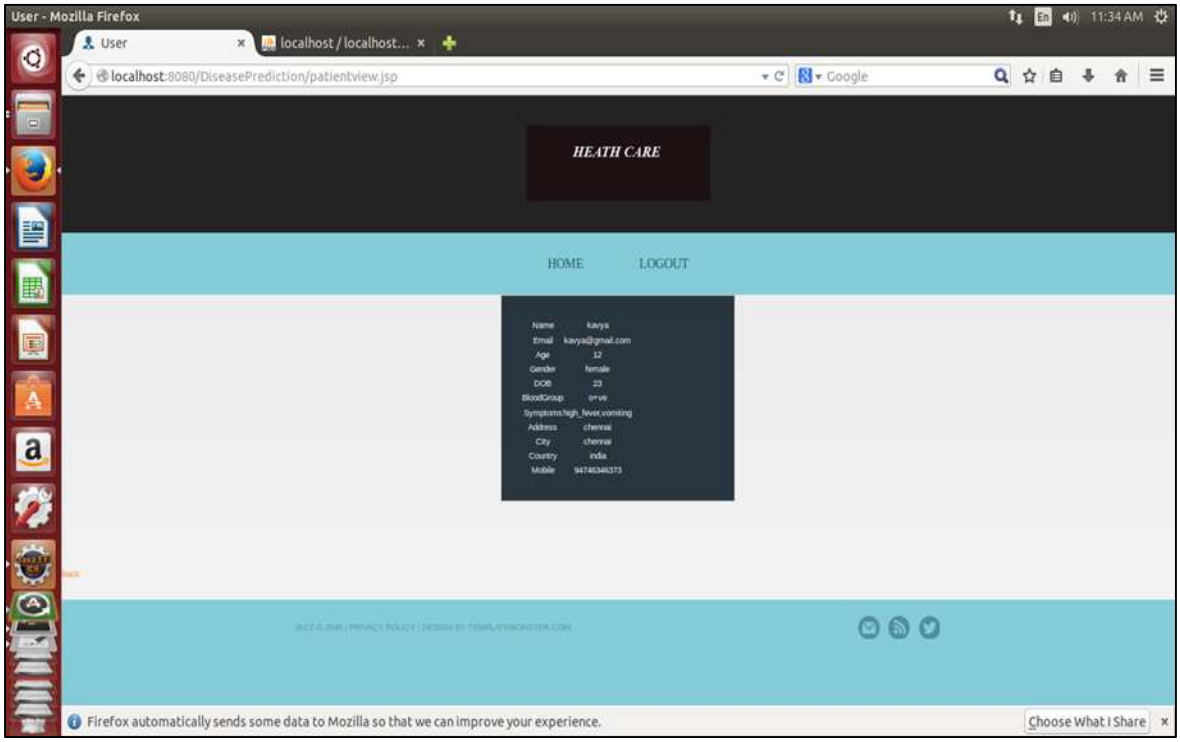

Fig. 5: Home Page

The user who uses the system, sign up to specify their details such as giving their name,age,gender,date of birth etc... and then a unique id is generated to the list of patients who sign in.Once the user log ins he is provided to enter his symptoms and get the disease prediction. Also the users can refer the doctors who are available at the time and he can prefer the doctor's advice to.

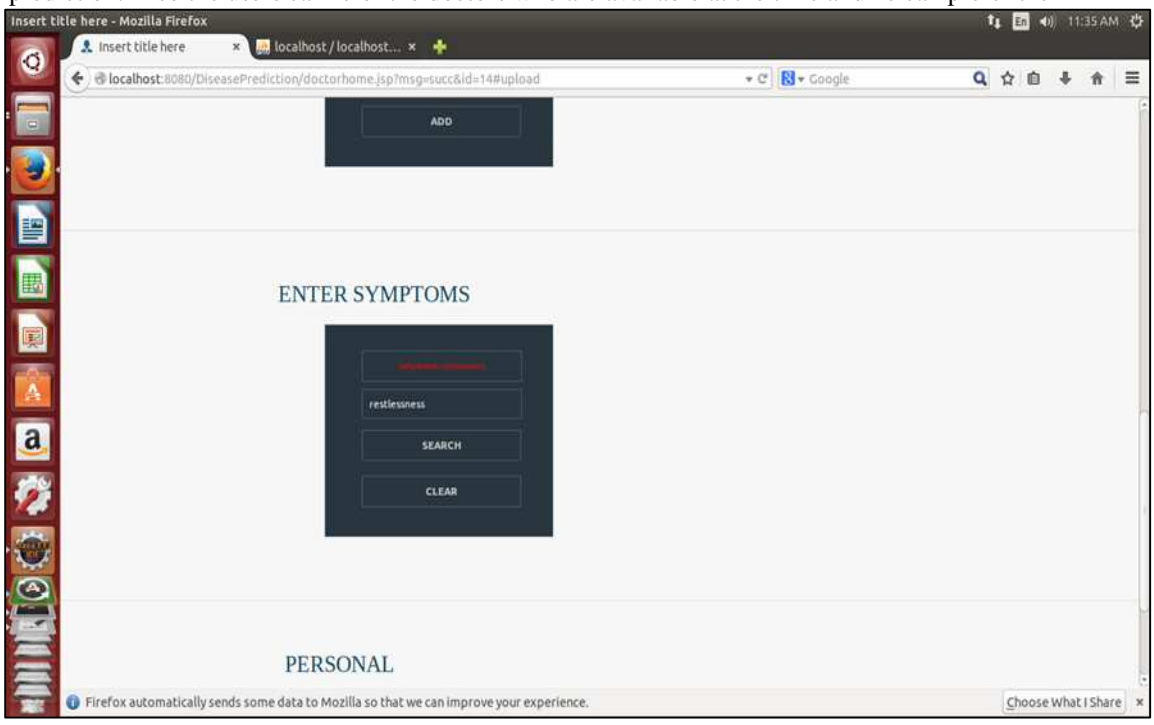

Fig. 6: Enter Symptoms

So the user is provided with the list of doctors who can consult them via this. And the user can enter the symptoms which they have to get further details regarding the disease they do have. Here the doctor can also be a survillance for the activity done by the machine which prescribes medicine to the user.

Once the user gets the disease by entering his symptom he can get the drug for the disease. The drug is preferred by learning the huge record sets of diseases with their preferred medicine which makes the system to predict the medicine or the drug.

V. FUTURE ENHANCEMENT

- Instead of a formal way of giving the system the user can give in his or her own natural language which may be convenient for the user to express his thoughts.
- The project can be expanded by using a wearable medical sensors which can automatically get the patient symptoms easy for the user to use the system.

VI. CONCLUSION

From the above reference we can say that terabytes of huge data can be maintained and processed by using those data efficiently. So with this system a next generation automation system can be developed which process with the medical data and give a better solution to the world .Big data helps in managing those data and the huge patient records can be maintained for future enhancement. Hadoop helps in retrieving the information of the patient with the high processing speed. Here it contains the high volume of PHR's in the database. It also contains the structured, unstructured and semi-structured data in the patient's record. In this paper, we get the patient information and we analysis the best medicine based on patients symptoms and suggest the best drug.

REFERENCES

[1] G. Lopez, V. Custodio, and J. I. Moreno, "LOBIN: E-textile and wireless-sensor-network-based platform for healthcare monitoring in future hospital environments," IEEE Trans. Information Technology in Biomedicine, vol. 14, no. 6, pp. 1446–1458, 2010.
[2] A.M. Nia, M. Mozaffari-Kermani, S. Sur-Kolay, A. Raghunathan, and N. K. Jha, "Energy-efficient long-term continuous personal health monitoring," IEEE Trans. Multi-Scale Computing Systems, vol. 1, no. 2, pp. 85–98, 2015.
[3] M. Mozaffari-Kermani, S. Sur-Kolay, A. Raghunathan, and N. K. Jha, "Systematic poisoning attacks on and defenses for machine learning in healthcare," IEEE J. Biomedical and Health Informatics, vol. 19, no. 6, pp. 1893–1905, 2015.
[4] M. Shoaib, N. K. Jha, and N. Verma, "Signal processing with direct computations on compressively sensed data," IEEE Trans. Very Large Scale Integr. Syst., vol. 23, no. 1, pp. 30–43, 2015.
[5] A. H. Khandoker, M. Palaniswami, and C. K. Karmakar, "Support vector machines for automated recognition of obstructive sleep apnea syndrome from ECG recordings," IEEE Trans. Information Technology in Biomedicine, vol. 13, no. 1, pp. 37–48, 2009.
[6] G. N. Forrest, T. C. Van Schooneveld, R. Kullar, L. T. Schulz, P. Duong, and M. Postelnick, "Use of electronic health records and clinical decision support systems for antimicrobial stewardship," Clinical Infectious Diseases, vol. 59, pp. 122–133, 2014.
[7] D. Suryakumar, A. H. Sung, and Q. Liu, "Influence of machine learning vs. ranking algorithm on the critical dimension," Int. J. Future Computer and Communication, vol. 2, no. 3, pp. 215–220, 2013.