PROJECT DEVELOPMENT PHASE

PHASE MODEL

PERFORMANCE TESTING

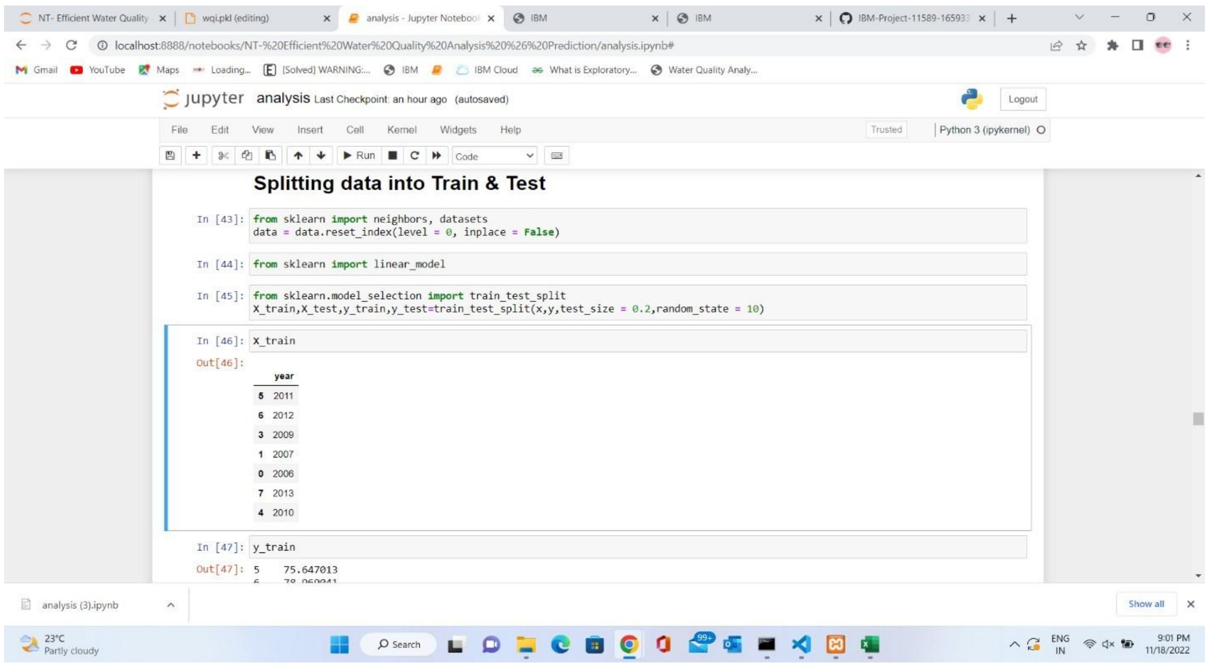
Date	**10 November2022**
Team ID	**PNT2022TMID38102**
Project Name	**Efficient Water Quality analysis&prediction using Machine learning**
Maximum Marks	**10Marks**

MODEL PERFORMANCE TESTING

Project team shall fill the following information in model performance testing template.

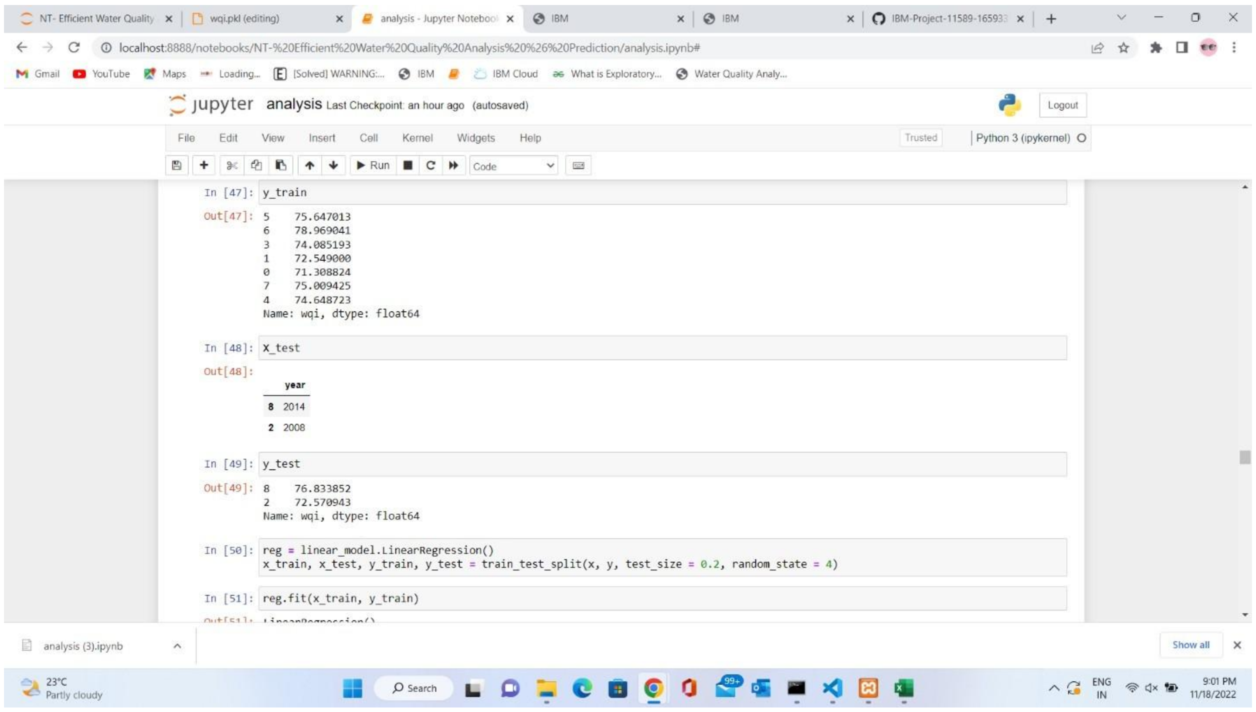
S.NO	PARAMETERS	VALUES	SCREEN SHOT
1	METRICS	Regression model **MAE - ,MSE-,RMSE-, R2score-** Classification model **Confusion Matrix - , Accuray Score-& ClassificationReport**	**Shown below**
2.	**Tune theModel**	**Hyperparameter Tuning - ValidationMethod -**	**Shown Below**

1. METRICS:LINEAR REGRESSION

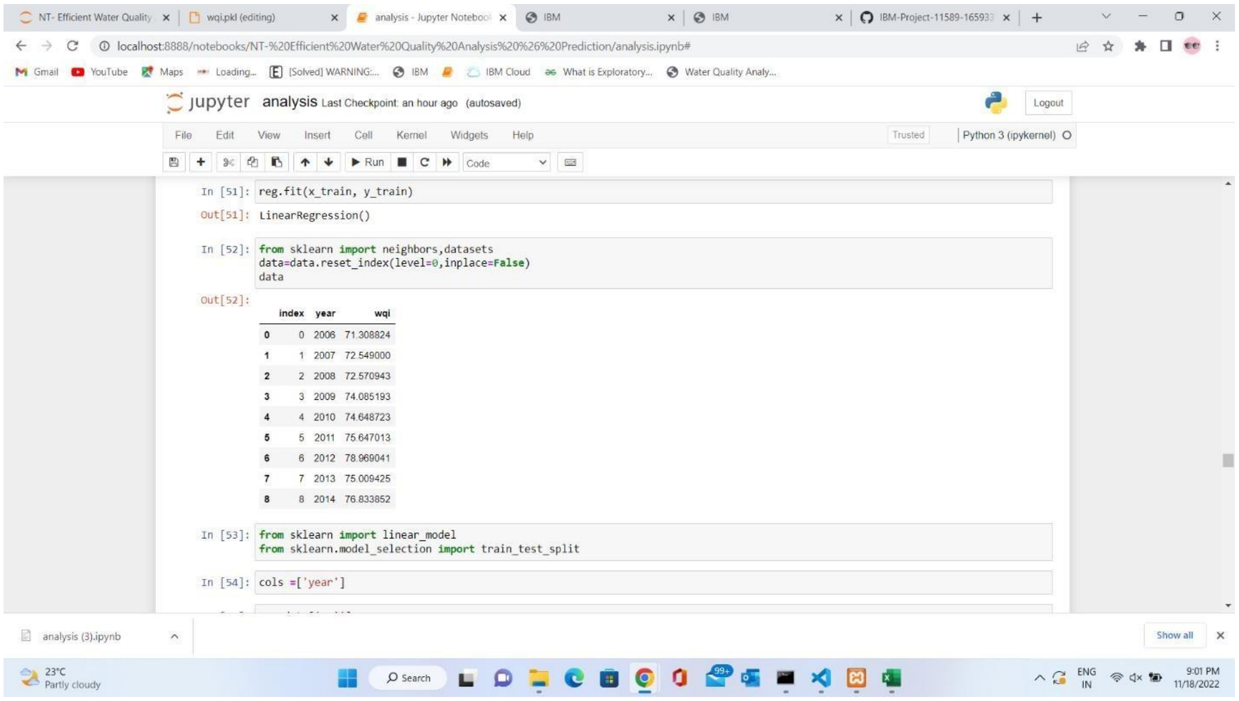

localhost:8888/notebooks/NT-%20Efficient%20Water%20Quality%20Analysis%20%26%20Prediction/analysis.ipynb#
jupyter analysis Last Checkpoint: an hour ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted
Python 3 (ipykernel)
Run
Code
analysis (3).ipynb
Show all

Splitting data into Train & Test

```
In [43]: from sklearn import neighbors, datasets
         data = data.reset_index(level = 0, inplace = False)

In [44]: from sklearn import linear_model

In [45]: from sklearn.model_selection import train_test_split
         X_train,X_test,y_train,y_test=train_test_split(x,y,test_size = 0.2,random_state = 10)

In [46]: X_train

Out[46]:
           year
         5 2011
         6 2012
         3 2009
         1 2007
         0 2006
         7 2013
         4 2010

In [47]: y_train

Out[47]: 5    75.647013
```


localhost:8888/notebooks/NT-%20Efficient%20Water%20Quality%20Analysis%20%26%20Prediction/analysis.ipynb#
jupyter analysis Last Checkpoint: an hour ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted
Python 3 (ipykernel)
Run
Code
analysis (3).ipynb
Show all

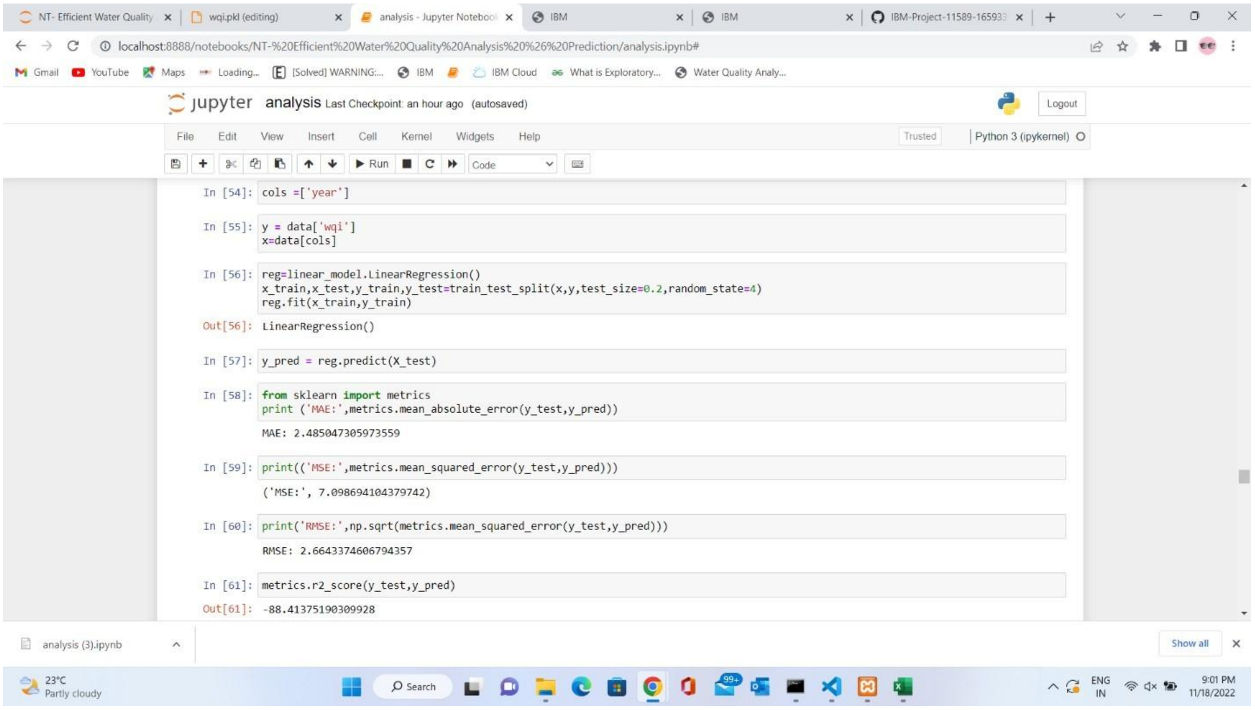
```
In [47]: y_train

Out[47]: 5    75.647013
         6    78.969041
         3    74.085193
         1    72.549000
         0    71.308824
         7    75.009425
         4    74.648723
         Name: wqi, dtype: float64

In [48]: X_test

Out[48]:
           year
         8 2014
         2 2008

In [49]: y_test

Out[49]: 8    76.833852
         2    72.570943
         Name: wqi, dtype: float64

In [50]: reg = linear_model.LinearRegression()
         x_train, x_test, y_train, y_test = train_test_split(x, y, test_size = 0.2, random_state = 4)

In [51]: reg.fit(x_train, y_train)
```



```
In [51]: reg.fit(x_train, y_train)

Out[51]: LinearRegression()

In [52]: from sklearn import neighbors,datasets
         data=data.reset_index(level=0,inplace=False)
         data

Out[52]:
```

	index	year	wqi
0	0	2006	71.308824
1	1	2007	72.549000
2	2	2008	72.570943
3	3	2009	74.085193
4	4	2010	74.648723
5	5	2011	75.647013
6	6	2012	78.969041
7	7	2013	75.009425
8	8	2014	76.833852

```
In [53]: from sklearn import linear_model
         from sklearn.model_selection import train_test_split

In [54]: cols =['year']
```



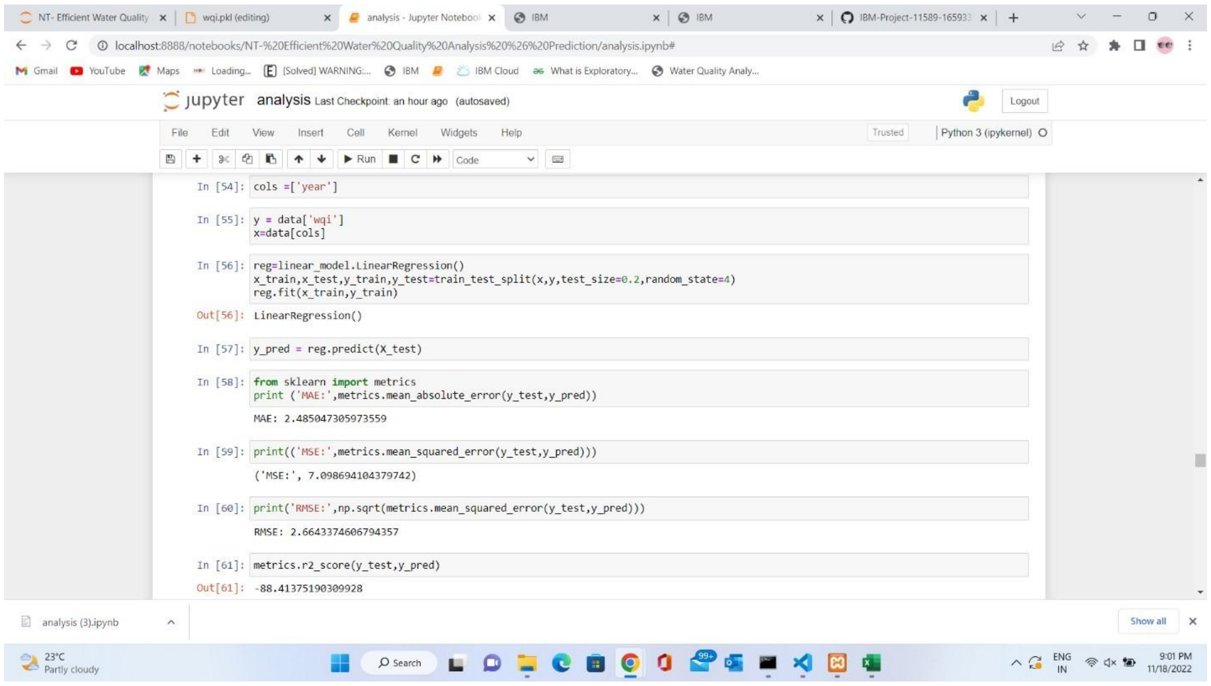
```
In [54]: cols =['year']

In [55]: y = data['wqi']
         x=data[cols]

In [56]: reg=linear_model.LinearRegression()
         x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=4)
         reg.fit(x_train,y_train)

Out[56]: LinearRegression()

In [57]: y_pred = reg.predict(X_test)

In [58]: from sklearn import metrics
         print ('MAE:',metrics.mean_absolute_error(y_test,y_pred))

         MAE: 2.485047305973559

In [59]: print(('MSE:',metrics.mean_squared_error(y_test,y_pred)))

         ('MSE:', 7.098694104379742)

In [60]: print('RMSE:',np.sqrt(metrics.mean_squared_error(y_test,y_pred)))

         RMSE: 2.6643374606794357

In [61]: metrics.r2_score(y_test,y_pred)

Out[61]: -88.41375190309928
```

2. TUNE THE MODEL:

HYPERPARAMETER TUNING

- **The number of features is important and should be tuned in linear regression**
- **Initially all parameters in the dataset are taken as independent values to arrive at the dependent decision of Exploratory Analysis of Water Quality Prediction**
- **But the result was not accurate so used only 8 more correlated values as independentvalues to arrive at the dependent decision of Exploratory Analysis of Water Quality Prediction.**

VALIDATION METHOD:


jupyter analysis Last Checkpoint: an hour ago (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted
Python 3 (ipykernel)
Run
Code

```
In [54]: cols =['year']

In [55]: y = data['wqi']
         x=data[cols]

In [56]: reg=linear_model.LinearRegression()
         x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.2,random_state=4)
         reg.fit(x_train,y_train)

Out[56]: LinearRegression()

In [57]: y_pred = reg.predict(X_test)

In [58]: from sklearn import metrics
         print ('MAE:',metrics.mean_absolute_error(y_test,y_pred))

         MAE: 2.485047305973559

In [59]: print(('MSE:',metrics.mean_squared_error(y_test,y_pred)))

         ('MSE:', 7.098694104379742)

In [60]: print('RMSE:',np.sqrt(metrics.mean_squared_error(y_test,y_pred)))

         RMSE: 2.6643374606794357

In [61]: metrics.r2_score(y_test,y_pred)

Out[61]: -88.41375190309928
```

: