Telecom Customer Churn Prediction Using Watson Auto AI

Introduction:

- **Overview:**

The project is about telecom customer churn prediction. The main idea of this project is to use Watson Auto AI to predict the customer churn. This project falls under the category of Machine Learning as we are training and testing a model to predict the output depending on certain inputs given.

- **Purpose:**

The purpose of this project is to create a model that predicts and identifies those customers who are most likely to leave a company.

Literature Survey:

- **Existing Problem:**

Customer churn is a major problem and one of the most important concerns for large industries. Telecommunication industry always suffers from very high churn rates when one industry offers a better plan than the previous, there is a high possibility of customer churning from the present due to a better plan in such a scenario it is very difficult to avoid losses due to the direct effect on the revenues of the companies, especially in the telecom field.

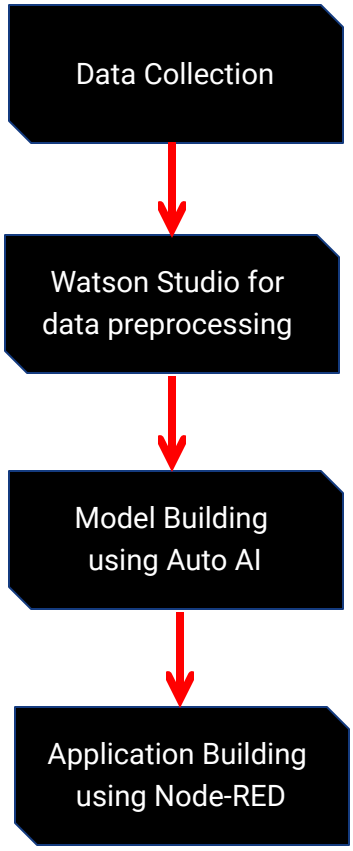
- **Proposed Solution:**

We are building a Machine Learning model to predict the customer churn using IBM Watson Auto AI Machine Learning Service. The model is deployed on IBM cloud to get scoring end point which can be used as API in mobile app or web app building. We are developing a web application which is built using node red service. We make use of the scoring end point to give user input values to the deployed model.The model prediction is then showcased on User Interface.

Theoretical Analysis:

■ Block Diagram:

The block diagram and steps for building a model that determines the churn prediction are as follows -



■ Hardware/Software Designing:

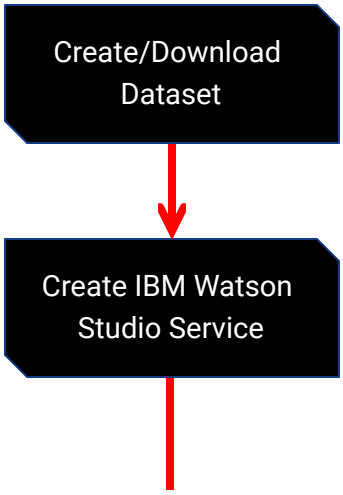
- IBM cloud
- IBM Watson Studio
- Machine Learning Service
- Auto AI Experiment
- UI using Node-Red

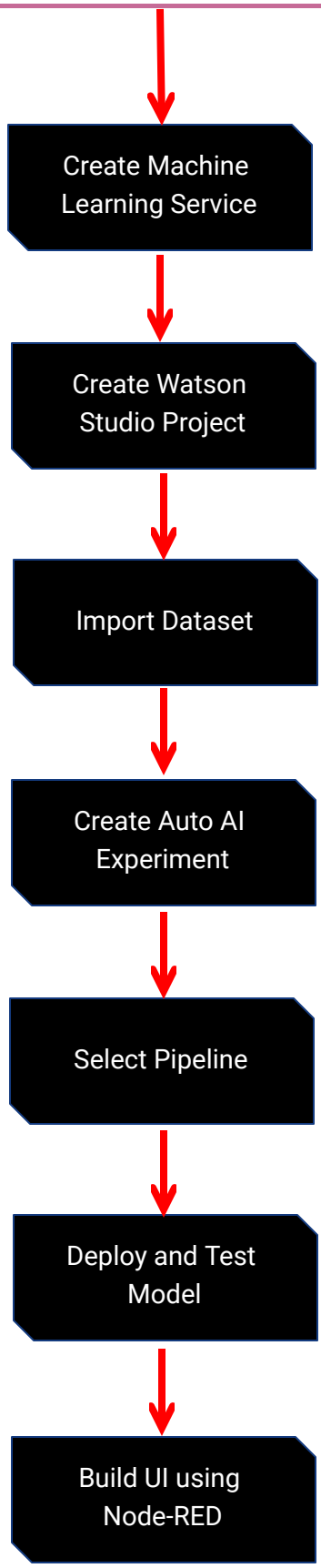
Experimental Investigations:

We decipher the following points based on the analysis of the provided dataset -

- The dataset falls under the category of supervised learning as inputs are given and output is to be predicted.
- The output of the dataset is not continuous but is discrete in nature hence, it falls under classification algorithm.
- The output is considered as dependent variable and all the input columns are considered as independent variables.
- The output of the dataset is of binary classification algorithm and hence accuracy is determined.
- Node-RED service is used to create a user interface.

Flowchart:




Create Machine Learning Service
Create Watson Studio Project
Import Dataset
Create Auto AI Experiment
Select Pipeline
Deploy and Test Model
Build UI using Node-RED

Result:

A machine learning model using IBM Auto AI and Node-RED user interface is successfully built for accurately calculating churn predictions.

Advantages:

- It is useful for making predictions related to customer churn in advance.
- Loses can be kept to a minimal level by creating a machine learning model.
- It helps reduce the direct affect on revenue by giving prior notice.
- The model has high accuracy.
- It can be used for large datasets.

Disadvantages:

- Model might be slow due to network glitch.
- May receive errors if the Node-RED model coding is not done properly.
- Run-time might be long for large datasets.

Applications:

- Predict customers' chance of leaving a phone subscription plan.
- The customer churn rates in telecom industry are highly increasing, the model helps predict if a person is going to change his plan or not before the person actually decides in order to prevent loses.
- It is used in telecome industries.
- It helps the telecom industry to create better plans in future.

Conclusion:

A machine learning model to predict telecom customer churn using Auto AI has been created to predict if a person is likely to leave a service or not.

Future Scope:

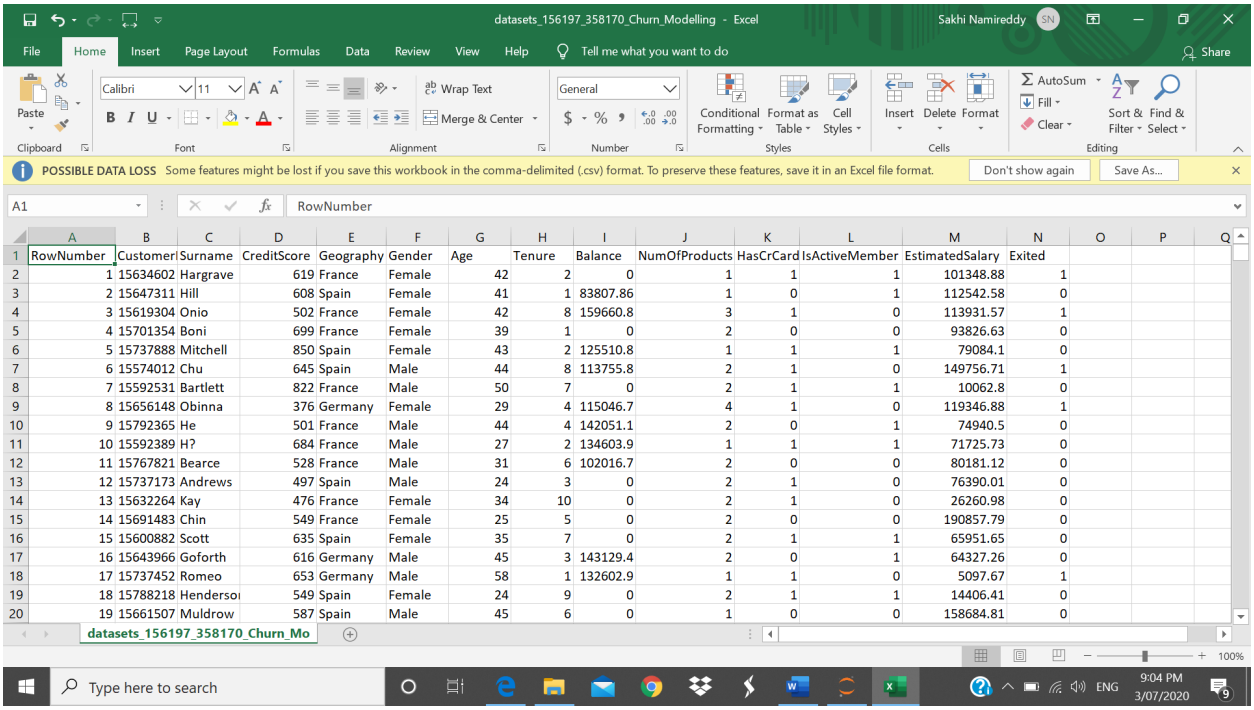
Telecom customer churn has been increasing rapidly thereby, causing loses to certain telecom industries. If a company offers better subsciption plan then customer churning takes place. It is important to know if a person is likely to leave a service or not in order to minimize the loses caused to a company. This model will be helpful in predicting the output.

Bibliography:

- https://smartbridge.teachable.com/
- https://smartinternz.com/
- https://cloud.ibm.com/
- https://node-red-bsqzs.eu-gb.mybluemix.net/
- https://www.kaggle.com/

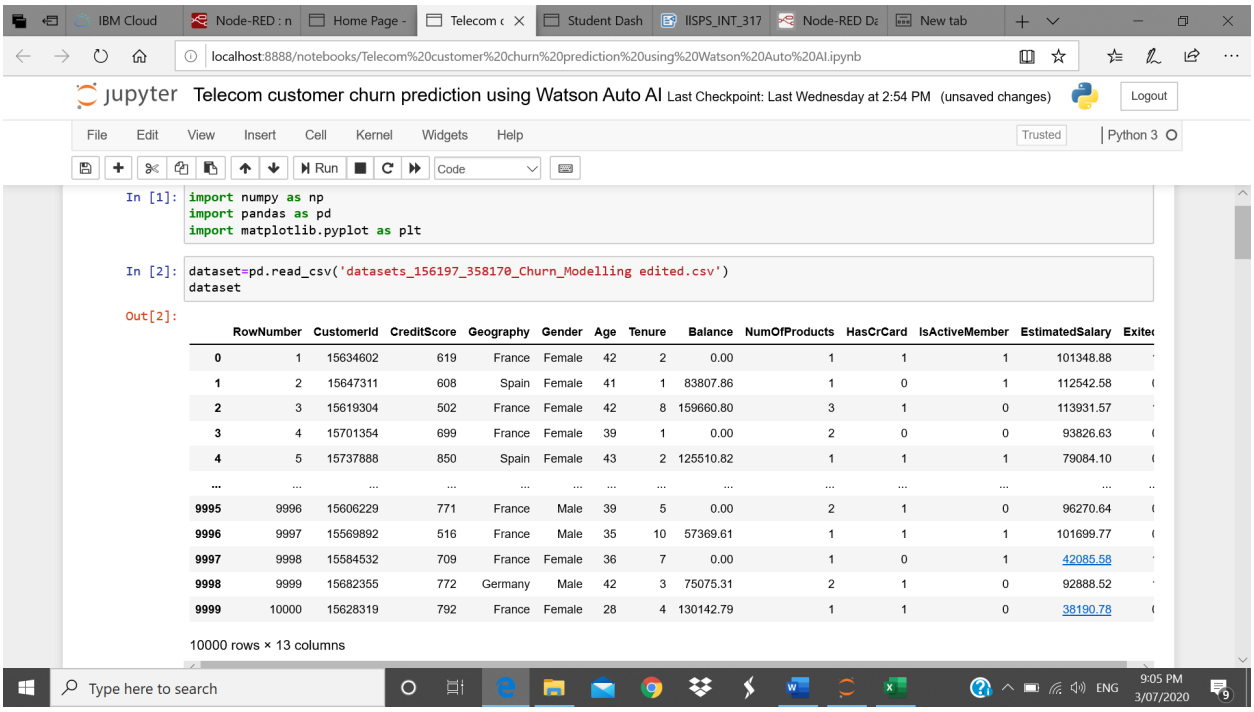
Appendix:

- ***Data Collection:***



RowNumber	CustomerId	Surname	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited
1	15634602	Hargrave	619	France	Female	42	2	0	1	1	1	101348.88	1
2	15647311	Hill	608	Spain	Female	41	1	83807.86	1	0	1	112542.58	0
3	15619304	Onio	502	France	Female	42	8	159660.8	3	1	0	113931.57	1
4	15701354	Boni	699	France	Female	39	1	0	2	0	0	93826.63	0
5	15737888	Mitchell	850	Spain	Female	43	2	125510.8	1	1	1	79084.1	0
6	15574012	Chu	645	Spain	Male	44	8	113755.8	2	1	0	149756.71	1
7	15592531	Bartlett	822	France	Male	50	7	0	2	1	1	10062.8	0
8	15656148	Obinna	376	Germany	Female	29	4	115046.7	4	1	0	119346.88	1
9	15792365	He	501	France	Male	44	4	142051.1	2	0	1	74940.5	0
10	15592389	H?	684	France	Male	27	2	134603.9	1	1	1	71725.73	0
11	15767821	Bearce	528	France	Male	31	6	102016.7	2	0	0	80181.12	0
12	15737173	Andrews	497	Spain	Male	24	3	0	2	1	0	76390.01	0
13	15632264	Kay	476	France	Female	34	10	0	2	1	0	26260.98	0
14	15691483	Chin	549	France	Female	25	5	0	2	0	0	190857.79	0
15	15600882	Scott	635	Spain	Female	35	7	0	2	1	1	65951.65	0
16	15643966	Goforth	616	Germany	Male	45	3	143129.4	2	0	1	64327.26	0
17	15737452	Romeo	653	Germany	Male	58	1	132602.9	1	1	0	5097.67	1
18	15788218	Henderso	549	Spain	Female	24	9	0	2	1	1	14406.41	0
19	15661507	Muldrow	587	Spain	Male	45	6	0	1	0	0	158684.81	0

■ *Importing Dataset and Calculating Correlation:*



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Run Code

In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

In [2]:
```
dataset=pd.read_csv('datasets_156197_358170_Churn_Modelling edited.csv')
dataset
```

Out[2]:

	RowNumber	CustomerId	CreditScore	Geography	Gender	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited
0	1	15634602	619	France	Female	42	2	0.00	1	1	1	101348.88	1
1	2	15647311	608	Spain	Female	41	1	83807.86	1	0	1	112542.58	0
2	3	15619304	502	France	Female	42	8	159660.80	3	1	0	113931.57	1
3	4	15701354	699	France	Female	39	1	0.00	2	0	0	93826.63	0
4	5	15737888	850	Spain	Female	43	2	125510.82	1	1	1	79084.10	0
...	...	...	...	...	...	...	...	...	...	...	...	...	...
9995	9996	15606229	771	France	Male	39	5	0.00	2	1	0	96270.64	0
9996	9997	15569892	516	France	Male	35	10	57369.61	1	1	1	101699.77	0
9997	9998	15584532	709	France	Female	36	7	0.00	1	0	1	42085.58	1
9998	9999	15682355	772	Germany	Male	42	3	75075.31	2	1	0	92888.52	1
9999	10000	15628319	792	France	Female	28	4	130142.79	1	1	0	38190.78	0

10000 rows × 13 columns

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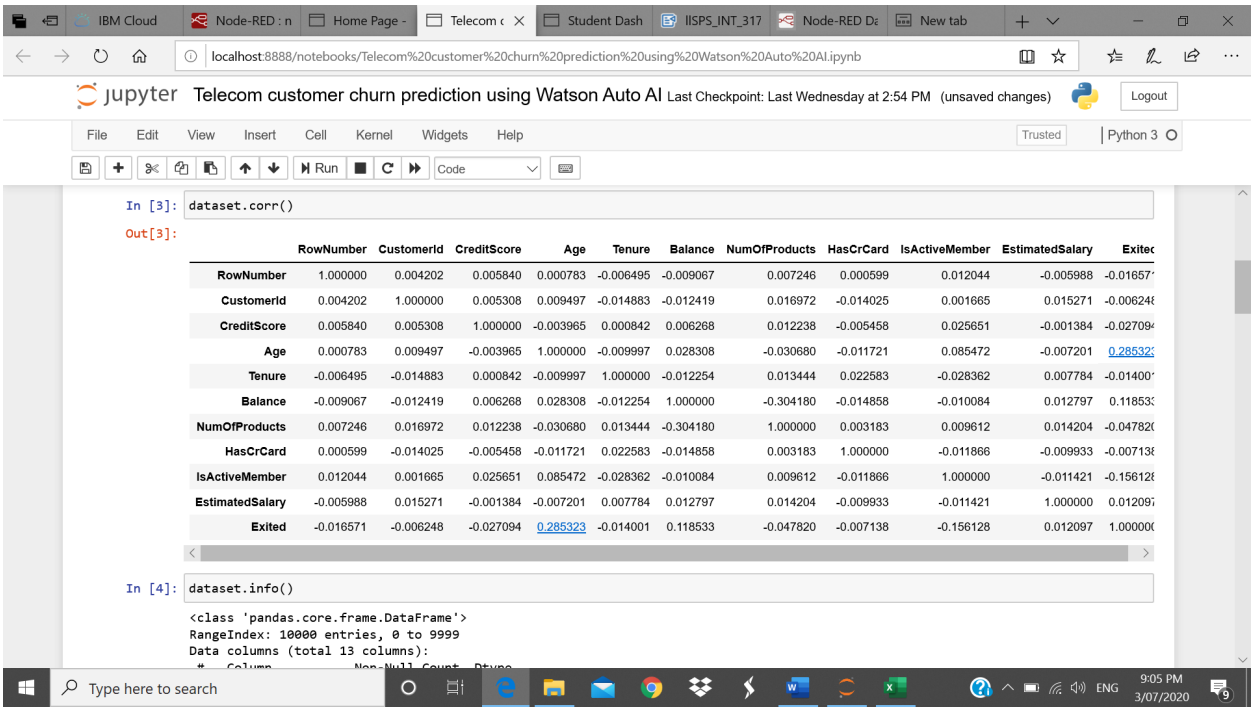

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Run Code

In [3]:
```
dataset.corr()
```

Out[3]:

	RowNumber	CustomerId	CreditScore	Age	Tenure	Balance	NumOfProducts	HasCrCard	IsActiveMember	EstimatedSalary	Exited
RowNumber	1.000000	0.004202	0.005840	0.000783	-0.006495	-0.009067	0.007246	0.000599	0.012044	-0.005988	-0.016571
CustomerId	0.004202	1.000000	0.005308	0.009497	-0.014883	-0.012419	0.016972	-0.014025	0.001665	0.015271	-0.006248
CreditScore	0.005840	0.005308	1.000000	-0.003965	0.000842	0.006268	0.012238	-0.005458	0.025651	-0.001384	-0.027094
Age	0.000783	0.009497	-0.003965	1.000000	-0.009997	0.028308	-0.030680	-0.011721	0.085472	-0.007201	0.285323
Tenure	-0.006495	-0.014883	0.000842	-0.009997	1.000000	-0.012254	0.013444	0.022583	-0.028362	0.007784	-0.014001
Balance	-0.009067	-0.012419	0.006268	0.028308	-0.012254	1.000000	-0.304180	-0.014858	-0.010084	0.012797	0.118533
NumOfProducts	0.007246	0.016972	0.012238	-0.030680	0.013444	-0.304180	1.000000	0.003183	0.009612	0.014204	-0.047820
HasCrCard	0.000599	-0.014025	-0.005458	-0.011721	0.022583	-0.014858	0.003183	1.000000	-0.011866	-0.009933	-0.007138
IsActiveMember	0.012044	0.001665	0.025651	0.085472	-0.028362	-0.010084	0.009612	-0.011866	1.000000	-0.011421	-0.156128
EstimatedSalary	-0.005988	0.015271	-0.001384	-0.007201	0.007784	0.012797	0.014204	-0.009933	-0.011421	1.000000	0.012097
Exited	-0.016571	-0.006248	-0.027094	0.285323	-0.014001	0.118533	-0.047820	-0.007138	-0.156128	0.012097	1.000000

In [4]:
```
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 10000 entries, 0 to 9999
Data columns (total 13 columns):
#   Column          Non-Null Count  Dtype
```

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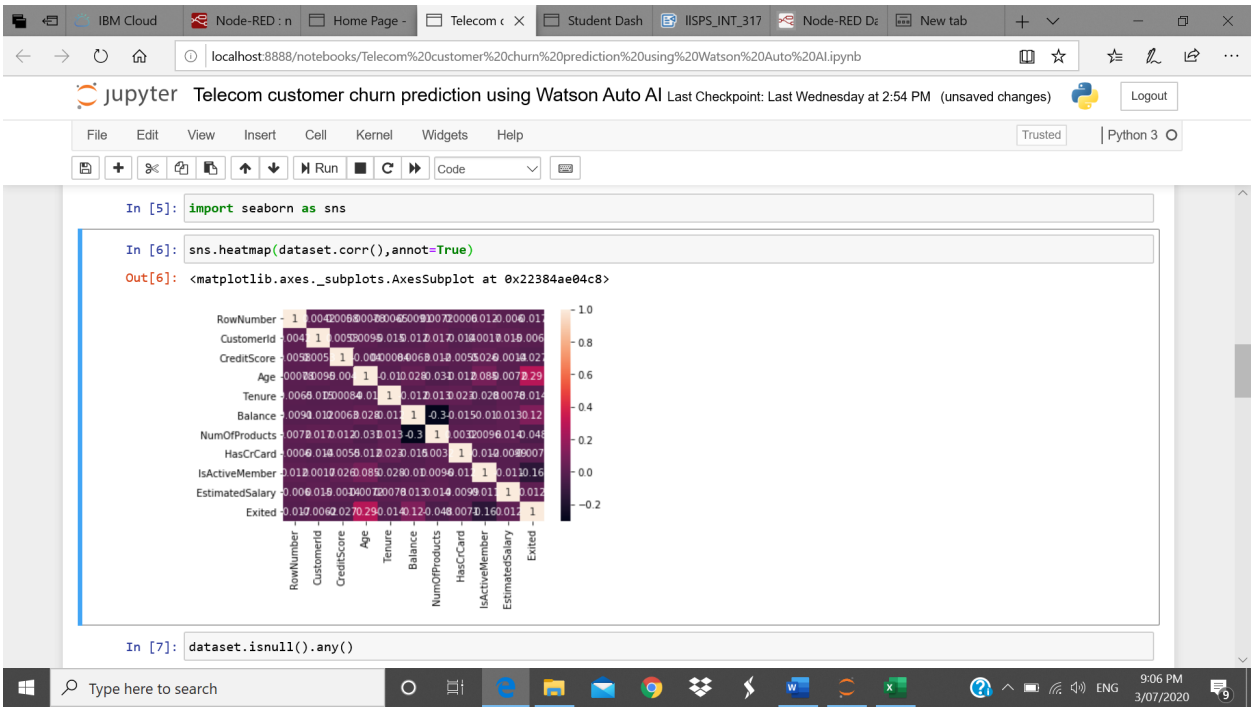
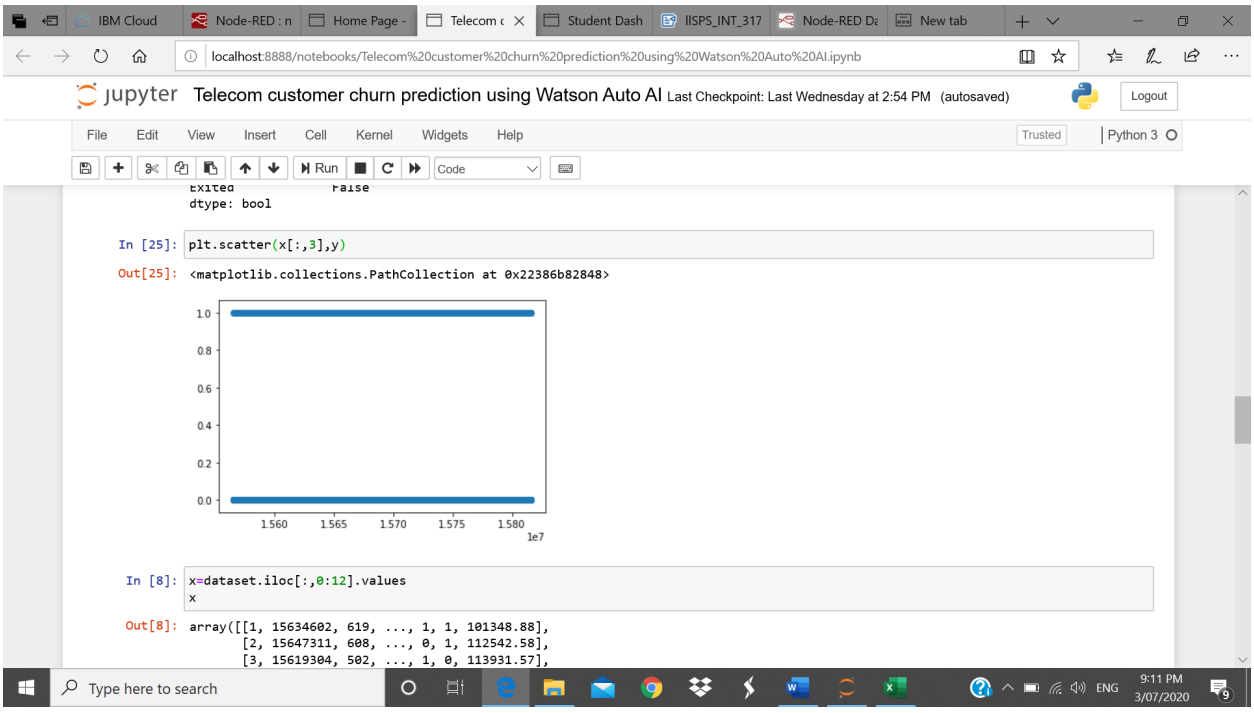
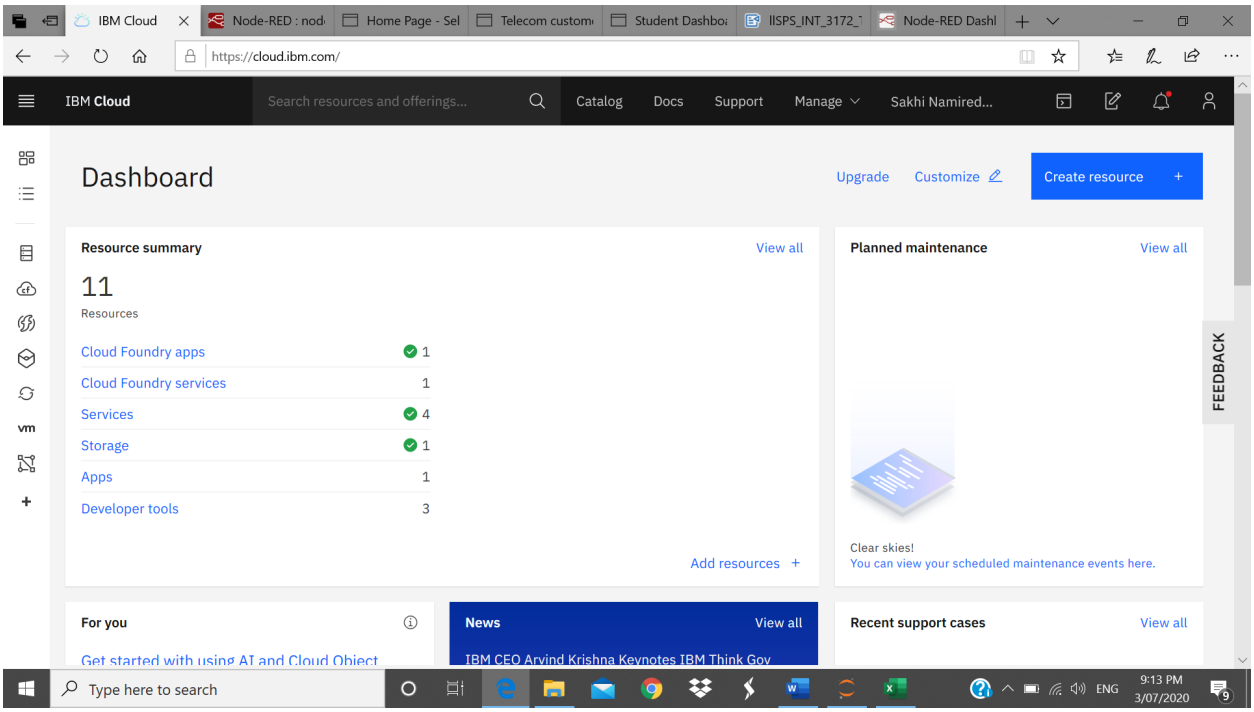
■ *Data visualization:*

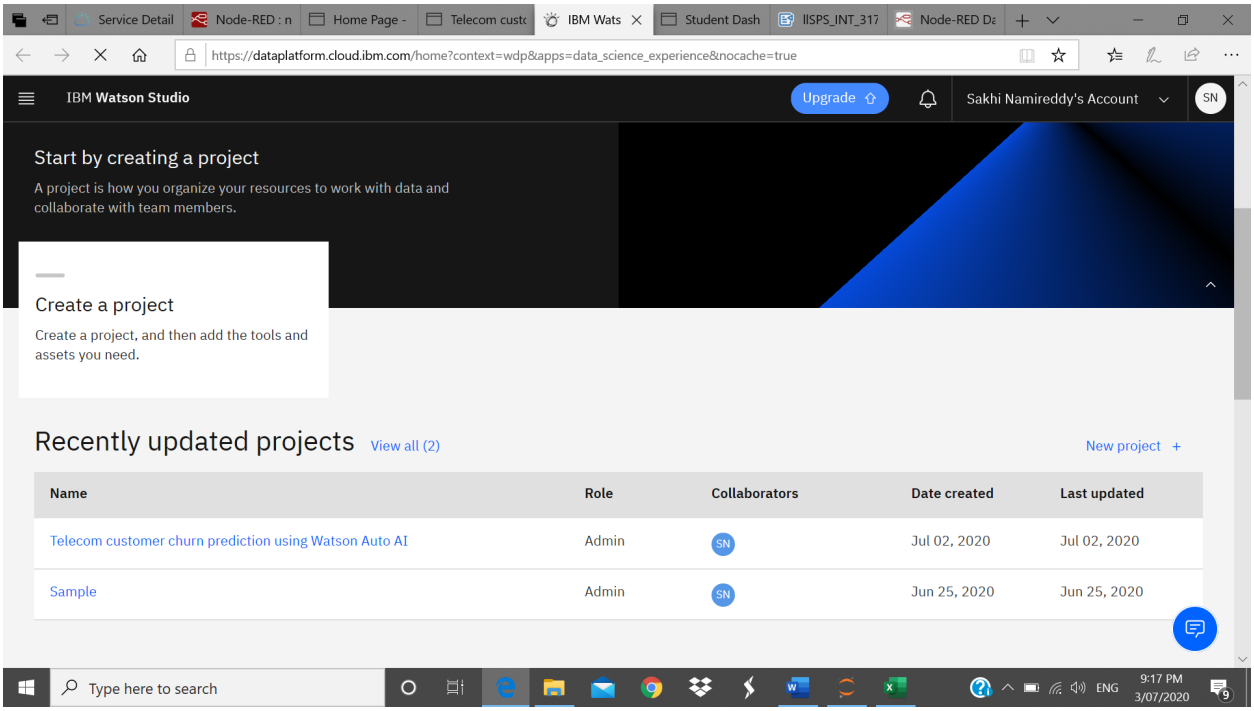




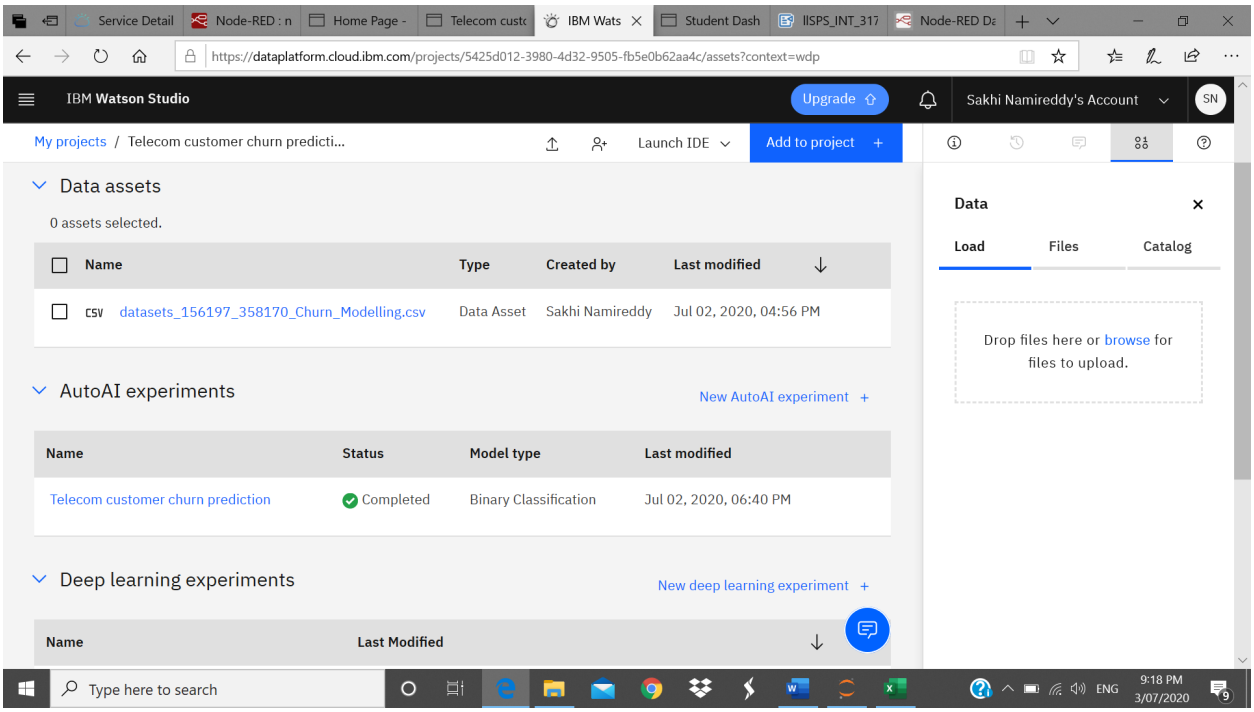
■ *IBM Cloud Dashboard:*



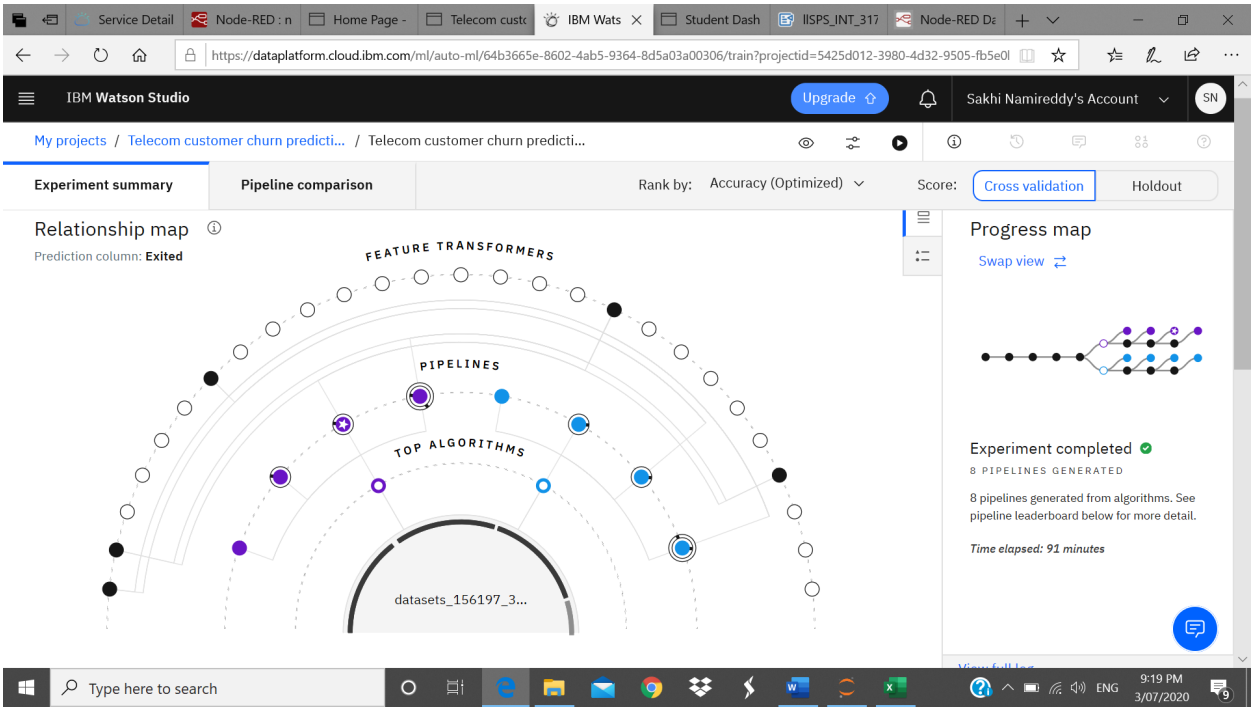
■ *Creating a Project using IBM Watson Studio:*



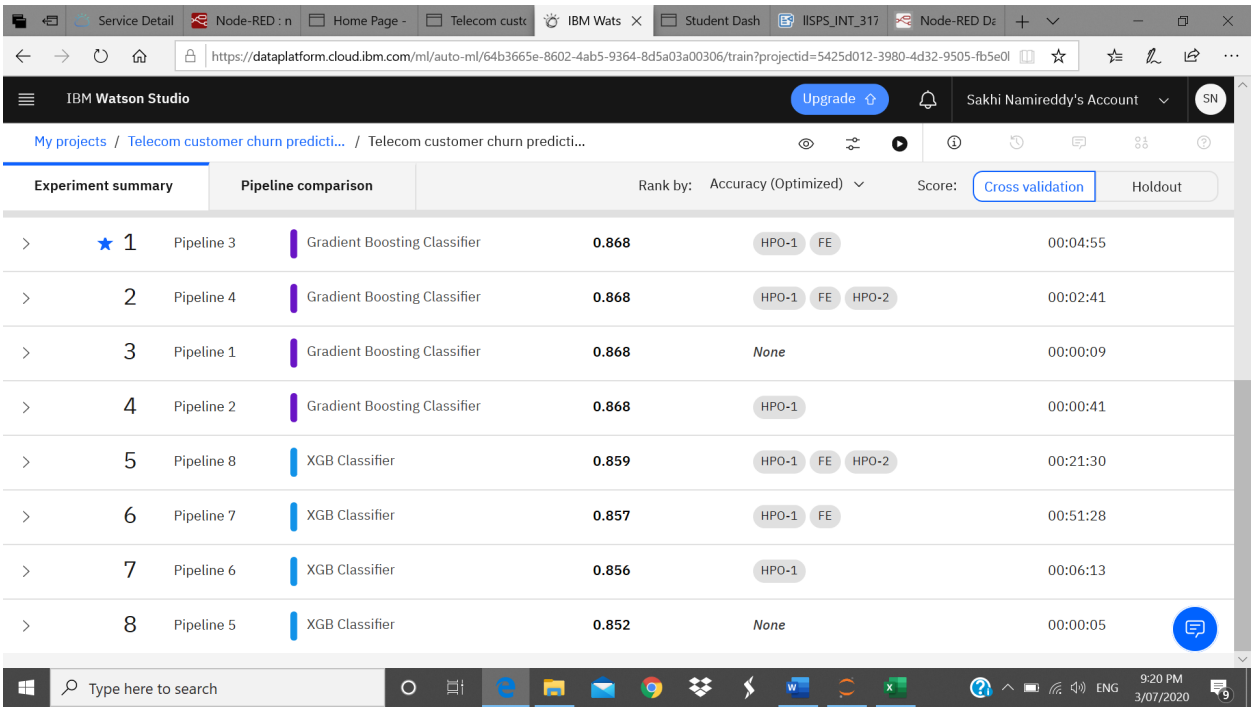
■ *Importing Dataset and Creating Auto AI experiment:*



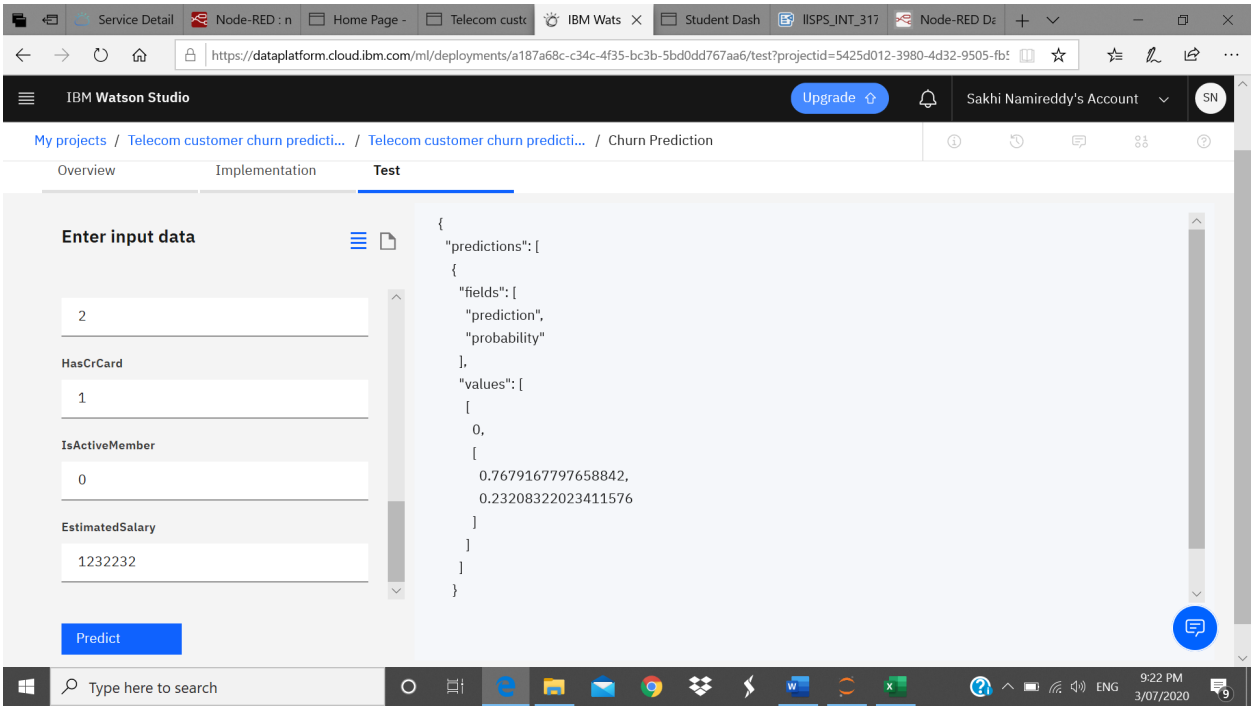
■ *Running the Auto AI Experiment:*



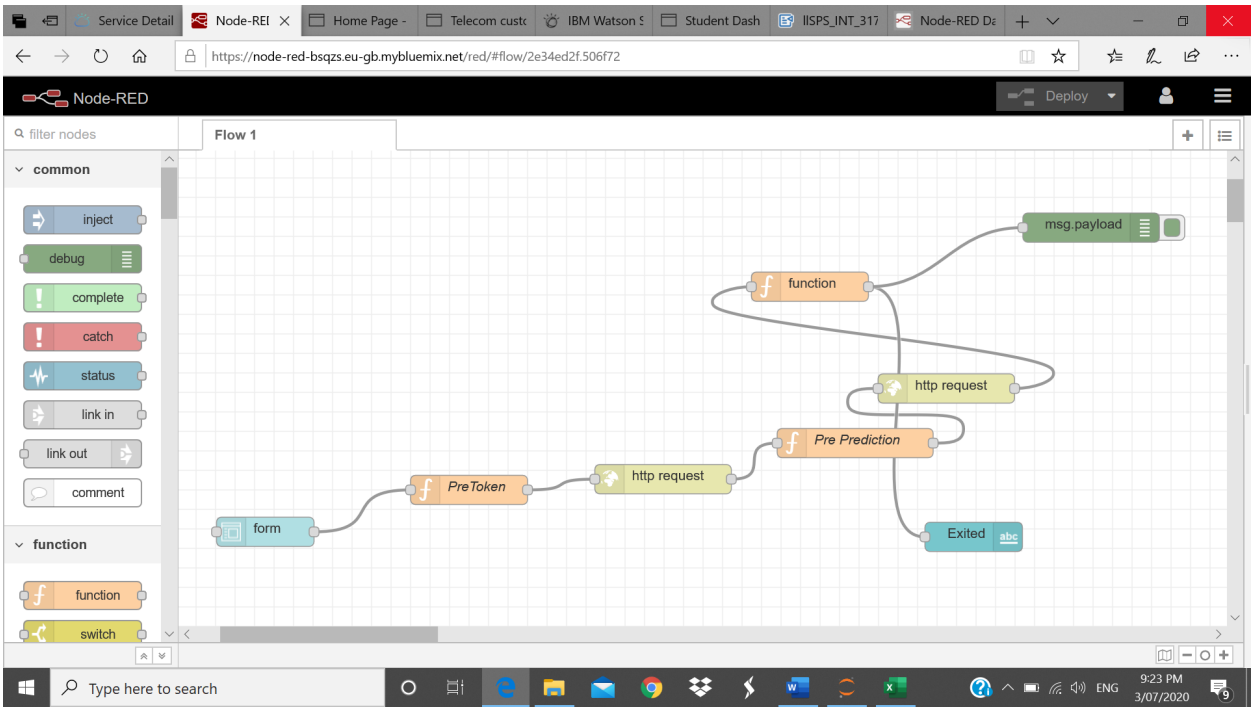
■ *Selecting a Pipeline:*



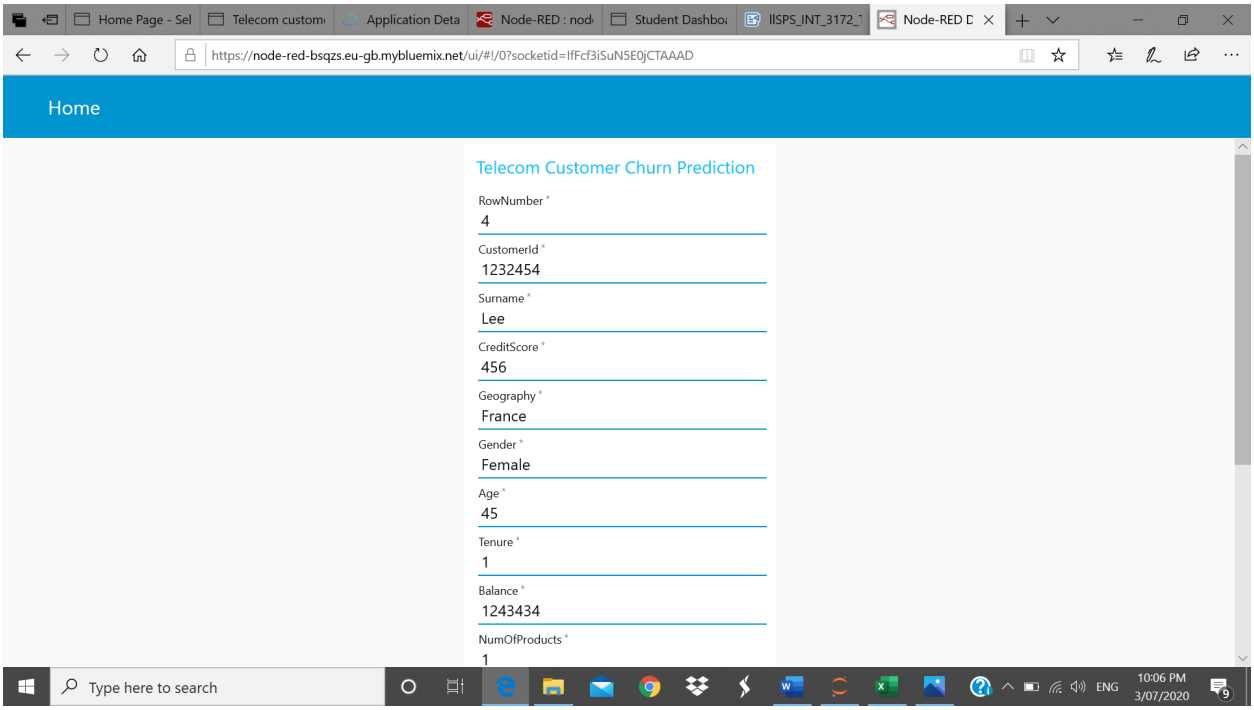
■ *Testing the Model:*

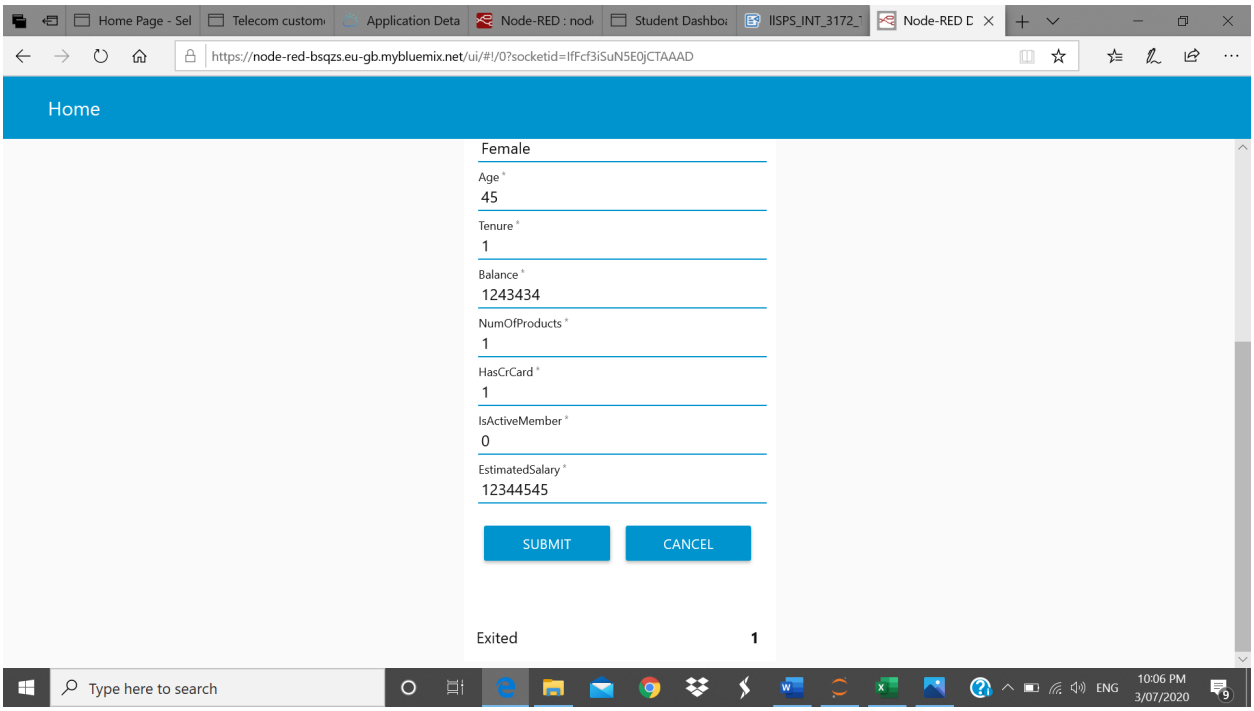


■ *Creating a Node-RED UI:*



■ *Predicting Output Using Node-RED:*

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