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Survival Prediction of Myocardial Infarction Disease using Cloud Assistance

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***Abstract*—** E-healthcare system have been increasingly facilitating health condition monitoring, early intervention and evidence based medical treatment by accepting the Personal Health Information (PHI) of the patients. Myocardial Infarction is one of the most leading cause variations in the health condition and that can be lead to the death of the human being. The early prediction of such disease can reduce or prevent development of it and helps to take the necessary treatment. The proposed system is one efficient tool to predicting such diseases. This system can learn from the past data of those patients to be capable of predicting the survival of death of the patient with myocardial infarction. The health information data of the patients who are suffering from such disease is collected and stored. It consists survival period and some clinical data of patients who suffered from myocardial infarction can be used to train an intelligent system to predict the survival or death of current myocardial infarction patients. The Gaussian Naïve Bayes algorithms are used to train the collected data of patients and generalize the survival or death of current patients suffering from myocardial infarction. Experimentally, the instances are stored in the cloud and used as the trained instance. The test data will be provided by the physician to predict the survival or death of the current patient suffering from myocardial infarction.

***Keywords*—** E-healthcare system, Authentication, Cloud, Myocardial infarction, Gaussian naïve Bayes classifier algorithm, survival prediction.

I. INTRODUCTION

E-healthcare system provide continuous health condition monitoring, detection of disease and early prevention methods to avoid attack of disease by taking required medical treatment in case of emergency or variation in the health condition. By collecting the Personal Health Information (PHI) of the different patient having diseases are together is in large number and huge amount of data cannot be stored in normal storage so the collected data outsourced to the cloud for the storage and retrieval purpose. [4] The personal health information of the patient can be retrieved from the cloud whenever it is required. [6] In this paper we are considering the myocardial infarction disease data for the survival or death prediction of the patient who is currently suffering from myocardial infarction disease as the test data and the past data of patient having myocardial infarction disease is used as the training data. Based on the past data the survival or death prediction of the patient currently suffering from myocardial infarction can be done. [7]

Initially, the patients are register with healthcare provider and upload the personal health information to the cloud. By regularly collecting personal health information of the patient that leads to huge amount of data, due to this it cannot be afforded at both patient and physician's ends. It is energy consuming task for the storage so it is outsourced to the cloud. [1] The health information retrieved from the cloud and it can be used for further medical treatment if it is required in the future. Registered or Authorized Physician will retrieve health information of the patient from the cloud and also Physician will provide the information to predict the survival or death of the patient who is currently suffering from myocardial infarction. [1]

II. NETWORK ARCHITECTURE

The Network Architecture healthcare system for survival prediction mainly consists of four entities they are patient, healthcare provider, physician and cloud. **Figure 1** shown in the above figure patient will register to the healthcare provider and upload the personal health information to the cloud for the storage. Physician will register with the healthcare provider and healthcare provider admin will check the registered physician and activate the authorized physician

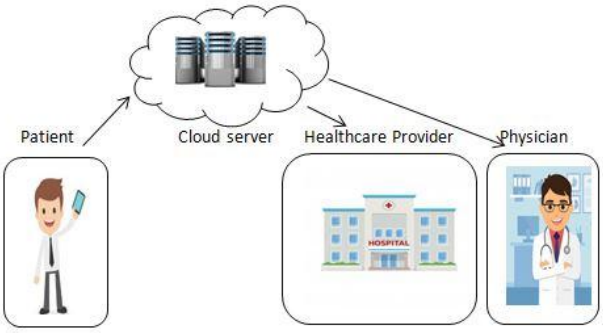

Figure 1: Healthcare system for survival prediction with cloud Assistance.

to access the personal health information or data of the patient. And then physician will enter the information to know the survival prediction of the patient with myocardial infarction. By collecting the personal health information of many patients that leads to huge amount of data and that cannot be afforded at both patient and physician ends, so it is outsourced to the cloud for the storage and retrieval purpose whenever it is required. [5] The Gaussian Naïve Bayes classifier algorithm is used to predict whether the patient will alive for more than one year or less than year. The testing data of the patient currently suffering from myocardial infarction will be entered by the physician and the comparison will be done with both training and test data to predict the survival or death of the patient. [1]

III. PROPOSED METHODOLOGY

In this work, we propose the use of classifier to predict the death or survival of the patients who are suffering from myocardial infarction. The Gaussian Naïve Bayes is one of easy and fast classifier to predict class of test data. When assumption of independence holds, a Naïve Bayes classifier performs better compare to other models. Therefore, this work is to develop the intelligent classifier system that will be trained using the data collection of many patients who have had suffered from myocardial infarction [2]. The database consists of 11 parameter in that one parameter is used to predict the death or survival of the patient who are currently suffering from myocardial infarction. [2]

For output, only one attribute can be used to predict the death or survival of the patient. Depending upon training dataset, the classifier system will be capable of predicting whether the patient with myocardial infarction is to going to survive or not. [3]

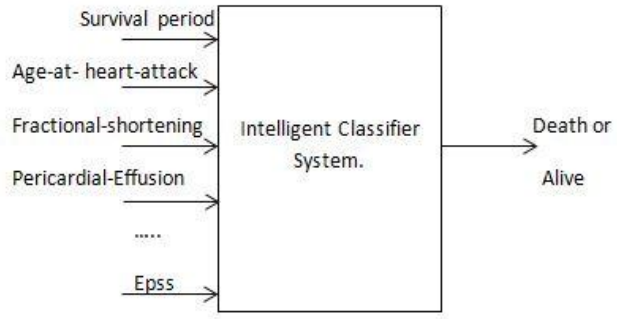

Figure 2: Survival Prediction Classifier

Data Collection Description

In this proposed system user interface is created for patients, physician and admin or healthcare provider. Patient will register to the system and login using the credentials to provide the personal health information or data. The data provided by the patient will automatically store in the cloud. Then physician will register to the system but it is not activated unless admin or healthcare provide authenticate or activate the physician to access the patient information. Once the admin authenticate or activate the physician, physician will get confirmation notification. Physician will login into the system using the credentials and access the patient information. Physician will enter the patient information or data for the survival prediction of the patient.

The data collection consists of the collected patient's information who is suffering from myocardial infarction. The dataset consists of 13 attributes of the patient who is suffering from myocardial infarction [8], in that unwanted attributes are discarded. In the remaining 10 attributes consists of clinical data, some medical variable and other attribute values, they are survival, still-alive, age at heart attack, pericardial effusion, fractional shortening, Epss, lvdd, wall motion score, wall motion index and alive at 1. [2] Among 10 attributes 9 are used as input for the prediction of the survival of the patient suffering from myocardial infarction and one attribute is used as the output that value represents the prediction value of the survive or death of the patient. [3]

$$ND = \frac{ParameterValue - Min.valueoftheattribute}{RangeofattributeValue} \quad \ldots(1)$$

Where ND represents the Normalized Data

Input

Initially, the personal health information or data will be entered by the patient in the form provided of the proposed system and collected data is stored in the cloud. As

mentioned in the above prediction system is coded in such a way that among the 10 attributes the 9 attributes are used as the input features for the prediction system and data collection. The data are normalized using the above equation for the input features or the attributes into the range of 0 to 1.

Output

From the above data collection alive at 1 attribute is used to represent the survival prediction of the patient which is Boolean data and it is derived from the first two attributes of the data. The personal health information provided by the patient is stored in the cloud and it can be accessed only by the authorized physician. One of the attribute is used as the output that indicates the survival or death of the patients suffering from myocardial infarction disease. [3]

IV. PROPOSED SYSTEM

The GaussianNB classifier algorithm is used to survival prediction of the patients are currently suffering from the myocardial infarction. Initially, the dataset of the patient suffering from myocardial infarction disease is collected and pre-processing is done. Data normalization is done using the equation (1) from the range 0 to 1 and the classification algorithm is applied to predict the survival or not of the patients suffering from myocardial infarction diseases. The comparison is made between to past data of the patient who are suffered from myocardial infarction disease and the patient who is currently suffering from myocardial infarction disease to predict the survival of the patient.

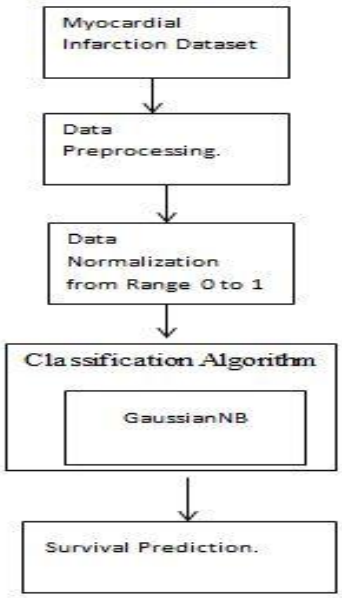

Figure 3: survival prediction system.

Above figure 3 represents the survival prediction of the patients which correct classified and incorrectly classified.

V. PREDICTION RESULTS

The experimental results of the developed survival myocardial infarction prediction system were as follows among the 131 instances we are used 61 as the training instances and the remaining as the test instances. In 61 instances 50 are correctly and 11 are incorrectly classified using the GaussianNB classifier algorithm with the accuracy of 81.96% and 18.03% for the correctly and incorrectly instances respectively.

VI. CONCLUSION

E-healthcare system is the one the trending technology in the medical field. Where patient, physician, cloud and healthcare provider plays a very important role in this proposed system. The patient provides the information to the physician to know the health condition. Physician will access the patient health information for the survival prediction of the patient. Here in this we collected the patient data that are suffered from myocardial infarction disease and trained. Test data used to predict the myocardial infarction disease based on the trained data. In this paper we have considered the health information of the patient who is suffering from the myocardial infarction disease to predict whether the patient will alive for more than one year or less than one year. For the fast and easy classification of the test data we have used Gaussian Naïve Bayes classifier. Gaussian Naïve Bayes is one of the better performance model compared to other model for the accuracy or prediction purpose.

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