Heart Failure prediction

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.

Heart failure is a common event caused by CVDs and this dataset contains 9 features that can be used to predict mortality by heart failure.

1.2 Purpose

In this project, we build a model using Auto AI and build a web application where we can showcase the prediction of heart failure.

2 LITERATURE SURVEY

2.1 Existing problem

In current world, loads of data is generated from various sensors, digital devices and other day to day process. Some of this generated data are labelled and some others are unlabelled. Plenty of Machine learning algorithms are available to process the data, but there is no single algorithm that is good at processing all real world applications. For a layman, its difficult to understand the process of modelling this data. As a result a customised application is needed. To create this customised application a person with domain knowlege is also needed. So the customised application assists the layman in selecting the model for a given a data. In the process it answer all question related to the modelling of the data. Some of the primary questions are: To run these algorithm what configuration of the system is required? Which algorithm will best suit my data? What are the parameters used by this algorithm? What are the initial values to be set for these parameters? Is this model underfitting /overfitting the data? Some of the secondary set of question are: Is this the best model? Can it optimised further by tuning the parameters and

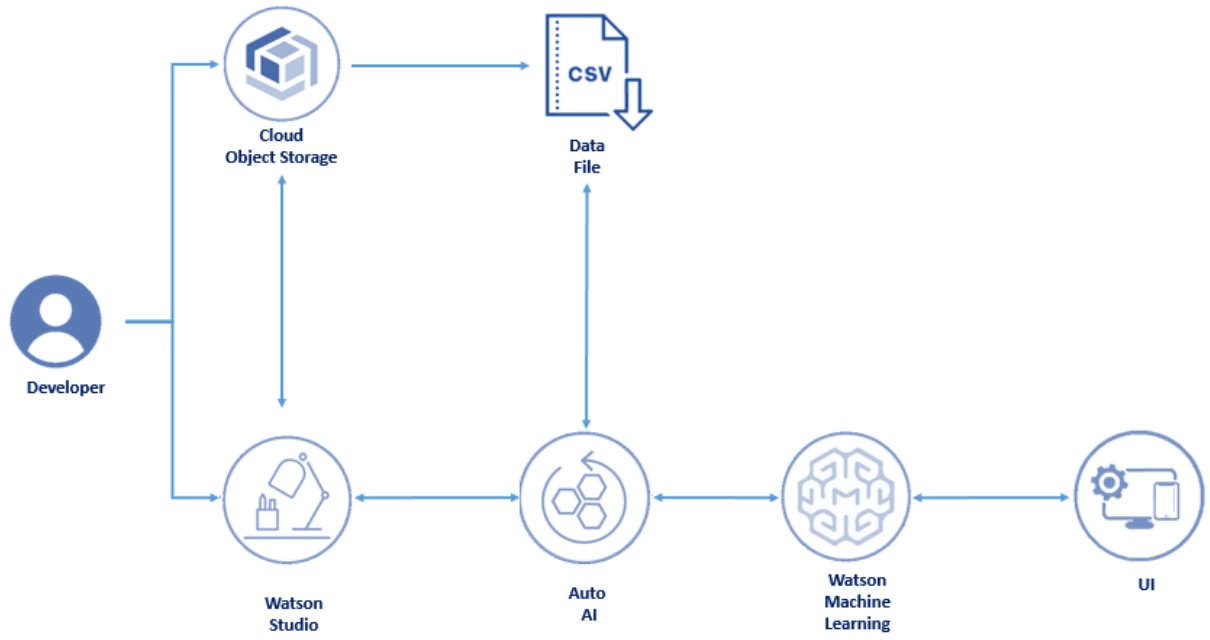
hyperparameters? What are the evalaution metrics to be considered? For every problem building a customised application from scratch is costlier both time and economically.

2.2 Proposed solution

Solution to the above primary question is to use a cloud environment and select some algorithm randomly and execute it for the given data. Imagine one or two of the model have performed the best. Testing for the generalisation of the model, to answer the question whether the model will perform with same confidence for the unseen data? Once all these questions are answered we finalised the model and execute it, deploy it.

3 THEORITICAL ANALYSIS

3.1 Block diagram



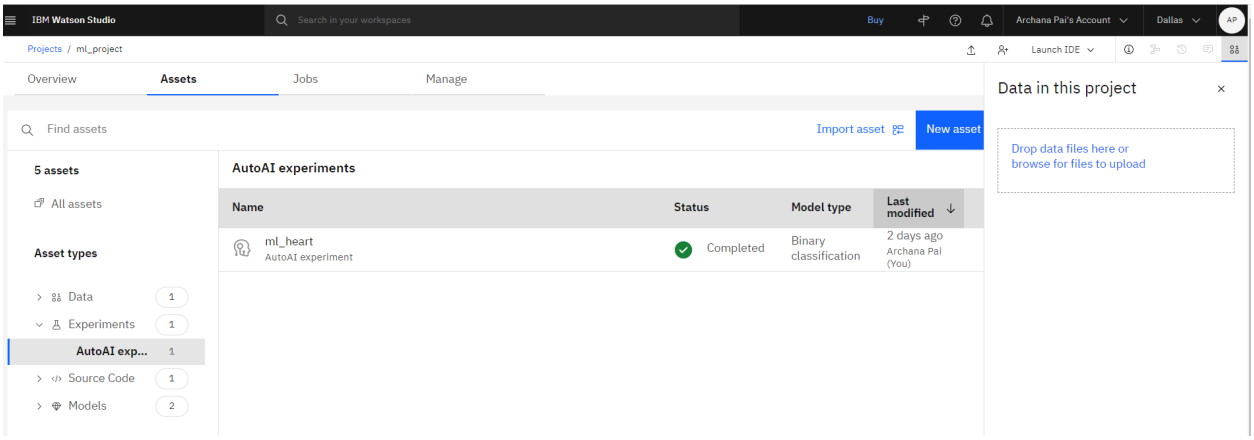
4 EXPERIMENTAL INVESTIGATIONS

Analysis or the investigation made while working on the solution.

1) First create an ibm cloud account.
2) From cloud catalogue create a ibm watson project
    a) Add a storage space
    b) Add a machine learning project
    c) Add Auto ai experiment to create a ML model by associate the machine learning project created in the last step to it. Select all machine learning algorithm and evaluation metrics required to evelauate the various pipelines. Run the model using the dataset provided. Save the best model with hieghest accuracy among the 8 pipelines.
3) Add a deployment space and deploy the auto ai model.
4) Now create a web application to deploy the auto ai model and genrate the prediction using scoring end point. Web application is generated using node red app. Scoring end point is show cased using the various tools from dashboard.

5 FLOWCHART

My IBM watson studio page:

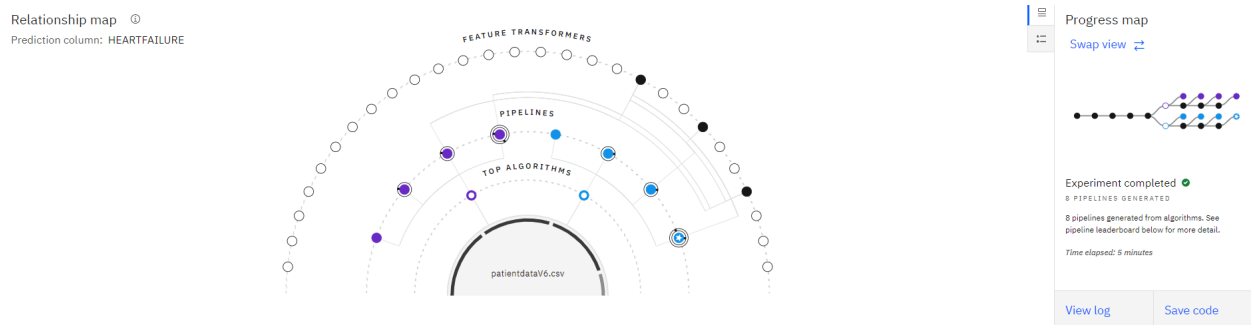


My pipeline leaderboard:

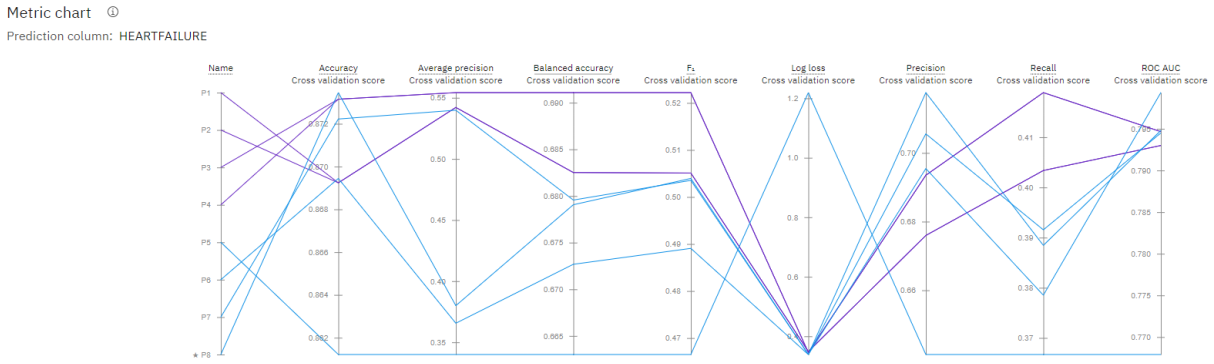
Pipeline leaderboard

	Rank	Name	Algorithm	Accuracy (Optimized) Cross Validation	Enhancements	Build time
★	1	Pipeline 8	Snap Random Forest Classifier	0.873	HPO-1 FE HPO-2	00:01:40
	2	Pipeline 3	XGB Classifier	0.873	HPO-1 FE	00:00:51
	3	Pipeline 4	XGB Classifier	0.873	HPO-1 FE HPO-2	00:01:52
	4	Pipeline 7	Snap Random Forest Classifier	0.872	HPO-1 FE	00:01:11
	5	Pipeline 6	Snap Random Forest Classifier	0.869	HPO-1	00:00:11
	6	Pipeline 1	XGB Classifier	0.869	*None*	00:00:01
	7	Pipeline 2	XGB Classifier	0.869	HPO-1	00:00:15
	8	Pipeline 5	Snap Random Forest Classifier	0.861	*None*	00:00:01

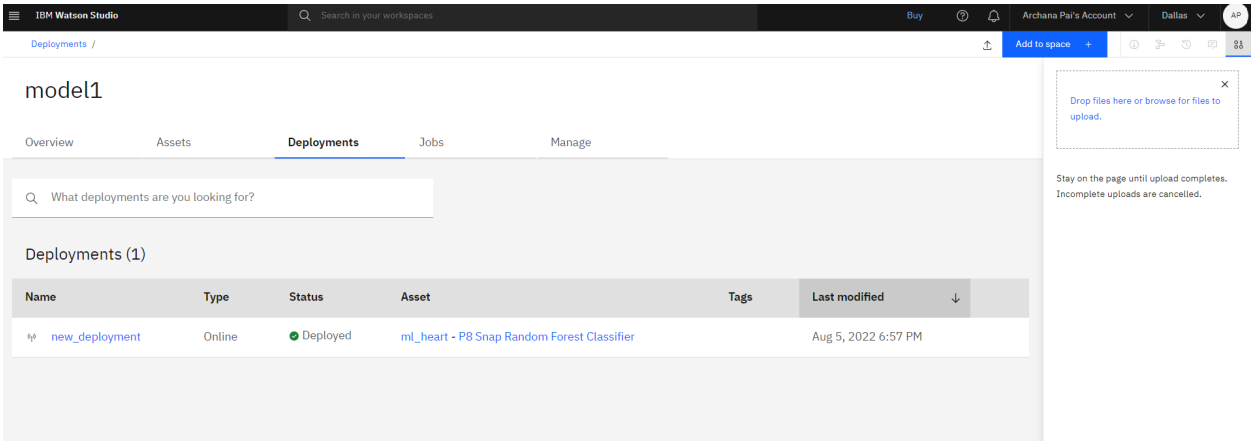
my relationship comparison:



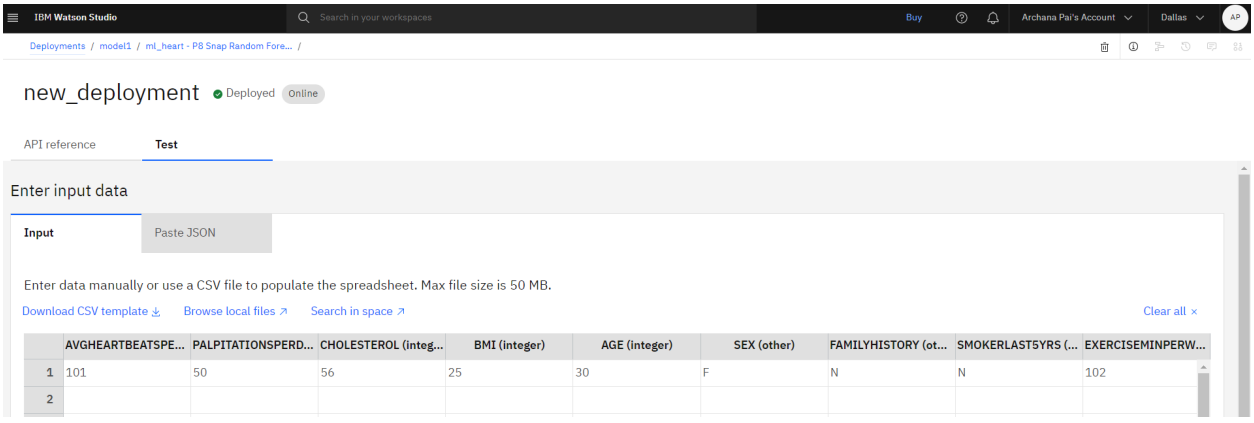
my metric chart:



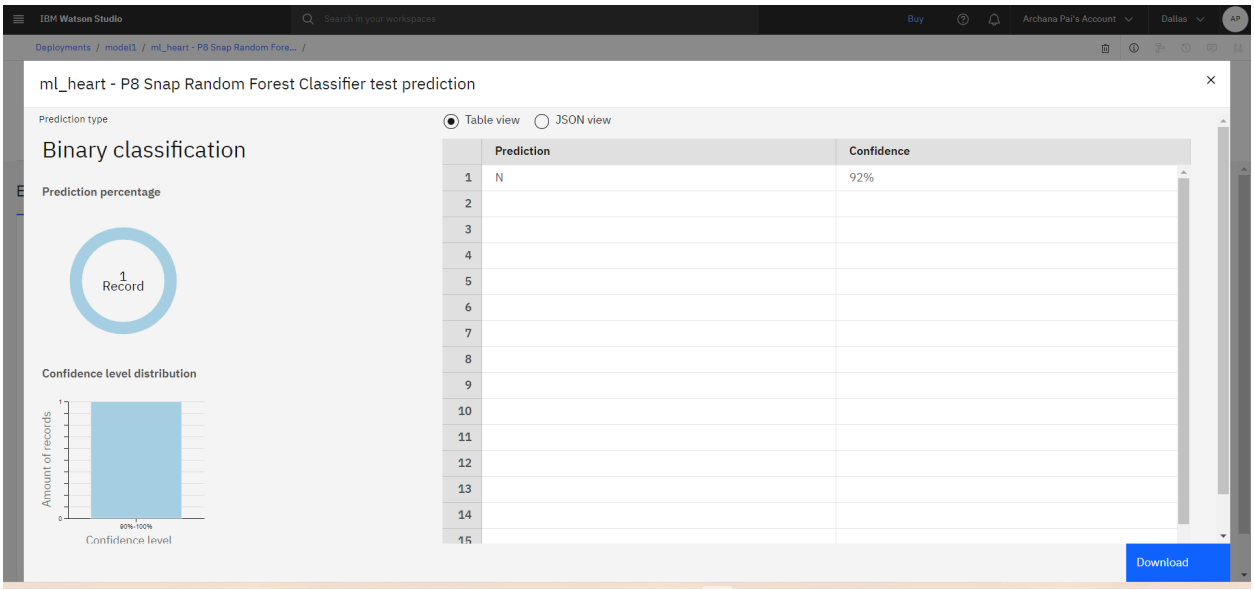
My deployment space used:



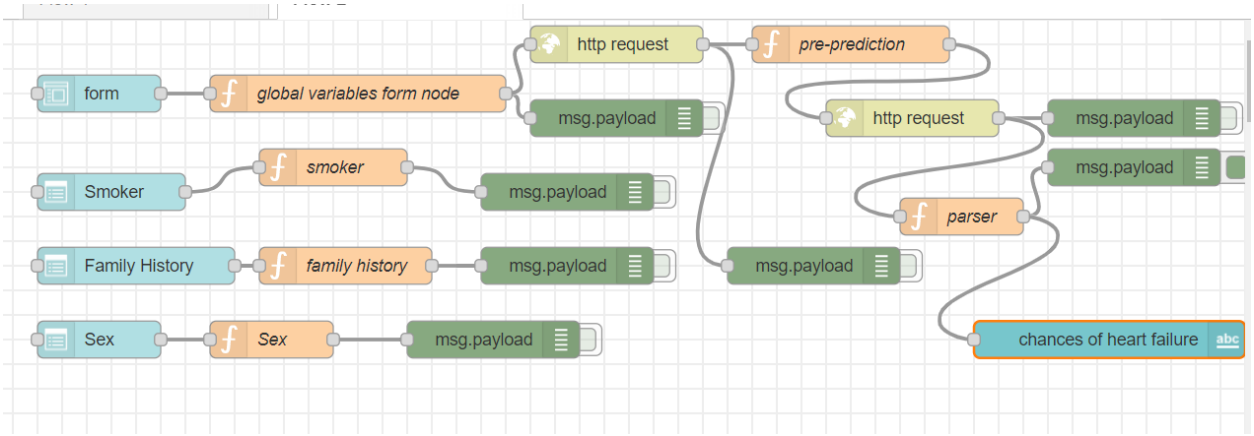
my data entry at test stage:



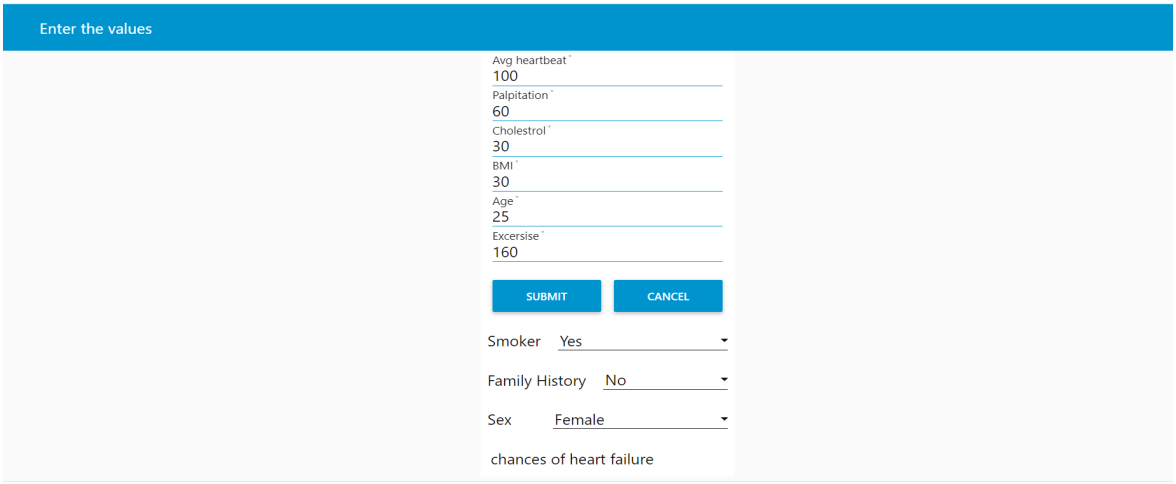
my prediction by auto-ai model:



my node red flow:

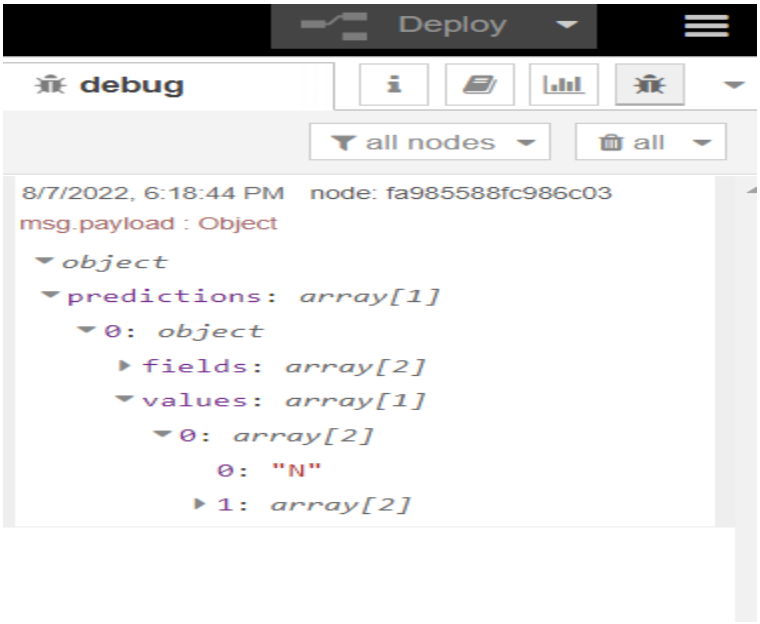


My node red dashboard:

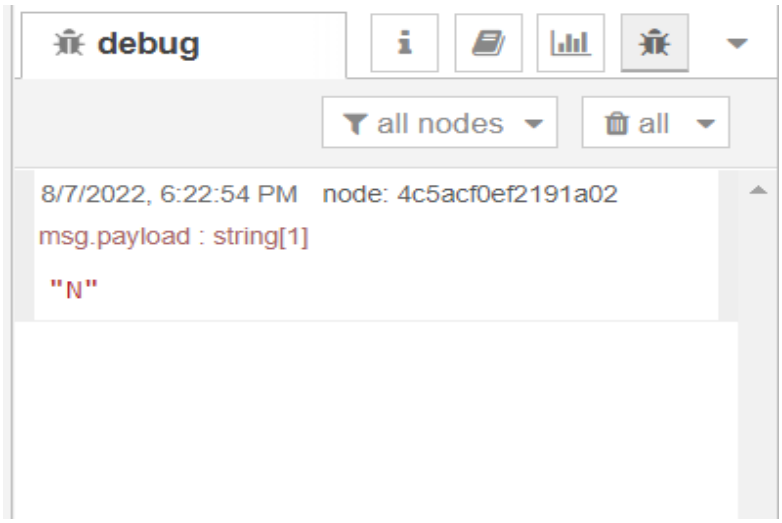


collecting my access token:

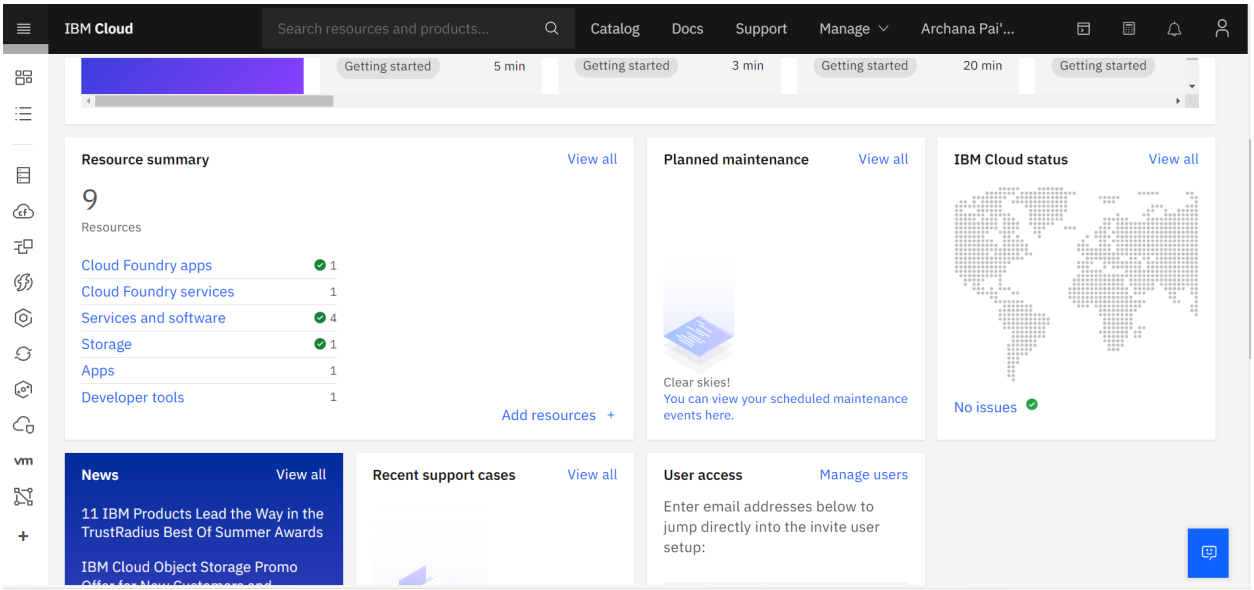
my debug window before parsing:



my debug screen after parsing:



My IBM cloud summary page:



6 RESULT

Depending on the values of the input attributes the model predicts the changes of the heart failure with very high confidence.

7 ADVANTAGES & DISADVANTAGES

One need not worry about the configuration of the system needed for executing the algorithms or the project. One needs to have only the knowlege of machine learning algorithms. The setup(the software and the storage) is provided by the IBM and is very user friendly.

8 APPLICATIONS

The solution is applicable in healthcare, fault detection, image segmentation etc

9 CONCLUSION

In this project we are creating a heart attack prediction model using IBM watson project and node red app for UI. this project is capable of giving prediction based on the input fields.

APPENDIX

A. Source Code

code for global variable form

```
global.set("AVGHEARTBEATSPERMIN",msg.payload.a)
global.set("PALPITATIONSPERDAY",msg.payload.p)
global.set("CHOLESTEROL",msg.payload.c)
global.set("BMI",msg.payload.b)
global.set("AGE",msg.payload.d)
global.set("EXERCISEMINPERWEEK",msg.payload.e)
var apikey="F-b1tgG3PqOCbuflpDuBK_iq-DNxN09GAXQfVCI8mQtO"
msg.headers={"content-type":"application/x-www-form-urlencoded"}
msg.payload={"grant_type":"urn:ibm:params:oauth:grant-
type:apikey","apikey":apikey}
return msg;
```

code for prediction:

```
var avgheartbeat=global.get("AVGHEARTBEATSPERMIN")
var palpitation=global.get("PALPITATIONSPERDAY")
var cholestrol=global.get("CHOLESTEROL")
var bmi=global.get("BMI")
var age=global.get("Age")
var excersise=global.get("EXERCISEMINPERWEEK")
var smoker=global.get("SMOKERLAST5YRS")
var family=global.get("FAMILYHISTORY")
var sex=global.get("SEX")
var token=msg.payload.access_token
msg.headers={'content_type':'application/json',"Authorization":"Bearer
"+token,"Accept":"application/json"}
msg.payload={"input_data":[{"fields":[["AVGHEARTBEATSPERMIN","PALPITA
TIONSPERDAY","CHOLESTEROL","BMI","AGE","SEX","FAMILYHISTORY","SMOK
ERLAST5YRS","EXERCISEMINPERWEEK"]],
"values":[[avgheartbeat,palpitation,cholestrol,bmi,age,sex,family,smoker,exc
ersise]]}]}
```

return msg;

code for parser function:

```
msg.payload=msg.payload.predictions[0].values[0][0]
return msg;
```

code for smoker drop down:

```
 global.set("SMOKERLAST5YRS",msg.payload)
return msg;
```

code for Family history drop down:

```
global.set("FAMILYHISTORY",msg.payload)
return msg;
```

code for Sex drop down:

```
global.set("SEX",msg.payload)
return msg;
```

my jason code for prediction:

```
{
	"input_data": [
		{
			"fields": [
				"AVGHEARTBEATSPERMIN",
				"PALPITATIONSPERDAY",
				"CHOLESTEROL",
				"BMI",
				"AGE",
				"SEX",
				"FAMILYHISTORY",
				"SMOKERLAST5YRS",
				"EXERCISEMINPERWEEK"
			],
			"values": [
				[
					101,
```

```
                    50,
                    56,
                    25,
                    30,
                    "F",
                    "N",
                    "N",
                    102
                ]
            ]
        }
    ]
}
```