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Prediction of Health Care Data Using Efficient Machine Learning Algorithms

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ABSTRACT- Every clinical decision relies on the doctor's expertise and comprehension. This standard procedure may, despite appearances, lead to errors, biases, and increased costs that compromise the patients' Quality of Service (QoS).There is a pressing need for adaptable equipment for critical patient care in developing nations like India. The majority of Indian hospitals are unable to provide their patients with adequate medical care due to a lack of suitable, simple, and expandable intelligent systems.The development of a comprehensive system that will enable hospitals to provide vital patients with a real-time feedback system is the objective of this project.Using IBM cloud computing as a service platform and machine learning, we propose a standard architecture, language, and classification scheme for analyzing vital patient health data (PaaS).The development of a machine learning (ML) method for predicting a patient's fitness is the primary goal of this study.Our models and data are stored and managed by IBM Watson Studio and IBM Cloud.The Base Predictors for our ml models are Nave Bayes, Logistic Regression, the KNeighbors Classifier, the Decision Tree Classifier, the Random Forest Classifier, the Gradient Boosting Classifier, and the MLP Classifier.The precision of the model has been increased by employing the ensemble learning bagging strategy.We use a variety of machine learning algorithms for ensemble learning.The Critical Patient Management System, or CPMS, is a mobile application we developed that allows for real-time data and record viewing.Data that is relevant to ML model training and deployment can be fetched in real time from IBM Cloud and made available through CPMS because of the way the system is built.Doctors can use Ml tendencies to predict a patient's health status.The CPMS will send an SMS notification to the duty physician and nurse to provide immediate care if the situation worsens as anticipated.Hospitals might get a smart healthcare solution if the mission, milliliter models, and mobile application are combined.

KEYWORDS- ML, IBM cloud, CPMS.

I. INTRODUCTION

The Basic Patient Care or Checking System is a cycle in which a specialist can constantly screen multiple patients for multiple boundaries at once in a remote location and has authority over medication measurements [1].These frameworks would greatly aid in the development and evaluation of emotionally supportive ICU networks.Basic patients whose bodies require time to recuperate and repair are assisted by devices like essential sign screens, mechanical ventilators, dialysis machines, and others.The patient's condition and test results are used to direct the vast majority of the machines.Thusly, we remembered to motorize the connection and dynamic limit with the help of present day advancement, especially the auto deployable man-made intelligence models and appropriated registering.If a patient requires immediate assistance, AI models can anticipate the patient's future state, regardless of whether their condition will improve or worsen.To summarize our models and data, we chose IBM Cloud as a PaaS that fully supports public, private, and mixed environments [2].Since we were unable to send our models directly at first, we had to use IBM Cloud and IBM Watson Studio to store, test, and send our entire framework.The ml models run inside the cloud administration and prepare with auto-conveyed data. The CPMS can also connect to the benefits of the cloud through Bluemix [3].The largest portion of this paper presents the auto deployable AI model within distributed storage with remarkable precision.Similarly, boundary selection and testing and tuning methods for various AI calculations.

II. LITERATURE SURVEY

A. Aggarwal, M., & Madhukar, M.[2]

Software tools on IoT platforms that conform to industry standards can be used to process the vast amounts of measured data from smart buildings.The operational and technological functions that determine the quality of the interior environment can be optimized in accordance with the actual requirements of the occupants with the assistance of these solutions.[1]This article looks at how IBM SPSS IoT software tools can be used to track when a Smart Home Care (SHC) room is used to improve CO2

forecast accuracy in SHC.Between the spring and fall seasons, the processed data were compared daily, weekly, and monthly.[2]The Radial Basis Function (RBF) method predicted the CO2 concentrations by utilizing measurements of both the indoor and outdoor temperature as well as relative humidity.The daily processing of data produced the most accurate projections.Utilizing a wavelet transform to eliminate noise from the CO2 forecasting data improved prediction accuracy.In the chosen experiments, prediction accuracy was greater than 95 percent.An intelligent building adapts to the needs of its occupants, their employers, and the community that surrounds it.To learn, change, and respond appropriately, intelligent buildings need constant access to real-time data about their occupants[3].

B. Rational Unified Process

The Rational Unified Process, a software engineering methodology with a searchable online database, is introduced in this article.Software best practices for all essential software lifecycle activities are provided as part of the process,[4] along with guidelines, templates, and tool mentors, to increase team productivity.Using the aforementioned knowledge base (UML),[5] development teams can take full advantage of the widely used Unified ModelingLanguage.The Rational Unified Process® is a standard approach in software development.Within a development team, it provides a methodical framework for assigning work[6].Its goal is to guarantee the timely and economical [10].delivery of software of high quality that meets the needs of its intended audience.[7]The Rational Unified Process is a process product that was developed by Rational® Software and is still being updated [8].To ensure that the process is always accurate and up to date, the Rational Unified Process development team works closely with partners, customers, Rational's product groups, and Rational's consultant organization[9].

III. PROPOSED SYSTEM

Laptop mastering techniques are gaining popularity in the search community as a means of automating the process and making more accurate predictions about diseases.Strategies for machine learning make it easier to transform the Genius into a machine, allowing it to operate at a higher level in the future by making use of the realized experience.On the digital fitness report dataset, machine learning strategies should provide valuable data and a prediction of fitness risks.

A. Implementation

The author of this paper proposes using machine learning algorithms like the Support Vector Machine (SVM), KNearestNeighbors (KNN), Decision Tree, Naive Bayes, and Ensemble Algorithm to automate abnormal health conditions.In this venture creator is proposing following modules:

- IBM Cloud:This module can be used to store and run machine learning algorithms. When a patient's mobile device senses a patient's vitals, it sends them to the IBM cloud, which applies machine learning algorithms to the received vitals to determine the patient's condition. If the patient's condition is not stable, the cloud will send an SMS message to the doctor to inform the doctor of the patient's condition.In order to implement this module, we must purchase IBM cloud space using credit card information. It is difficult for students to manage this payment, so I have built a dummy cloud that can run on a single laptop or other LAN-connected laptop.You can, for instance, run a dummy cloud on one laptop and a client on another laptop that is connected to the LAN.We are avoiding this SMS service because we must also pay to purchase SMS for SMS services.
- Module for dataset: We will upload the dataset to the dummy cloud using this module.
- Pre-process module: We will use this module to convert missing or alphabetical values into 0 or 1 numbers.
- Module on Machine Learning: This module allows us to train a dataset with a variety of machine learning algorithms and evaluate their performance. The best algorithm will be used to predict the patient's condition.
- Client/Mobile Module:The author of this module claims that the patient's smart phone will send information about his temperature, blood pressure, and other vitals to IBM cloud for monitoring.Because we do not have any sensors, we are uploading test data from the client application. The client will then send the test data to the dummy cloud, where machine learning algorithms will be used to predict the condition of the patient and return the results to the client.
- We have developed two applications for this project:
  - Cloud Application:We can upload datasets, pre-process them, and use machine learning to build a train model in this application.This application uses machine learning algorithms to predict the condition of the patient and return the predicted value to the client application after receiving vitals from the client or mobile application.
  - Application for Client:This application sends a file containing patient vitals to a cloud application, uploads them, and receives the results.

IV. RESULTS AND DISCUSSIONS

The screen for uploading a health care dataset is shown in Figure 1; after uploading the dataset, the screen below appears as show in figure 2.

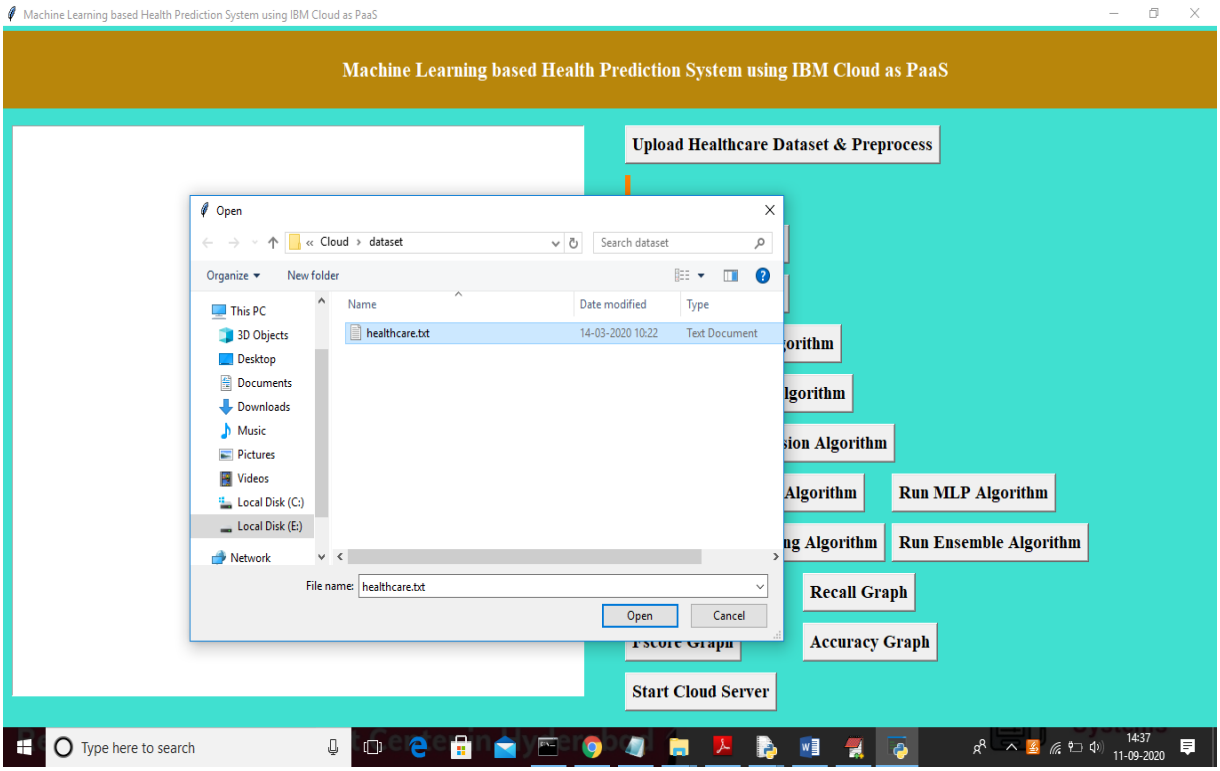

Figure 1: Uploading a health care dataset

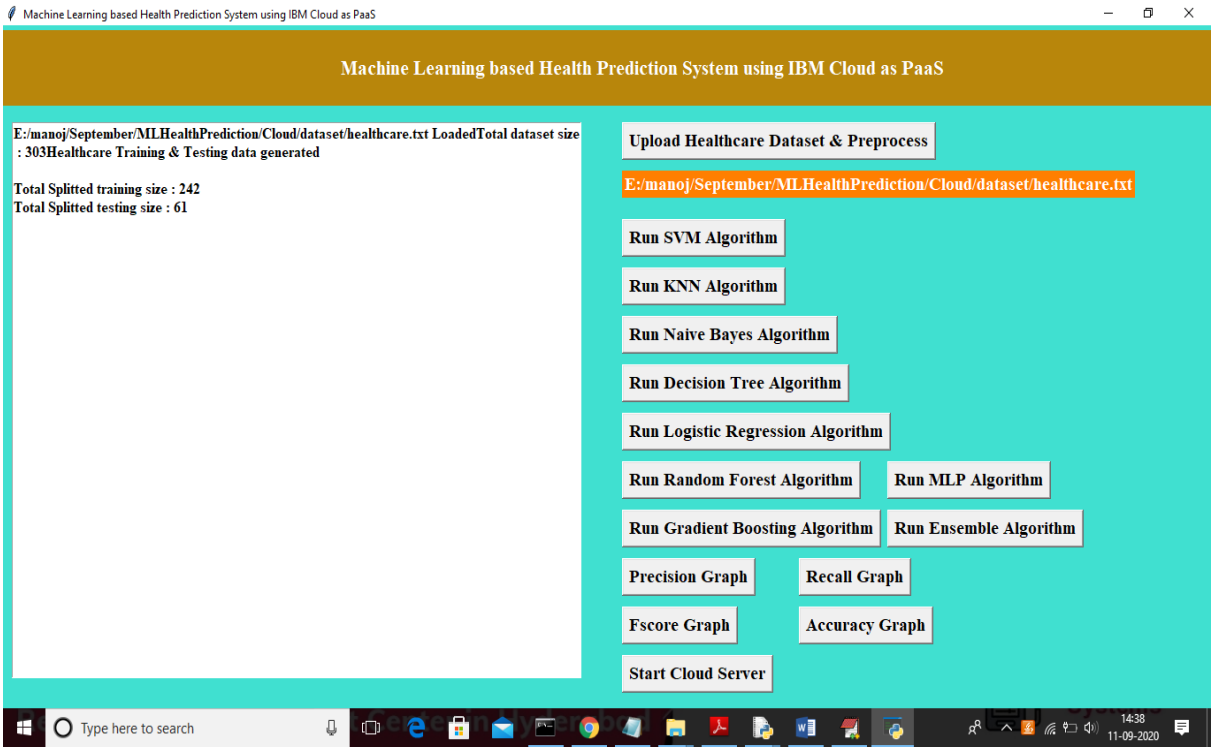

Figure 2: Dataset's records for training

The application uses 80% of the dataset's records for training and 20% for testing, as shown in the figure 2. The dataset totals 303 records.Now that the train dataset and the test dataset are prepared, click the button that says "Run SVM Algorithm" to apply SVM to the train dataset and then check how well it does on the test data to figure out how accurate the predictions are.

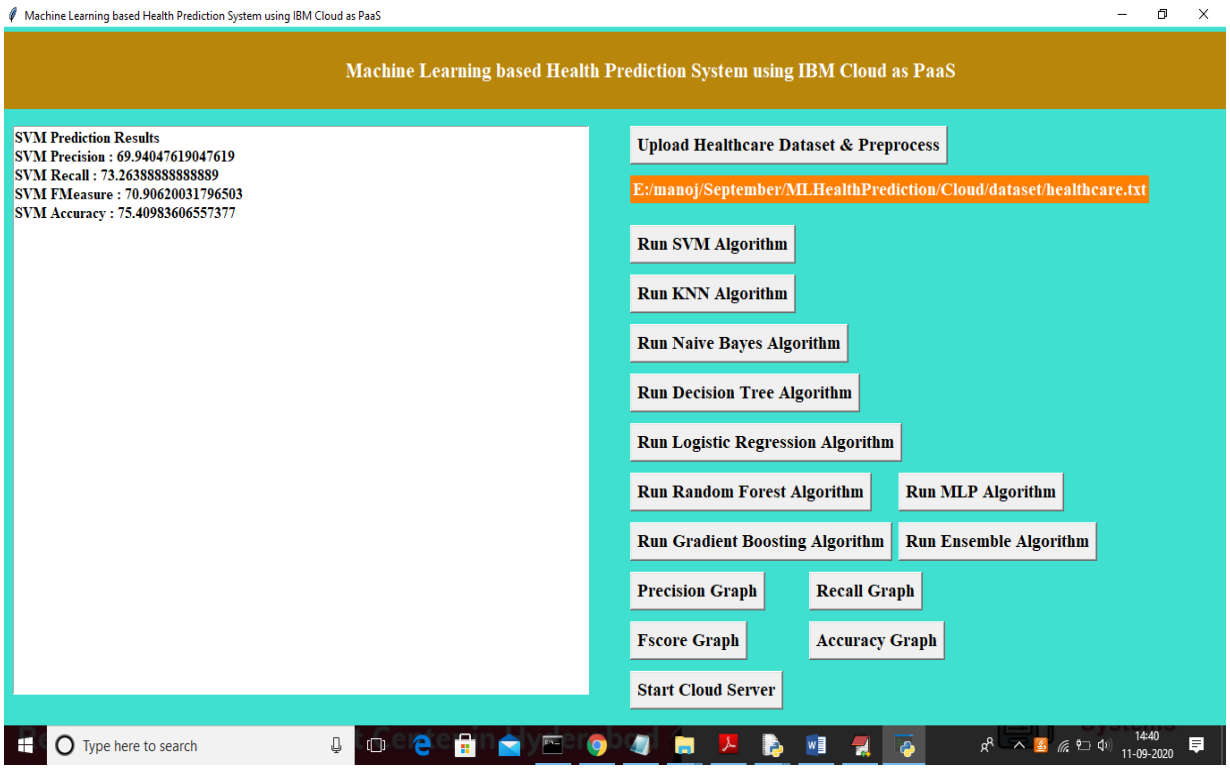

Figure 3: SVM prediction accuracy

On the 20% test dataset, the SVM prediction accuracy is 75%, as shown in Figure 3. We can also see the precision, FMeasure, and Recall values.To generate a KNN model, click the "Run KNN Algorithm" button now.

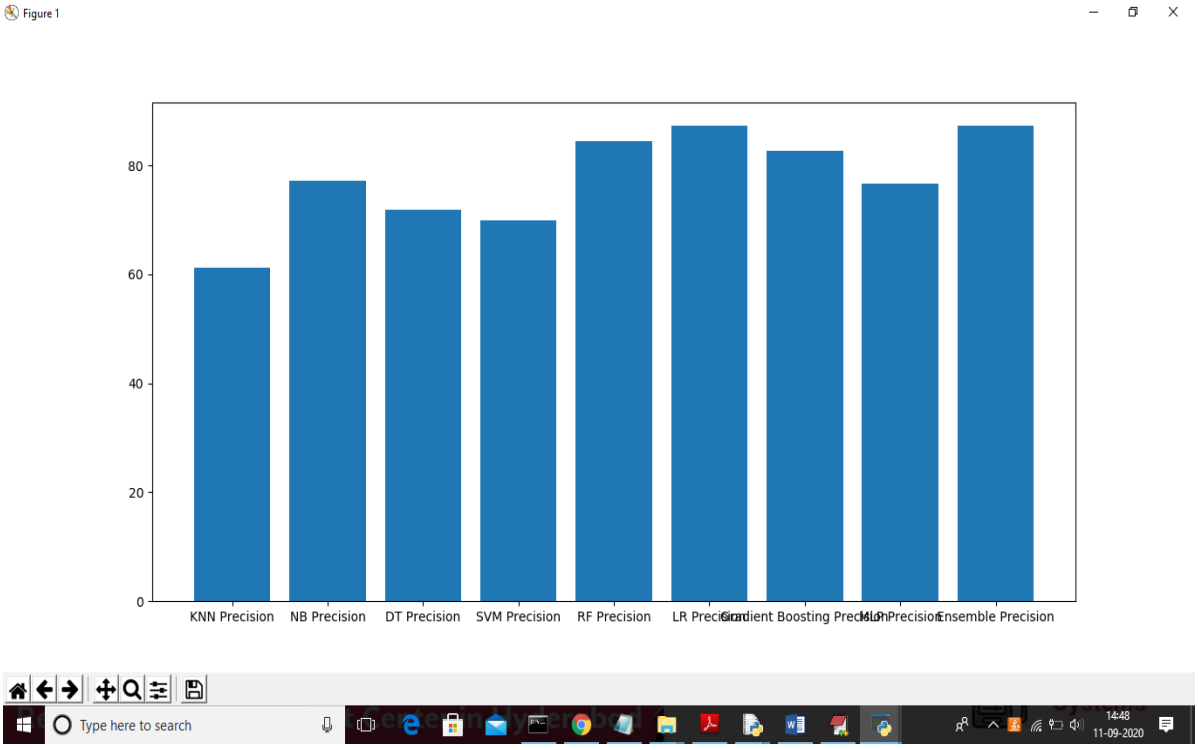

Figure 4: Algorithms are shown on the x-axis, and the precision is shown on the y-axis

Figure 4 In the screen above, the names of the algorithms are shown on the x-axis, and the precision of those algorithms is shown on the y-axis. All of the algorithms in the ensemble perform well.Now, select the "Recall Graph" button to view the following recall graph.

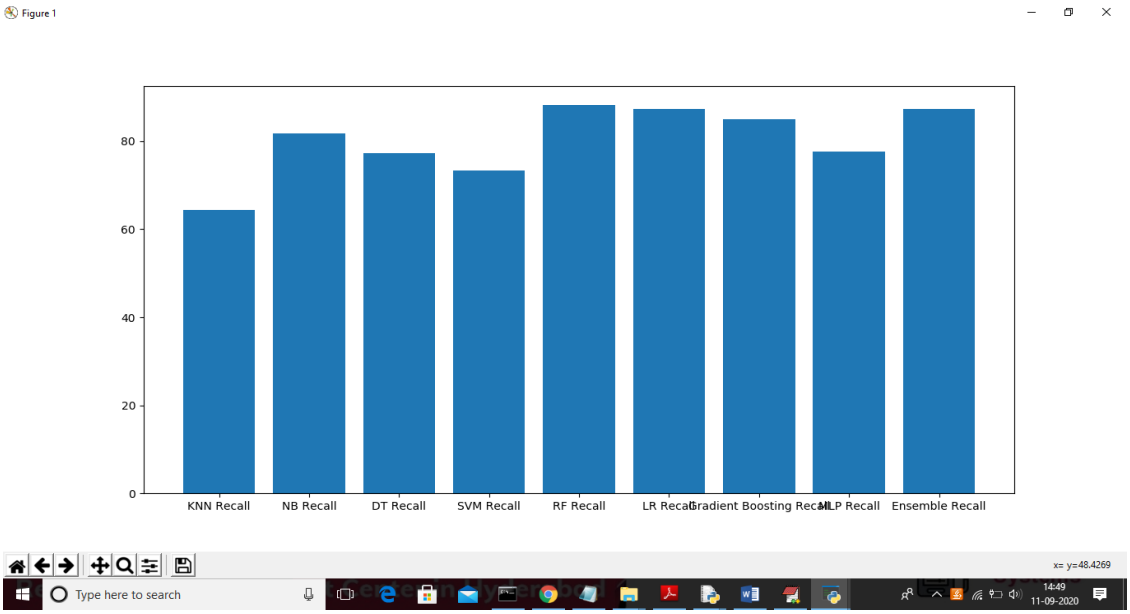

Figure 5: Now click on 'F Score Graph' button to get below F Measure graph

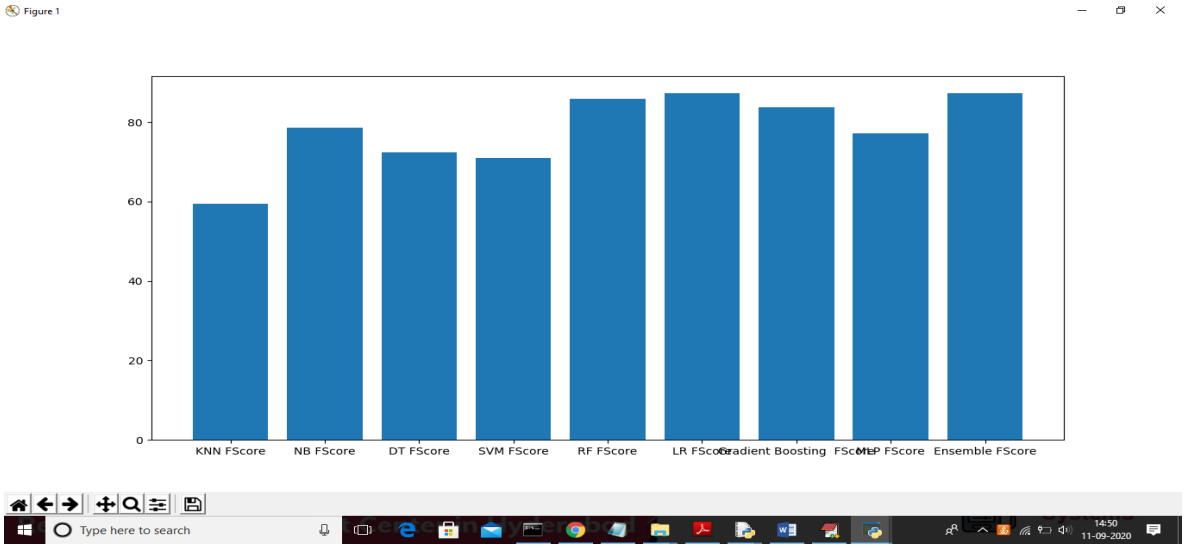

Figure 6: Now click on "Accuracy Graph' button to get below accuracy graph

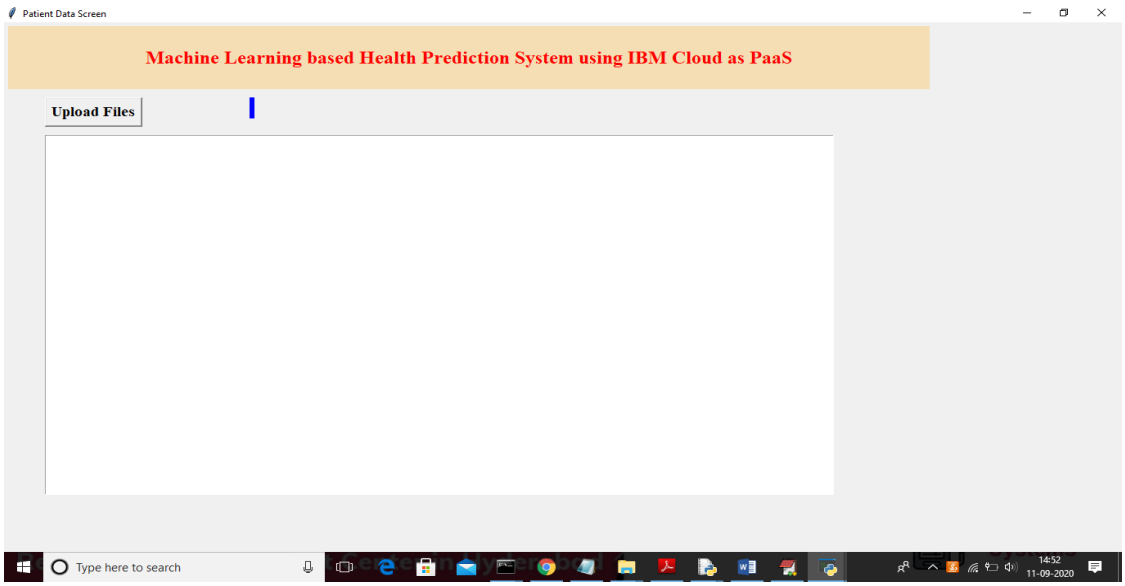

Figure 7: Upload Files' button to upload file with patient

In above screen (Fig 7) client can click on 'Upload Files' button to upload file with patient vitals and this vitals will send to cloud server

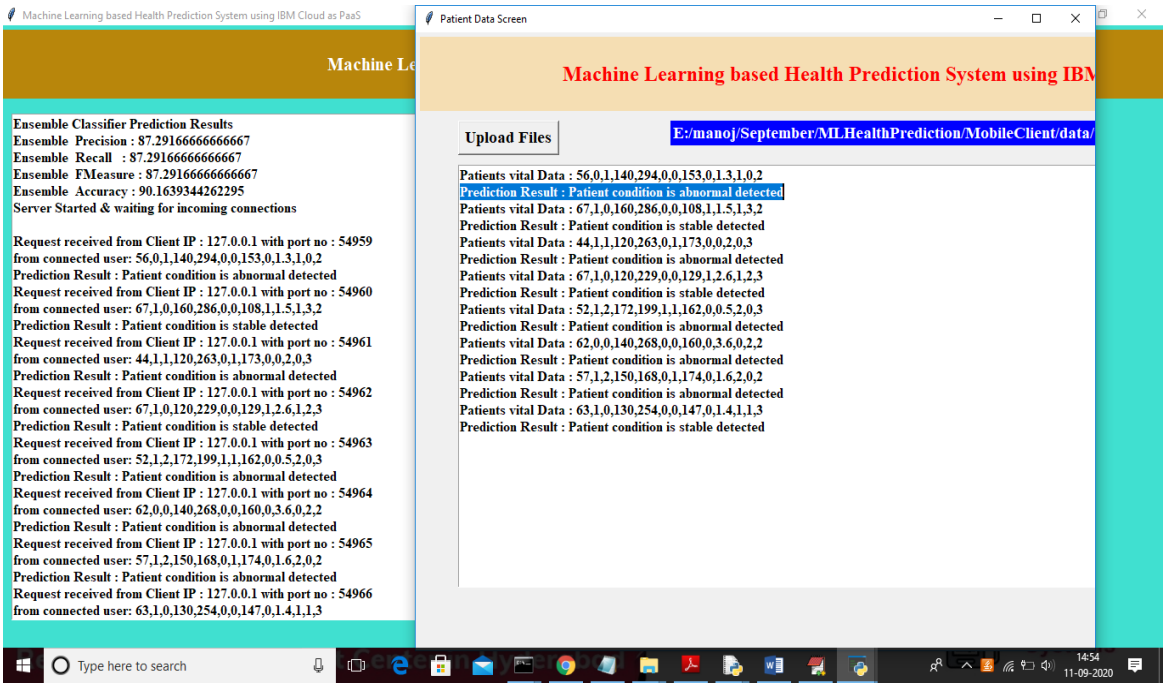

Figure 8: Patient's predicted condition based

In the above figure 8, the first line displays the patient's vitals, and the second line displays the patient's predicted condition based on vitals by machine learning algorithms. The first record on the aforementioned screen shows that machine learning predicted the abnormal condition of the patient.

V. CONCLUSION

In addition to developed improvements at a low cost, we need to provide superior service.We began this project with the goal of achieving first-rate patient service in emergency clinics.In order to supply each additional structure in the scientific health center and nursing sector, we made use of a portion of the existing methods and advancements.The exactness of the ml fashions varied significantly, from 80% to 92%.The lowest level of precision achieved is 80%.The expanding applications of computer learning techniques for scientific patients and comprehensive statistics controls are a comprehensive finding of this assignment.With a satisfaction rate of over 90%, the IBM Cloud demonstrated excellent and promising tasks.The outcomes of our research and testing are conclusively indicating that this device has the potential to expand its market share among urban and low-income groups.A digital professional can be trained to better serve people and give patients proper consideration with the assistance of this task.As a clever clinical care system, this is also a dynamic companion for the professional.We can further advance this project by including full boundaries to measure the body's courses because we have established it with few boundaries of the actual portions.We hope to introduce an implanted device in the future that can monitor the Ventilator, Medicine Pump, Heart Monitor, and other ICU equipment.Additionally, this will improve the task's regular working exactness.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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