MACHINE LEARNING BASED HEART DISEASE PREDICTION USING IBM CLOUD

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Abstract

One of the main concerns for hospitals in developing nations is a compliant patient-concerned system. Due to the lack of appropriate, accessible, and ascendable smart technology, the majority of hospitals in developing countries lack sufficient health assistance. The objective of this project is to generate a functional system that will enable hospitals to provide real-time feedback to patients in need of assistance. The central idea of this research is patient cardiac disease prediction using machine learning (ML). The raised area utilized for this study to accumulate and manage data and ML paradigms is IBM Cloud, IBM Watson Studio. Bagging approach of ensemble learning method has been applied to improve the paradigms accuracy. For ensemble learning, the following algorithms are employed: Bagging SVC, K-Neighbors, Extra Trees, and Random Forest.

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1. Introduction

Due to the lack of adequate, accessible, and scalable smart technology, the majority of hospitals struggle to provide proper healthcare. By carefully monitoring the patient's condition and test results, the majority of the devices are operated manually. Therefore, we explored optimizing the procedures and decision-making capacity with the aid of contemporary innovations. Machine learning models can predict a patient's status in the near future, including whether it will improve or deteriorate and if it will require immediate assistance. In Bangladesh, the use of technology in the health industry seems to be one of the least prevalent. Although other industries have fully benefited from this opportunity, the health industry appears to be behind. The majority of government initiatives to incorporate technology into the health industry have failed. The majority of instances involve patient deaths or serious bodily or mental harm as a result of inadequate care of patients during an emergency.Fullyutilizing machine learning to acclaim an advanced course and therefore, doctors may quickly observe a number of patients. Family members of patients can even stay informed without frequently visiting the hospital.

- Why It's challenging to handle so many patients at once, and the most skilled doctor has a high degree of the patient.
- The hospital lacks aiding adequate health services owing to the absence of correct, simple, and controllable smart technologies.

Problem Statement

Patients have to endure waiting for the diagnosis and results, which takes time because specialized specialists are difficult to find.

Proposed System

Here, we build a system that hospitals may use to assist critically ill patients in real time. With machine learning and IBM cloud, we want to develop a general architecture, related language.

Existing System

In the current system, it is quite challenging to bring about so numerous patients simultaneously, and the top veteran doctor has a great patient mandate. We learned about the aspects that characterize a patient's medical status from the hospital survey, including their natural health issues, key health situations. Why It's complicated to handle so many patients at once, and the most skilled doctor has a high degree of the patient, so the hospital lacks aiding adequate health services owing to the absence of correct, simple, and controllable smart technologies.

Disadvantages of The Existing System

The central idea of this study is patient cardiac disease prediction using machine learning (ML).
The research's platform for storing and conserving our data and ML models is IBM Watson Studio. We have chosenXg-Boost, Ada-Boost, and Ensemble as our Base Predictors for Ml models.

Advantages of Proposed System

- It allows doctor to remotely monitor a patient's condition while leveraging cloud to entree the patient's prominence from any abode and fully utilizing machine learning in recommending an advanced course of action.
- Physicians can quickly observe a large number of patients.

System Design Architecture

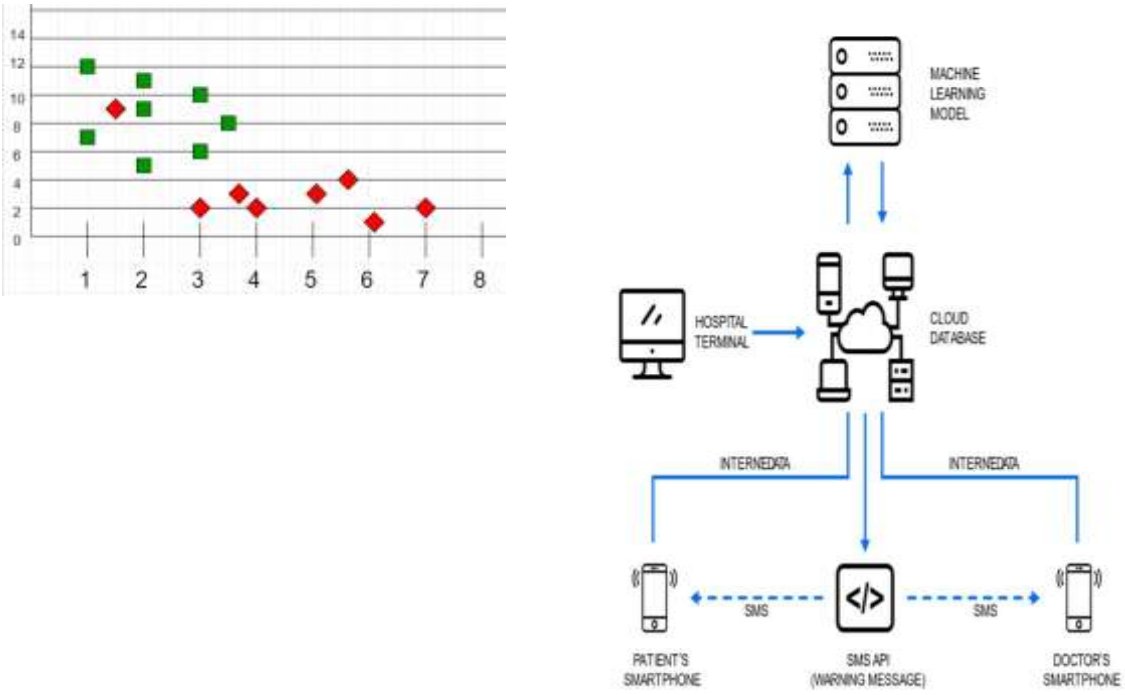

Fig.Architectural view of Machine Learning based heart disease prediction using IBM cloud.

Algorithms

- **Support Vector Machine:**Support Vector Machine (SVM) is a supervised machine learning technique that may be used to elucidate problems involving regression or classification. It is frequently applied to categorization issues. with the value of a certain location representing the evaluation of each characteristic. Then, classification is achieved by identifying the hyper-plane that effectively make a distinctionamongst the two classes

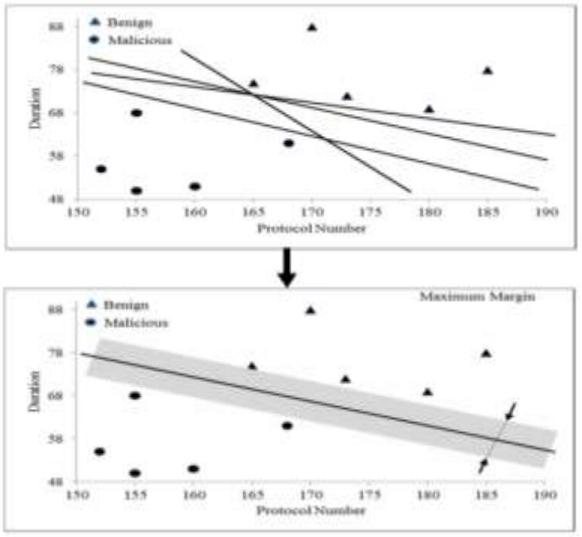

Fig.Support vector machine

- **KNN:**This supervised learning method uses non-parametric data to provide predictions for both classification and regression. The data set is simply maintained during the training phase, and when new data is received, it is organized into categories that are quite similar to the current data.

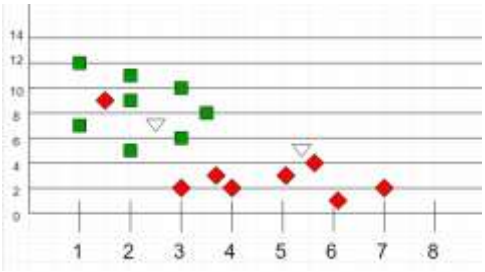

Fig.KNN algorithm

- **Ensemble:**Ensemble learning mentions to algorithms that combine the predictions from two or more
- models.
- **Xgboost:**Xgboost is a decision-tree-based ensemble Machine learning algorithm that usage a gradient boosting framework.
- **Ada-boost:**Ada-boost Algorithm is also well-known as Adaptive Boosting which is an Ensemble modeling technique cast-off in Machine Learning to find the best model.
- **Linear Regression:** Linear Regression is a machine learning algorithm centered on supervised learning. It accomplishes a regression task. Ensemble model (SVM and KNN).

Modules

- Data exploration
- Data preprocessing
- Splitting data into train & test
- Model generation

Module Description

- **Data exploration:**The data is entered into the system using this module.
- **Dividing data into train and test:** Data will be divided into train and test using this module.
- **Model Generation:** SVM, Linear Regression, K-Neighbors Classifier, Decision Tree Classifier, Xg-Boost, Ada-Boost, and Ensemble are used for model development.

Implementation

- To run project install python 3.7 IDLE
- After installation run below command from healthcare dataset.
- Run python manage.py run server in the command prompt.
- Open browser and enter url from the command prompt.

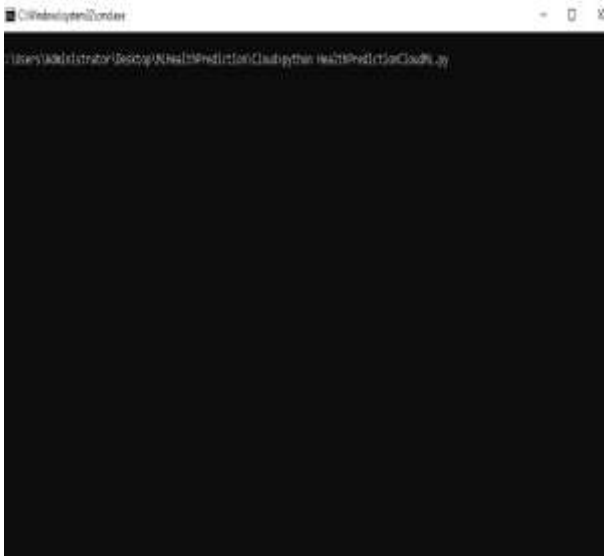

Fig.Command prompt used for running algorithms with dataset.

Fig.Copying the Url from command prompt.

Testing

Testing Strategies: Testing is the procedure where test data is organized and utilized to test each module separately before the validation is supplied for the fields. Then the system is tested to ensure that each component of the system is functioning as a whole.

- **System testing:**Complex software must undergo testing to ensure that it is solving the issue for which it was designed before being made available to consumers. So that one can validate the reliability of the program, this testing consists of multiple types of tests.so that one can confirm the dependability of the program.
- **Module testing:** Each module is independently checked in order to localise faults. whenever the programme does not provide the necessary .
- **Acceptance Testing:**The user identified no serious flaws in the accuracy of the system followin

2. Result

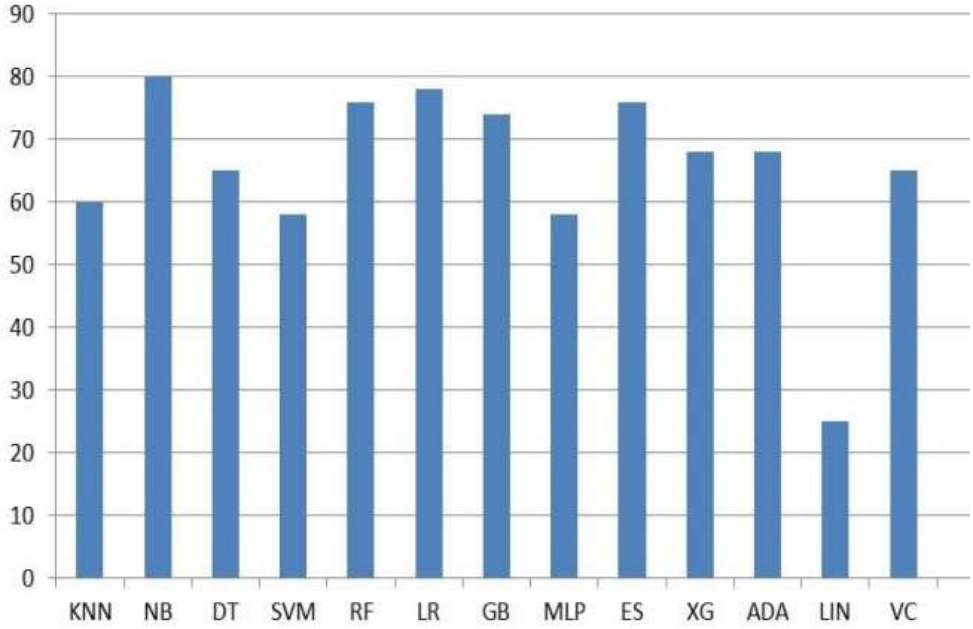

Fig. Precision Graph

The above figure has Naïve bayes algorithm got 80% accuracy and click on 'Precision Graph' button to get above precision graph.

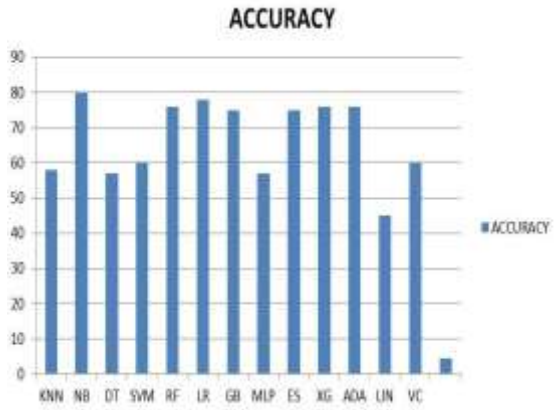

Fig.Accuracy Graph

Click on "Accuracy Graph' button to get accuracygraph. The naïve Bayes algorithm has highest accuracy.

Fig. Fscore Graph

Click on 'FScore Graph' button to get FMeasuregraph. The highest Fscore value is for naïve Bayes algorithm.

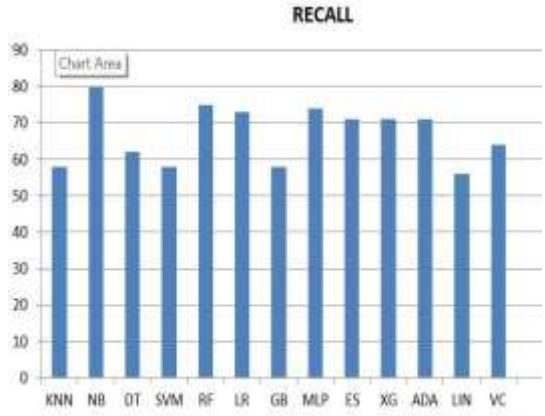

Fig.Recall Graph

Click on 'Recall Graph' button to get Recall graph.The highest Fscore value is for naïve Bayes algorithm.

3. Conclusion

To fetch out an upright results in the hospitals to support patients, we cast-off the occurredmethods and equipment to promote a new structure in the hospitals. Most of the ML models accuracy range from 45% to 80%. Minimumcorrectness gained is 45%. Adominant verdict of this forecast is the apt use of ML paradigms for patients.

Future Scope

In future, more machine learning models can be employed to appliance and provide diagnosis for other diseases and provide accurate results. The installation ofentrenched system to return a live analysis from the patient.Accumulation of more efficient algorithms will upsurge the whole working accuracy.

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