Effective Heart Disease Prediction Using IBM Auto AI Service

1.Introduction

1.1 Overview

Cardiovascular diseases (CVDs) are the number 1 cause of death globally, taking an estimated 17.9 million lives each year, which accounts for 31% of all deaths worldwide.Among all fatal disease, heart attacks diseases are considered as the most prevalent. Medical practitioners conduct different surveys on heart diseases and gather information of heart patients, their symptoms and disease progression. Increasingly are reported about patients with common diseases who have typical symptoms. In this fast moving world people want to live a very luxurious life so they work like a machine in order to earn lot of money and live a comfortable life therefore in this race they forget to take care of themselves, because of this there food habits change their entire lifestyle change, in this type of lifestyle they are more tensed they have blood pressure, sugar at a very young age and they don't give enough rest for themselves and eat what they get and they even don't bother about the quality of the food if sick the go for their own medication as a result of all these small negligence it leads to a major threat that is the heart disease

The term 'heart disease' includes the diverse diseases that affect heart. The number of people suffering from heart disease is on the rise (health topics, 2010). The report from world health organization shows us a large number of people that die every year due to the heart disease all over the world. Heart disease is also stated as one of the greatest killers in Africa.

Data mining has been used in a variety of applications such as marketing, customer relationship management, engineering, and medicine analysis, expert prediction, web mining and mobile computing. Of late, data mining has been applied successfully in healthcare fraud and detecting abuse cases.

1.2 Purpose

Clinical decisions are often made based on doctor's insight and experience rather than on the knowledge rich data hidden in the dataset. This practice leads to unwanted biases, errors and excessive medical costs which affects the quality of service provided to patients. The proposed system will integrate clinical decision support with computer-based patient records (Data Sets). This will reduce medical errors, enhance patient safety, decrease unwanted practice variation, and improve patient outcome. This suggestion is promising as data modeling and analysis tools, e.g., data mining, have the potential to generate a knowledge rich environment which can help to significantly improve the quality of clinical decisions.

There are voluminous records in medical data domain and because of this, it has become necessary to use data mining techniques to help in decision support and prediction in the field of healthcare. Therefore, medical data mining contributes to business intelligence which is useful for diagnosing of diseaseHeart failure is a common event caused by CVDs and this dataset contains 9 features that can be used to predict mortality by heart failure.

2.Literature Survey

2.1 Existing Methods

Numerous studies have been done that have focus on diagnosis of heart disease. They have applied different data mining techniques for diagnosis & achieved different probabilities for different methods.

(Polaraju, Durga Prasad, & Tech Scholar, 2017) proposed Prediction of Heart Disease using Multiple Regression Model and it proves that Multiple Linear Regression is appropriate for predicting heart disease chance. The work is performed using training data set consists of 3000 instances with 13 different attributes which has mentioned

earlier. The data set is divided into two parts that is 70% of the data are used for training and 30% used for testing.

(Deepika & Seema, 2017) focuses on techniques that can predict chronic disease by mining the data containing in historical health records using Naïve Bayes, Decision tree, Support Vector Machine (SVM) and Artificial Neural Network (ANN). A comparative study is performed on classifiers to measure the better performance on an accurate rate. From this experiment, SVM gives highest accuracy rate, whereas for diabetes Naïve Bayes gives the highest accuracy.

(Beyene & Kamat, 2018) recommended different algorithms like Naive Bayes, Classification Tree, KNN, Logistic Regression, SVM and ANN. The Logistic Regression gives better accuracy compared to other algorithms. (Beyene & Kamat, 2018) suggested Heart Disease Prediction System using Data Mining Techniques. WEKA software used for automatic diagnosis of disease and to give qualities of services in healthcare centers. The paper used various algorithms like SVM, Naïve Bayes, Association rule, KNN, ANN, and Decision Tree. The paper recommended SVM is effective and provides more accuracy as compared with other data mining algorithms.

Chala Beyene recommended Prediction and Analysis the occurrence of Heart Disease Using Data Mining Techniques. The main objective is to predict the occurrence of heart disease for early automatic diagnosis of the disease within result in short time. The proposed methodology is also critical in healthcare organization with experts that have no more knowledge and skill. It uses different medical attributes such as blood sugar and heart rate, age, sex are some of the attributes are included to identify if the person has heart disease or not. Analyses of data set are computed using WEKA software.

(Soni, Ansari, & Sharma, 2011) proposed to use non- linear classification algorithm for heart disease prediction. It is proposed to use bigdata tools such as Hadoop Distributed File System (HDFS), Map reduce along with SVM for prediction of heart disease with optimized attribute set. This work made an investigation on the use of different data

mining techniques for predicting heart diseases. It suggests to use HDFS for storing large data in different nodes and executing the prediction algorithm using SVM in more than one node simultaneously using SVM. SVM is used in parallel fashion which yielded better computation time than sequential SVM.

(Science & Faculty, 2009) suggested heart disease prediction using data mining and machine learning algorithm. The goal of this study is to extract hidden patterns by applying data mining techniques. The best algorithm J48 based on UCI data has the highest accuracy rate compared to LMT. (Purushottam, Saxena, & Sharma, 2016) proposed an efficient heart disease prediction system using data mining. This system helps medical practitioner to make effective decision making based on the certain parameter. By testing and training phase a certain parameter, it provides 86.3% accuracy in testing phase and 87.3% in training phase.

(Kirmani, 2017) suggested multi disease prediction using data mining techniques. Nowadays, data mining plays vital role in predicting multiple disease. By using data mining techniques, the number of tests can be reduced. This paper mainly concentrates on predicting the heart disease, diabetes and breast cancer etc.,

(Sai & Reddy, 2017) proposed Heart disease prediction using ANN algorithm in data mining. Due to increasing expenses of heart disease diagnosis disease, there was a need to develop new system which can predict heart disease. Prediction model is used to predict the condition of the patient after evaluation on the basis of various parameters like heart beat rate, blood pressure, cholesterol etc. The

accuracy of the system is proved in java.

(A & Naik, 2016) recommended to develop the prediction system which will diagnosis the heart disease from patient's medical data set. 13 risk factors of input attributes have considered to build the system. After analysis of the data from the dataset, data cleaning and data integration was performed. He used k-means and naïve Bayes to predict heart disease. This paper is to build the system using historical heart database

that gives diagnosis. 13 attributes have considered for building the system. To extract knowledge from database, data mining techniques such as clustering, classification methods can be used. 13 attributes with total of 300 records were used from the Cleveland Heart Database. This model is to predict whether the patient have heart disease or not based on the values of 13 attributes.

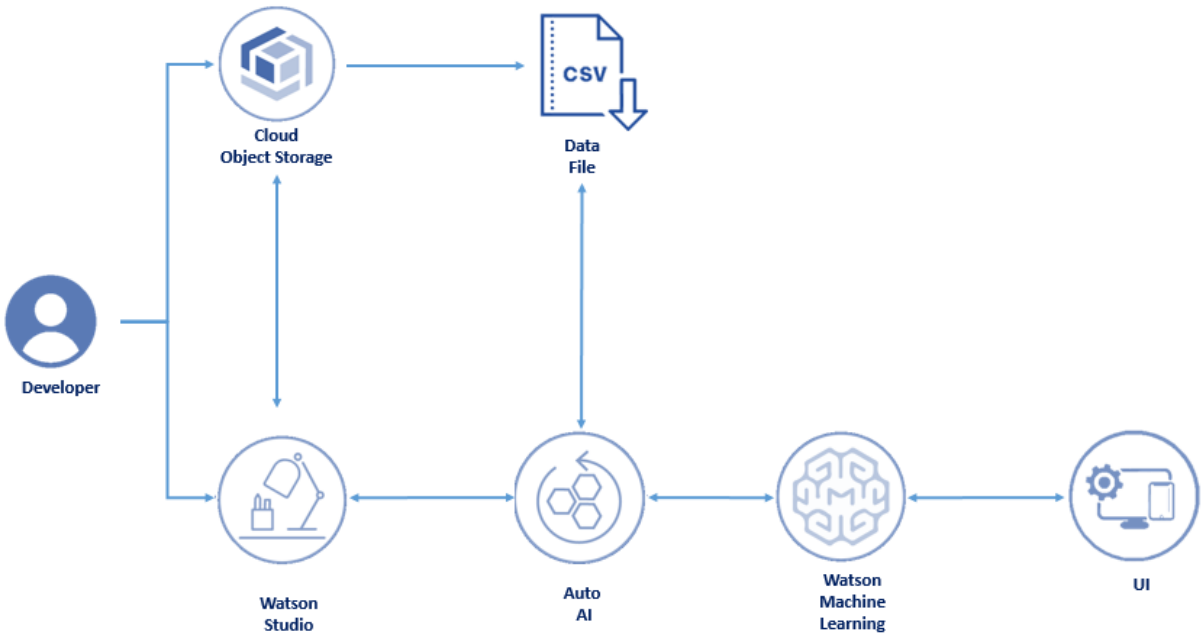
(Sultana, Haider, & Uddin, 2017) proposed an analysis of cardiovascular disease. This paper proposed data mining techniques to predict the disease. It is intended to provide the survey of current techniques to extract information from dataset and it will useful for healthcare practitioners. The performance can be obtained based on the time taken to build the decision tree for the system. The primary objective is to predict the disease with a smaller number of attributes.

2.2 Proposed solution

In this project, a model is build using Auto AI together with a web application where the prediction of heart failure can be view.

3.Theoretical Analysis

3.1Block Diagram



3.2 Software designing

Services Used:

- IBM Watson Studio
- IBM Watson Machine Learning
- Node-RED
- IBM Cloud Object Storage

4.Experimental Investigations

In this Activity, We gonna build a machine learning model that predicts heart failure based on the following parameters

- AVGHEARTBEATSPERMIN
- PALPITATIONSPERDAY
- CHOLESTEROL
- BMI
- AGE
- SEX
- FAMILY HISTORY
- SMOKERLAST5YRS
- EXERCISEMINPERWEEK

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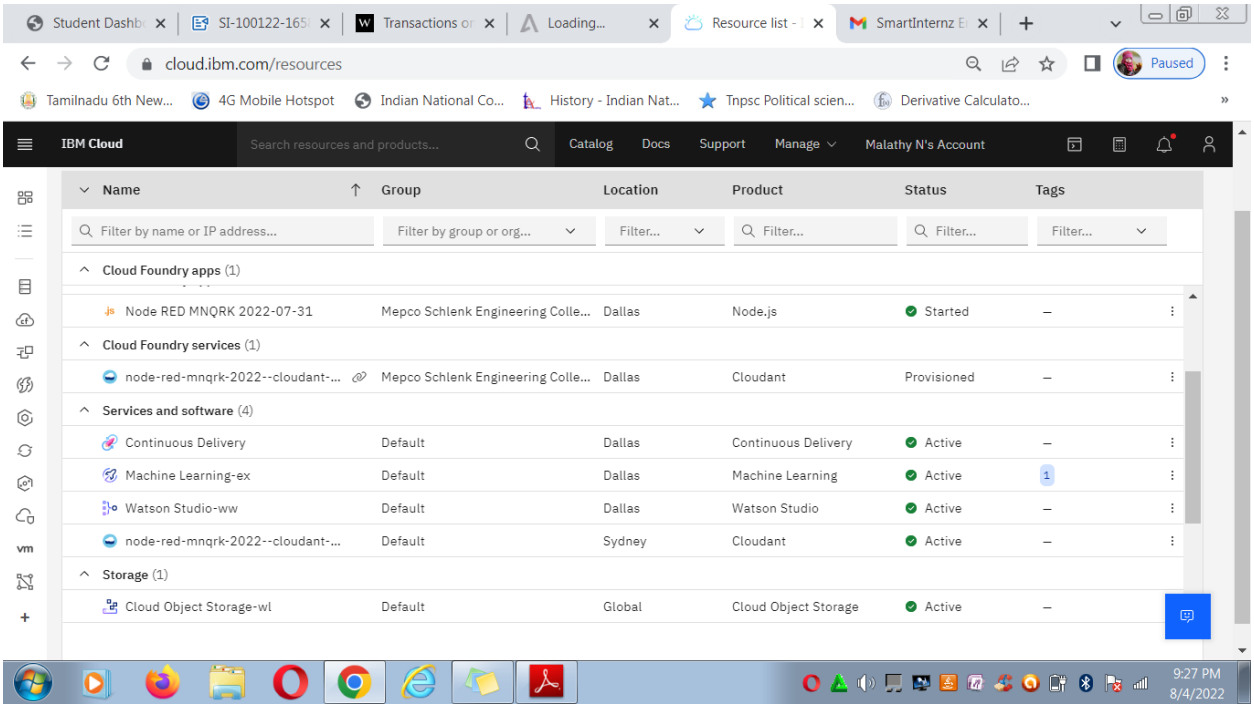

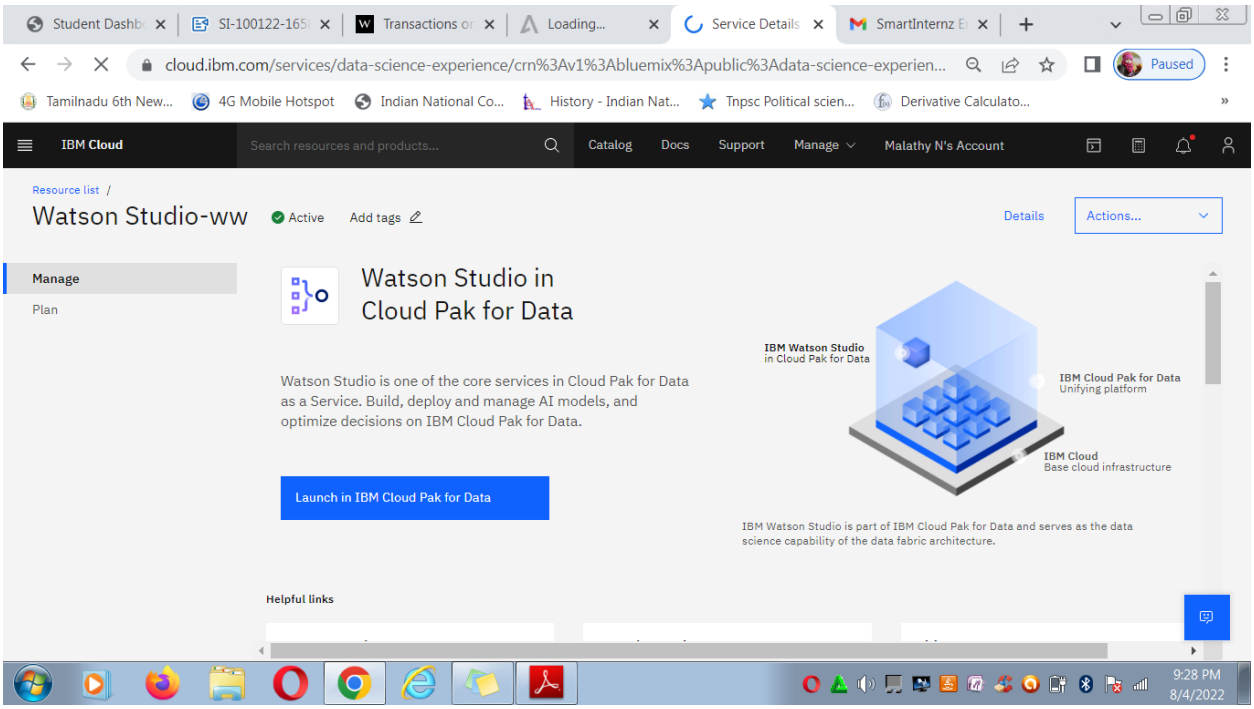
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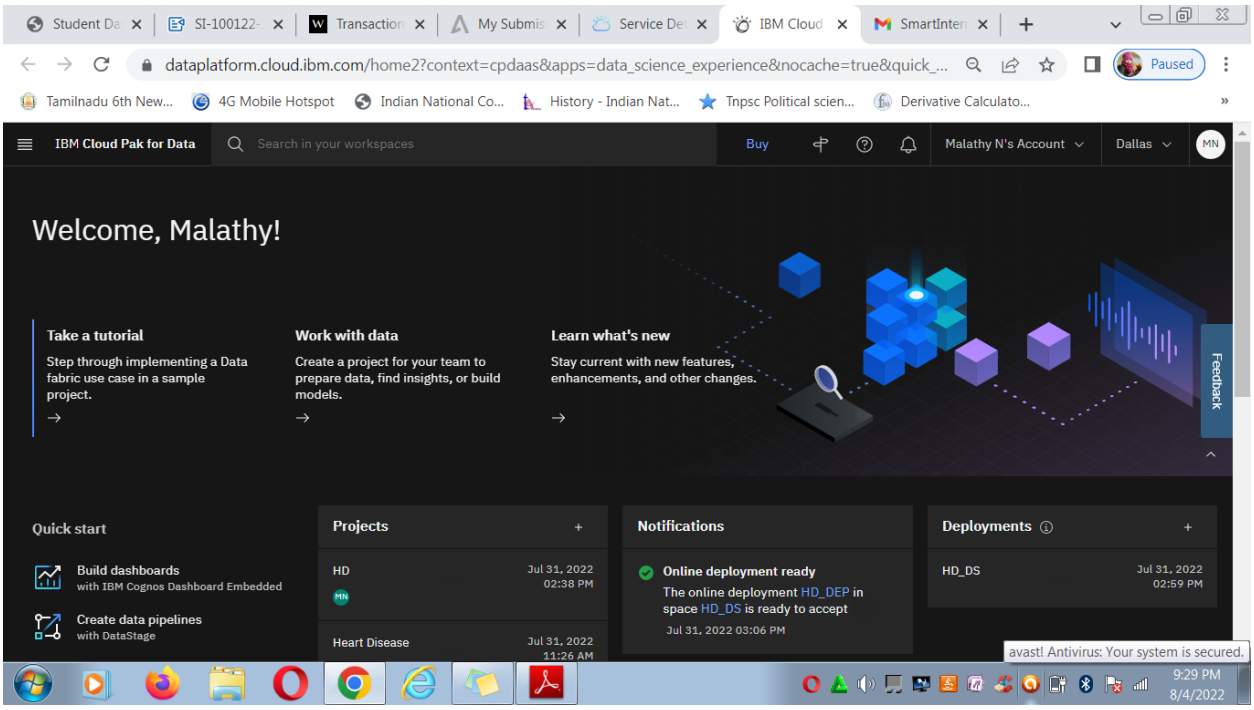
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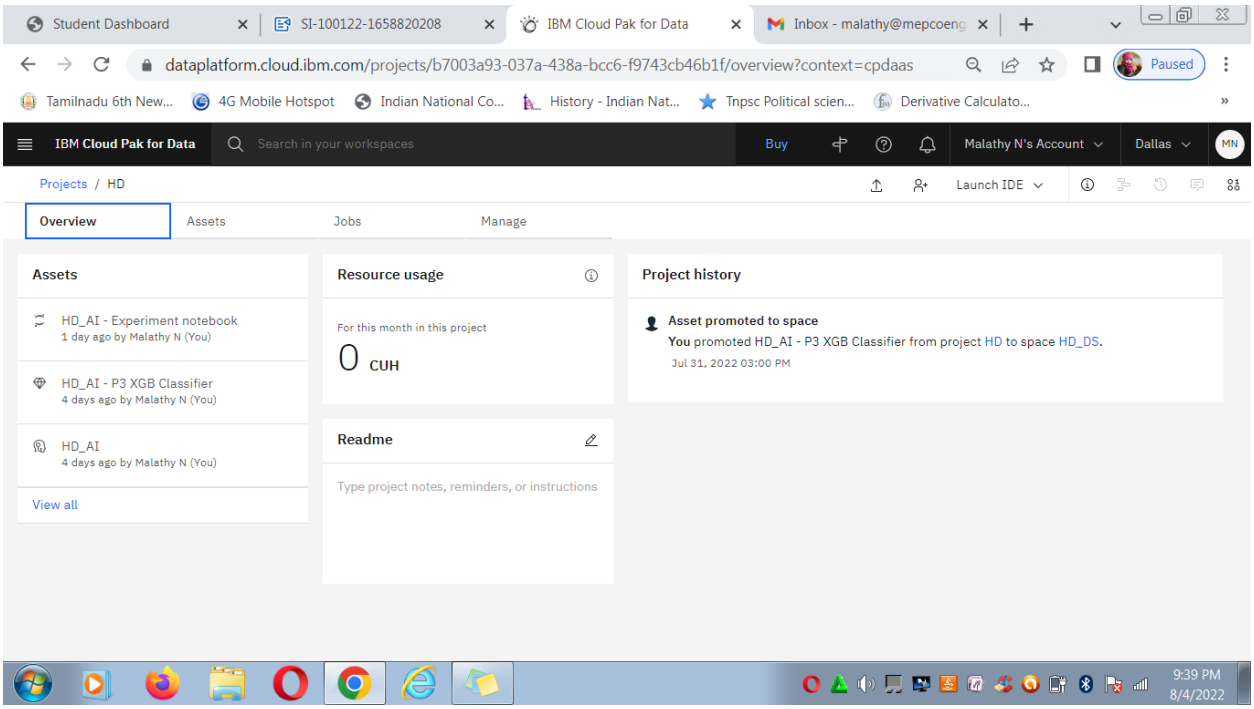
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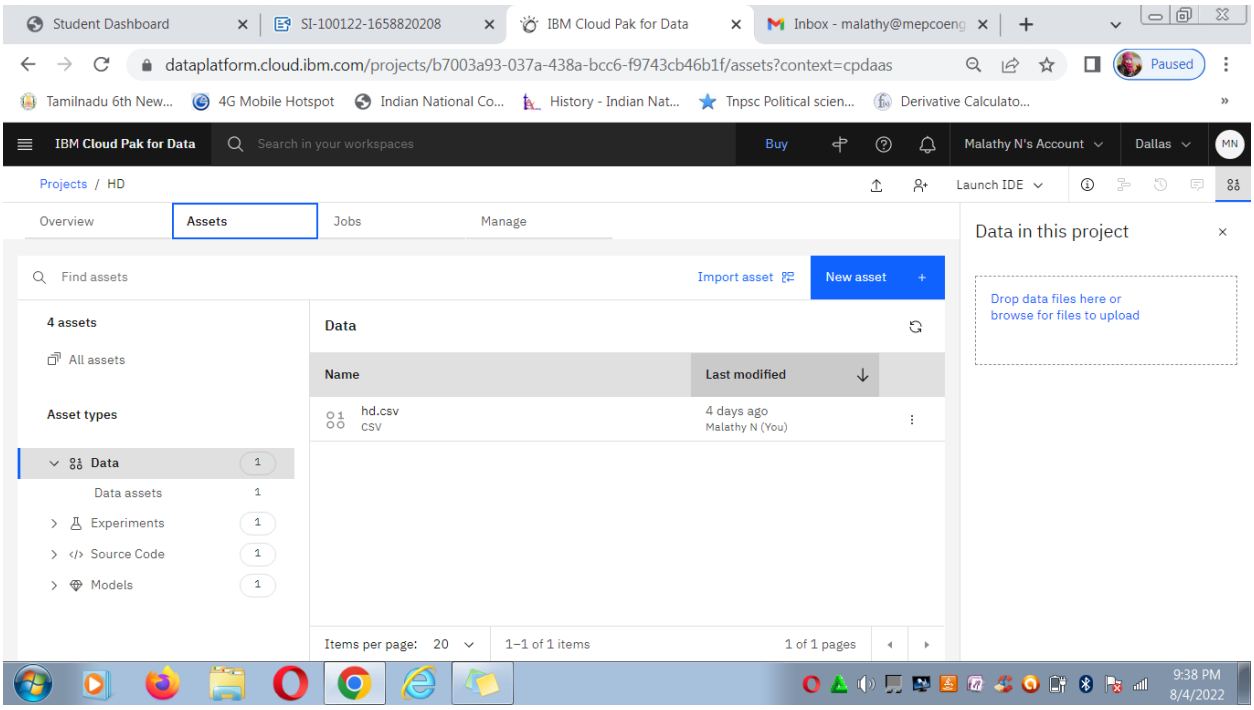
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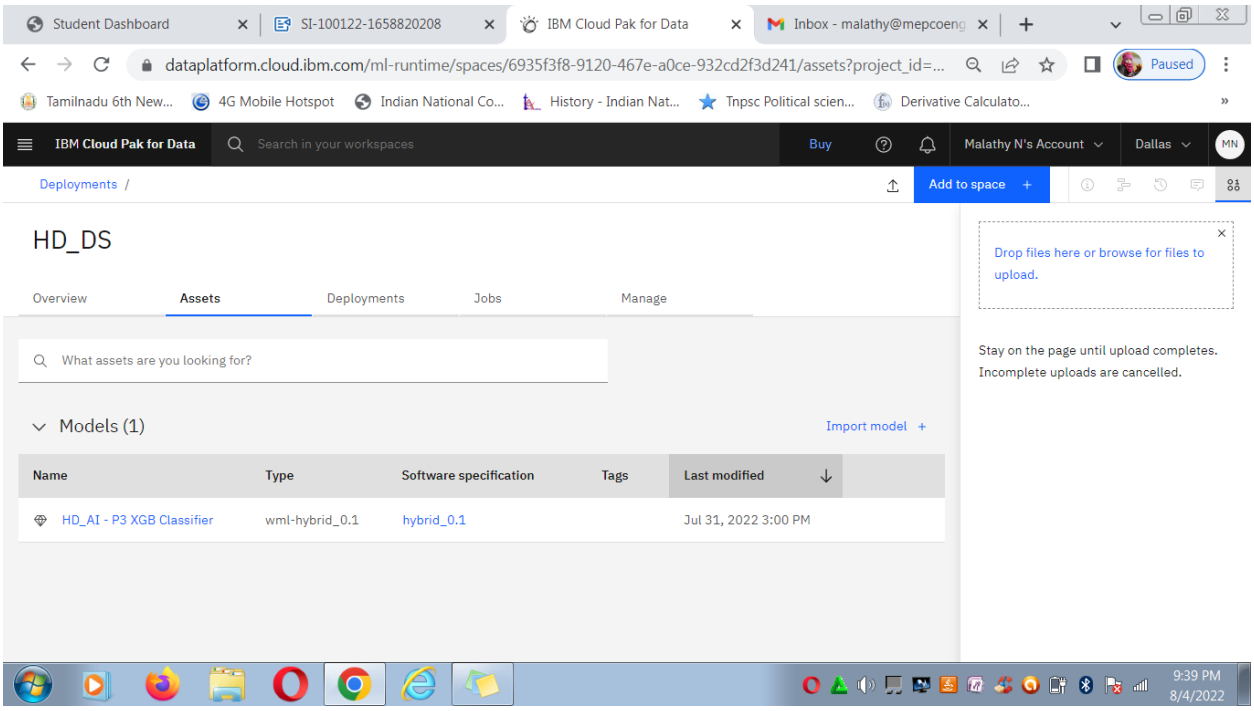
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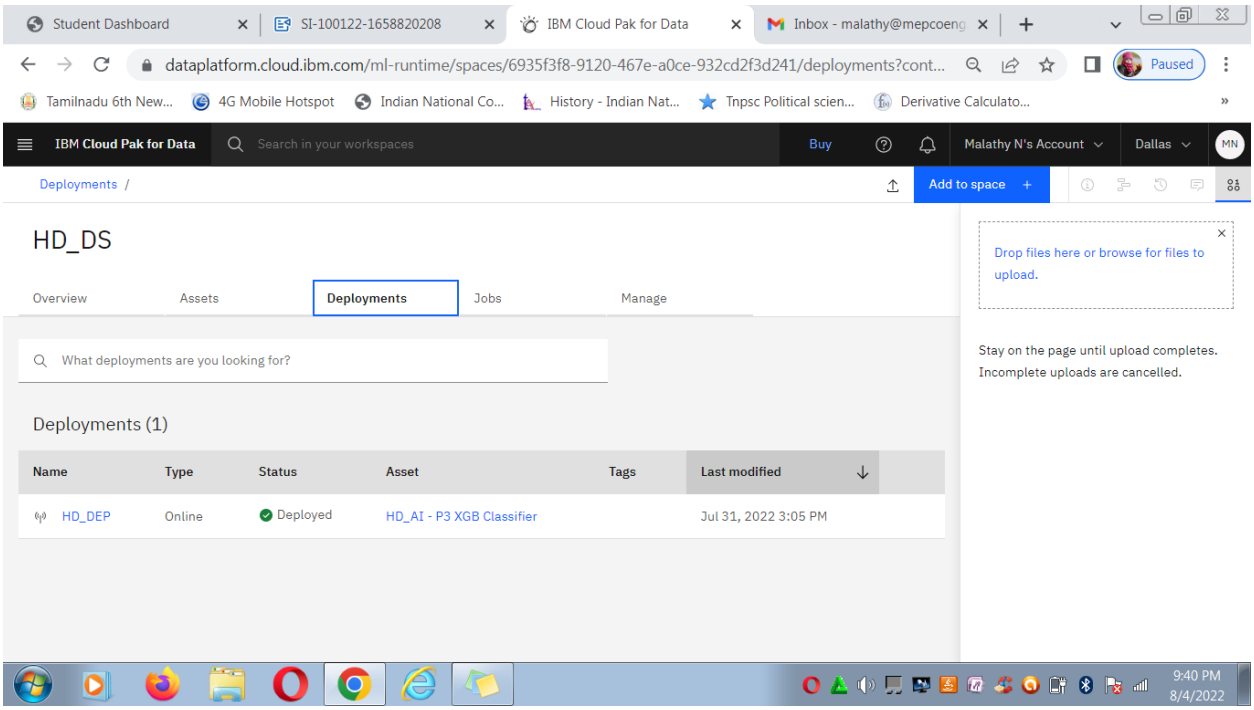
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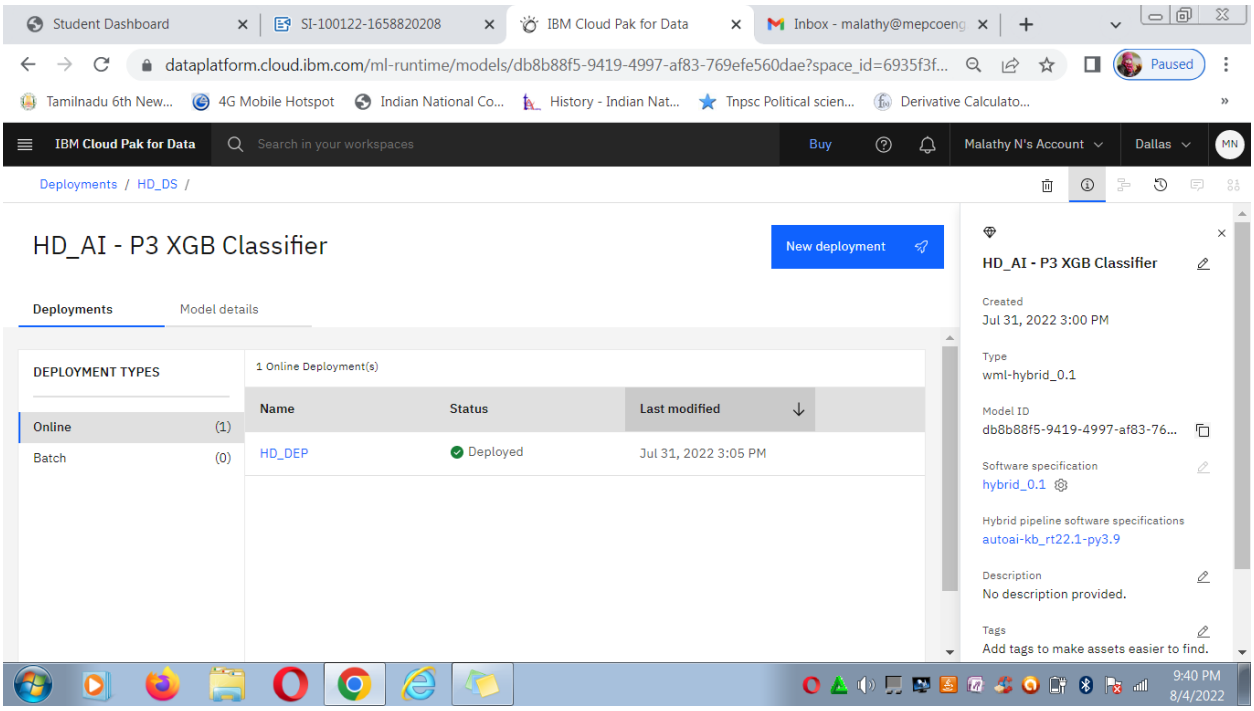
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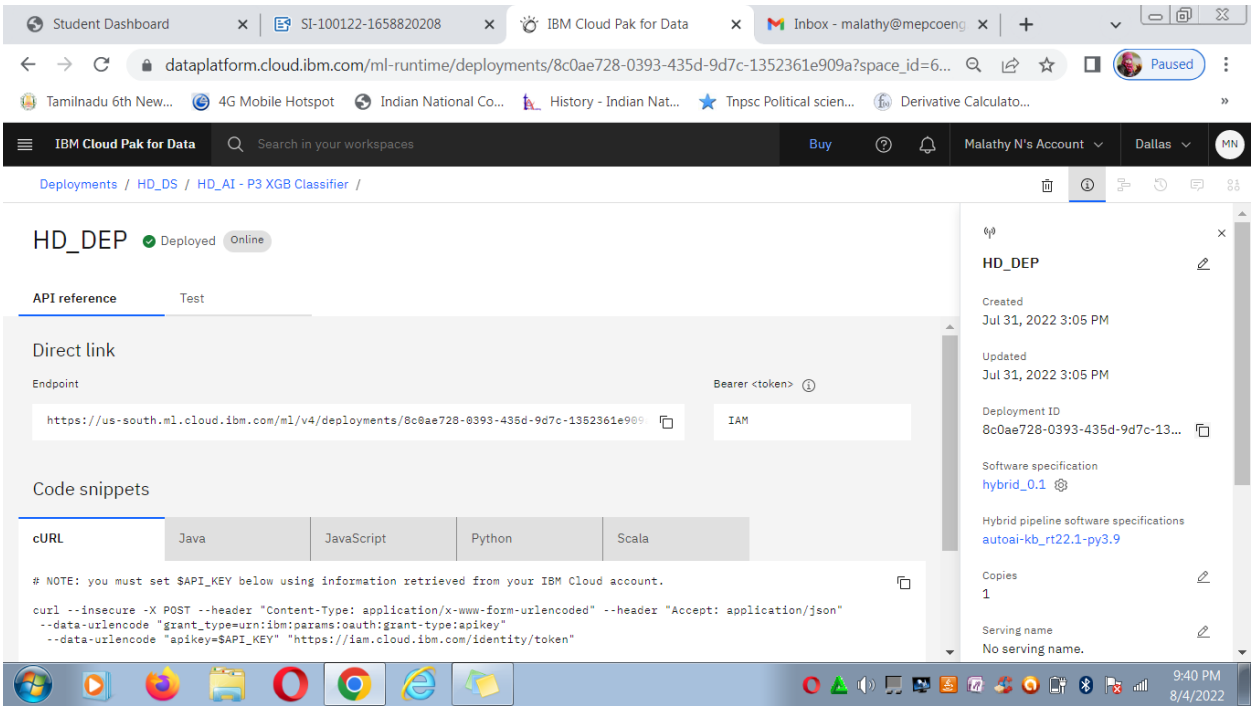
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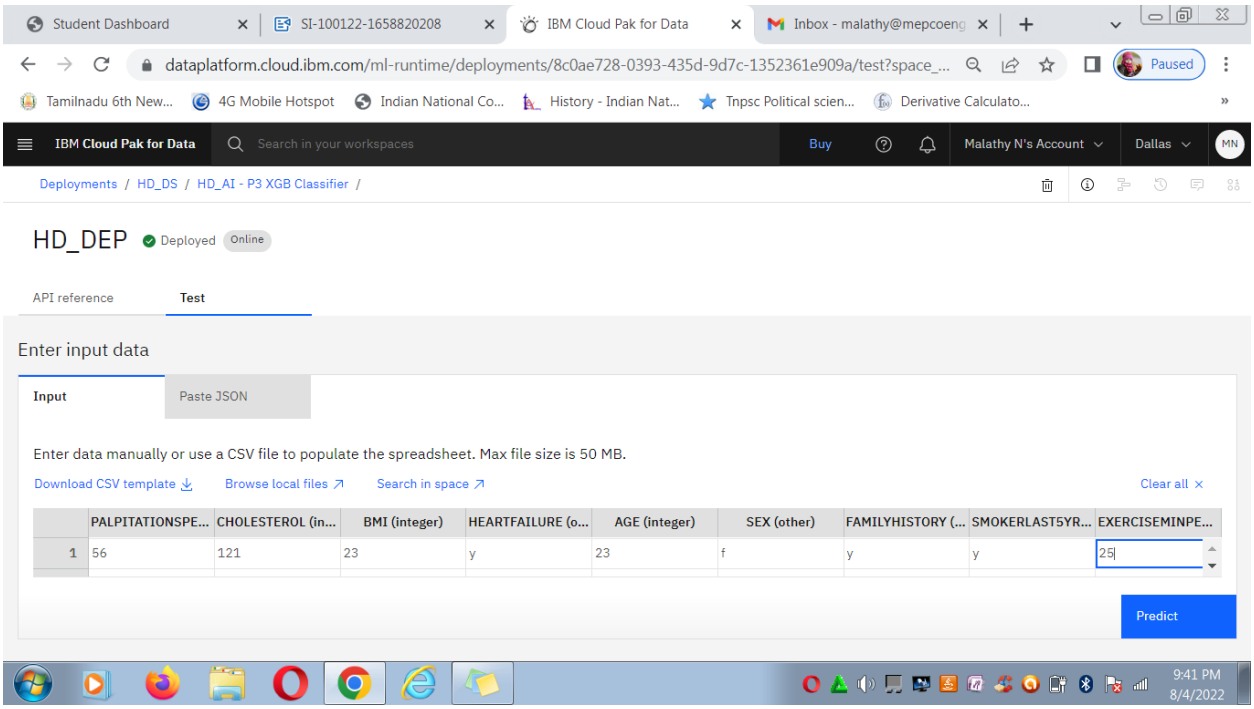
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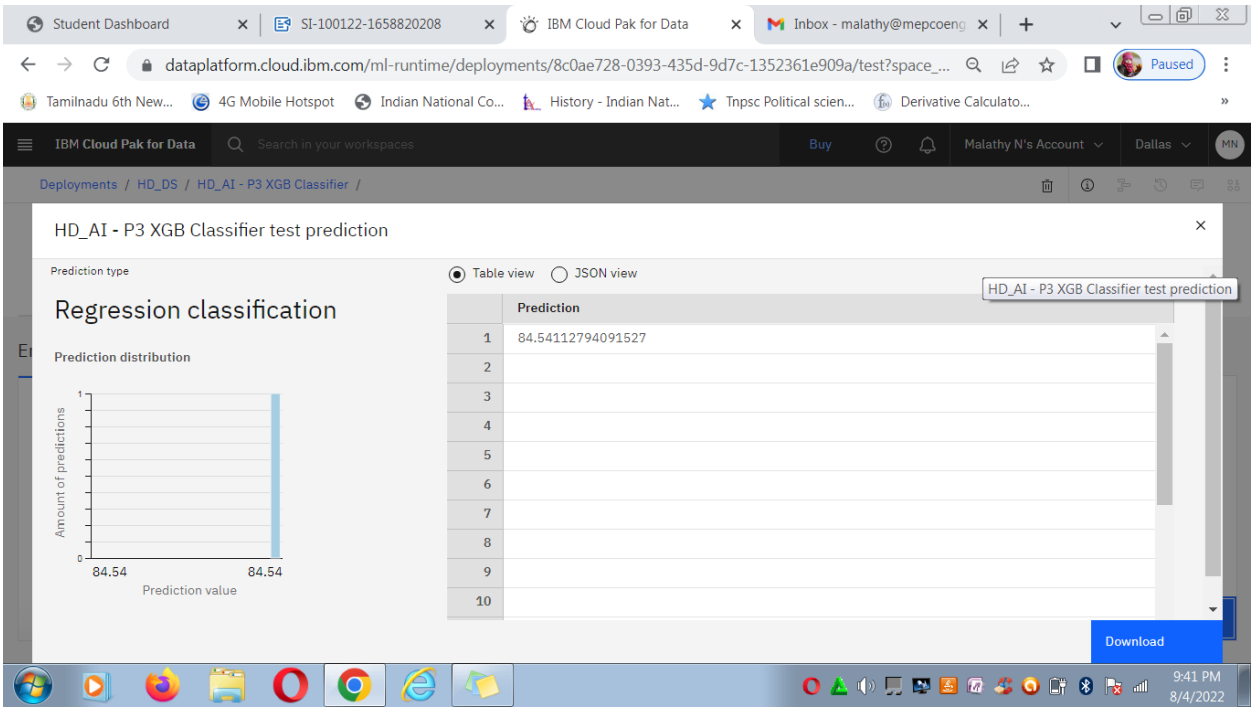
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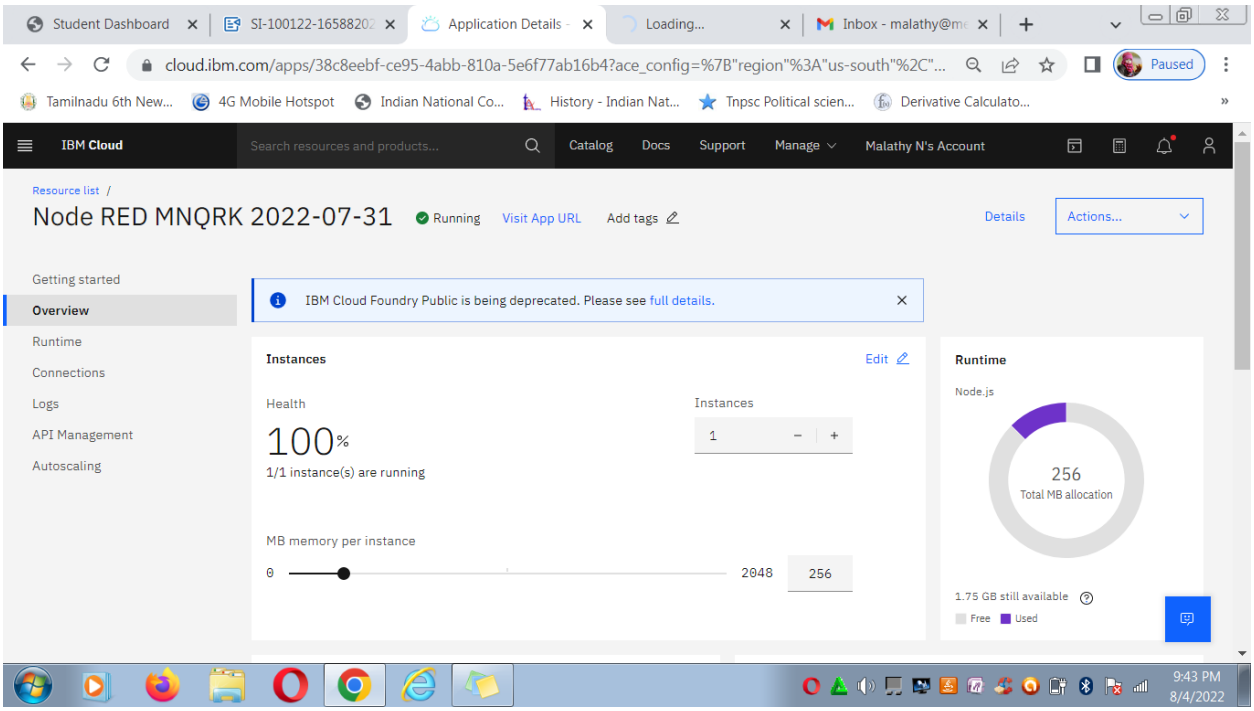
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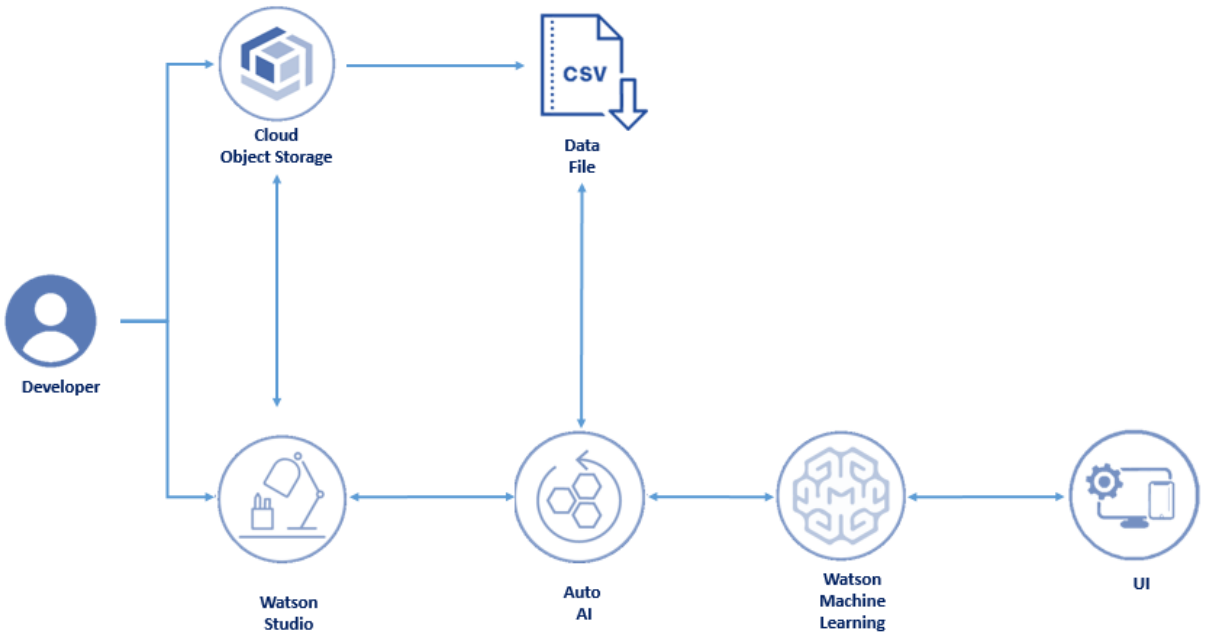
5.Flow Chart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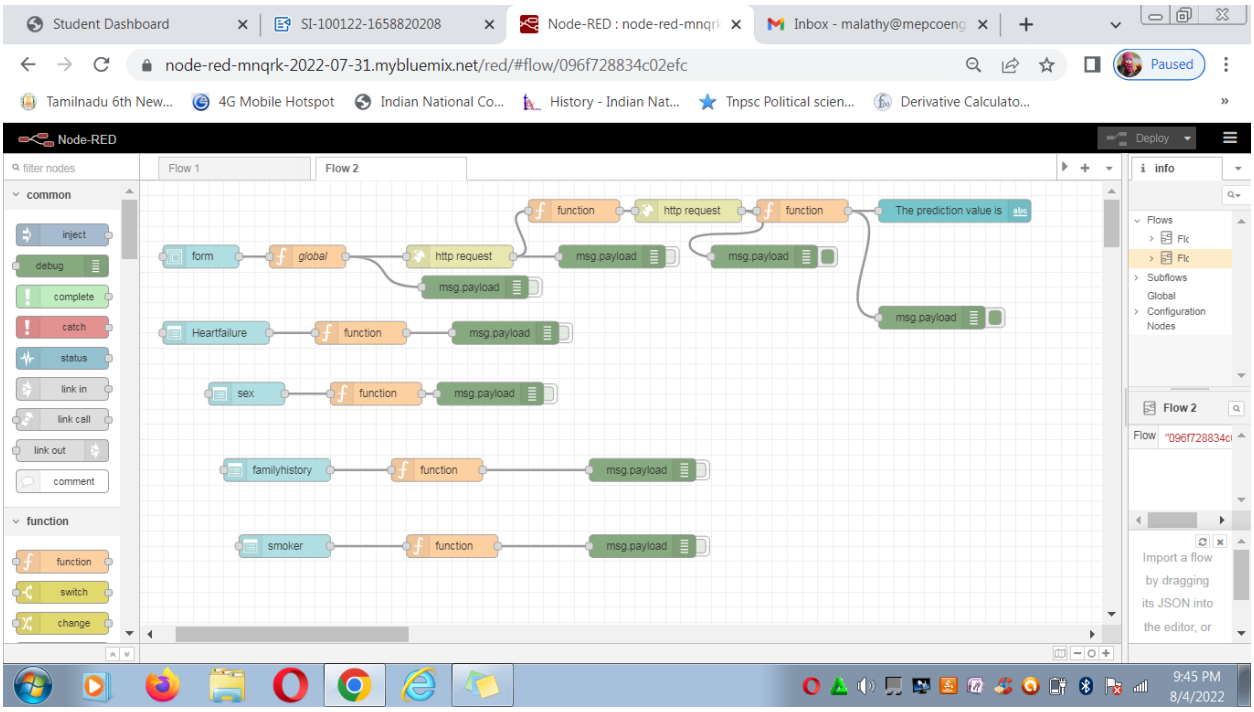
6.Result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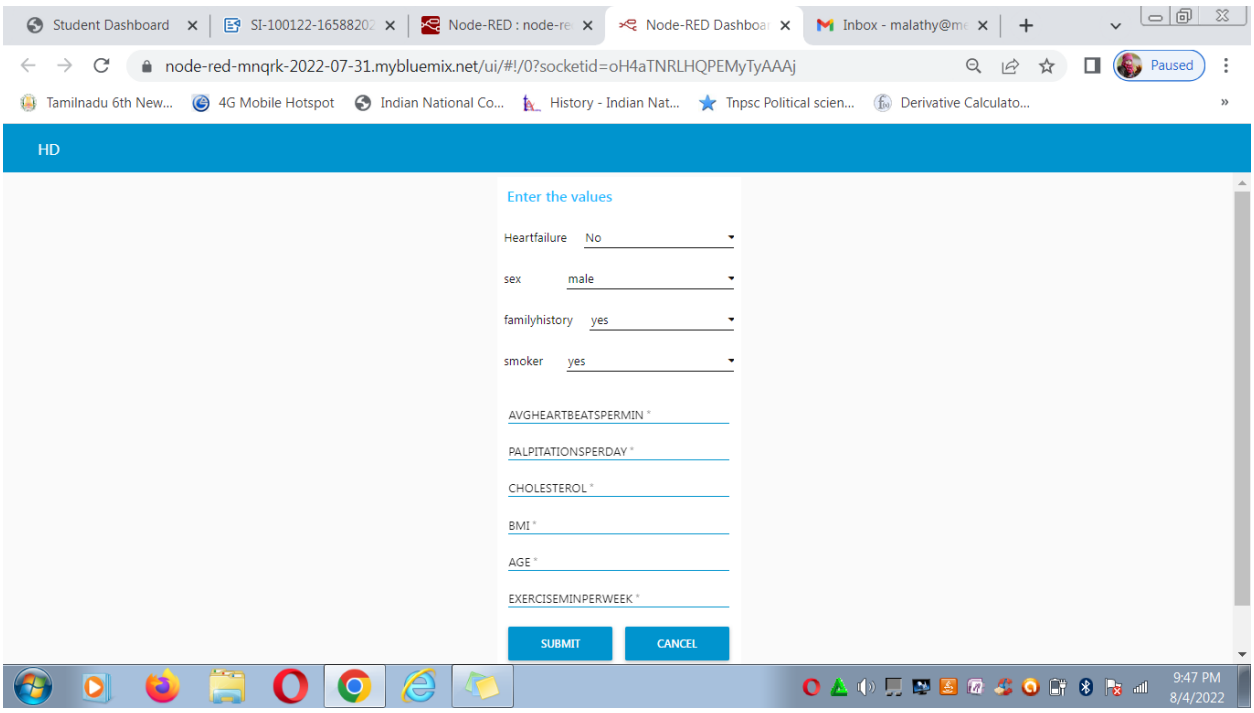
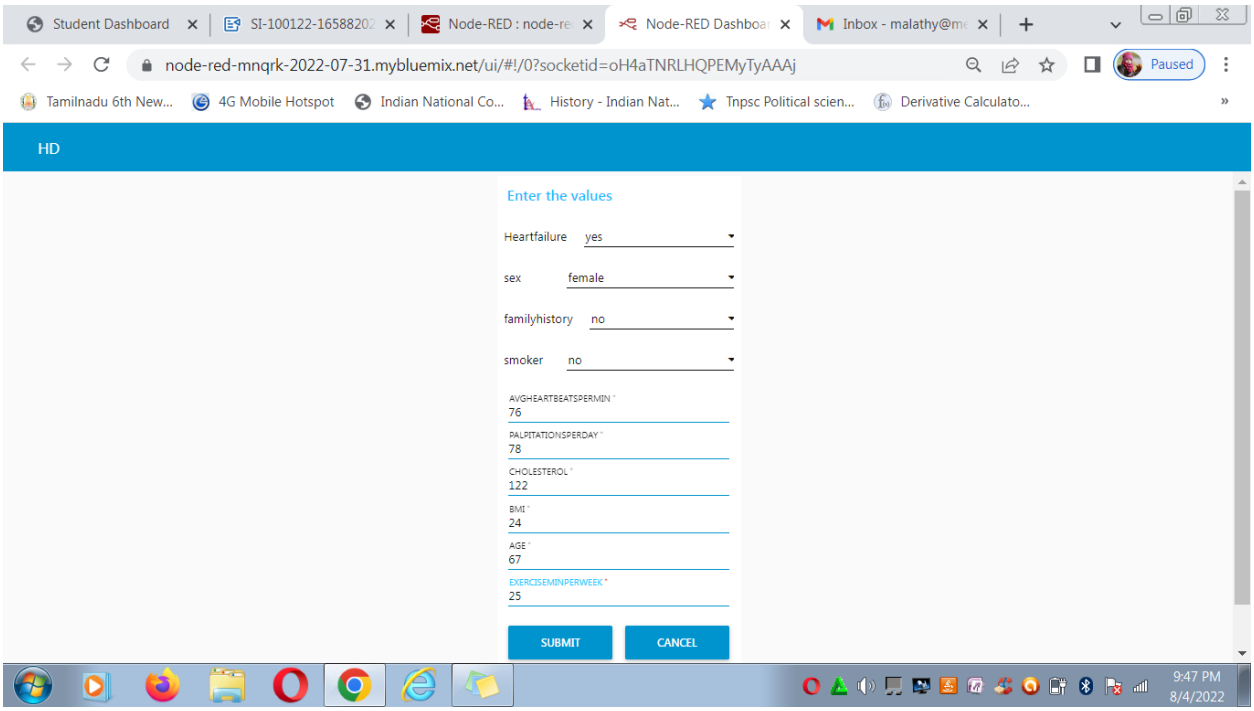
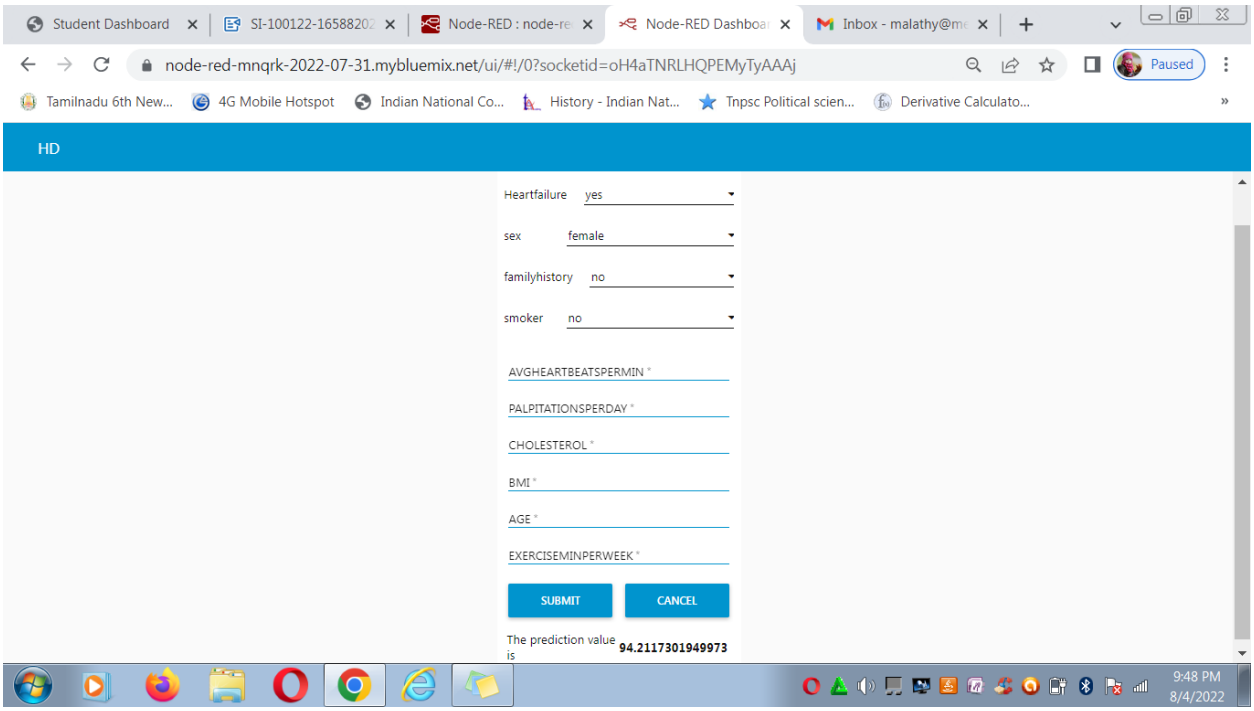
status
link in
link call
link out
comment
function
function
switch
change
form
global
http request
function
http request
function
The prediction value is
msg.payload
msg.payload
msg.payload
msg.payload
Heartfailure
function
msg.payload
sex
function
msg.payload
familyhistory
function
msg.payload
smoker
function
msg.payload
info
Flows
Subflows
Global
Configuration Nodes
Flow 2
Import a flow by dragging its JSON into the editor, or
9:45 PM
8/4/2022


Student Dashboard
Node-RED : node-re
Node-RED Dashboa
Inbox - malathy@mc
node-red-mnqrk-2022-07-31.mybluemix.net/ui/#!/0?socketid=oH4aTNRLHQPEMyTyAAAj
Paused
HD
Enter the values
Heartfailure No
sex male
familyhistory yes
smoker yes
AVGHEARTBEATSPERMIN *
PALPITATIONSPERDAY *
CHOLESTEROL *
BMI *
AGE *
EXERCISEMINPERWEEK *
SUBMIT
CANCEL
9:47 PM
8/4/2022





7.Advantages

It can be used in hospitals to predict the disorder at an earlier stage

8.Applications

It can be used in hospitals to predict the disorder at an earlier stage

9.Conclusion and Future work

The proposed system is GUI-based, user-friendly, scalable, reliable and an expandable system. The proposed working model can also help in reducing treatment costs by providing Initial diagnostics in time. The model can also serve the purpose of training tool for medical students and will be a soft diagnostic tool available for physician and cardiologist. General physicians can utilize this tool for initial diagnosis of cardio-patients. There are many possible improvements that could be explored to improve the scalability and accuracy of this prediction system. As we have developed a generalized system, in future we can use this system for the analysis of different data sets. The performance of the health's diagnosis can be improved significantly by handling numerous class labels in the prediction process, and it can be another positive direction of research. In DM warehouse, generally, the dimensionality of the heart database is high, so identification and selection of significant attributes for better diagnosis of heart disease are very challenging tasks for future research.

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