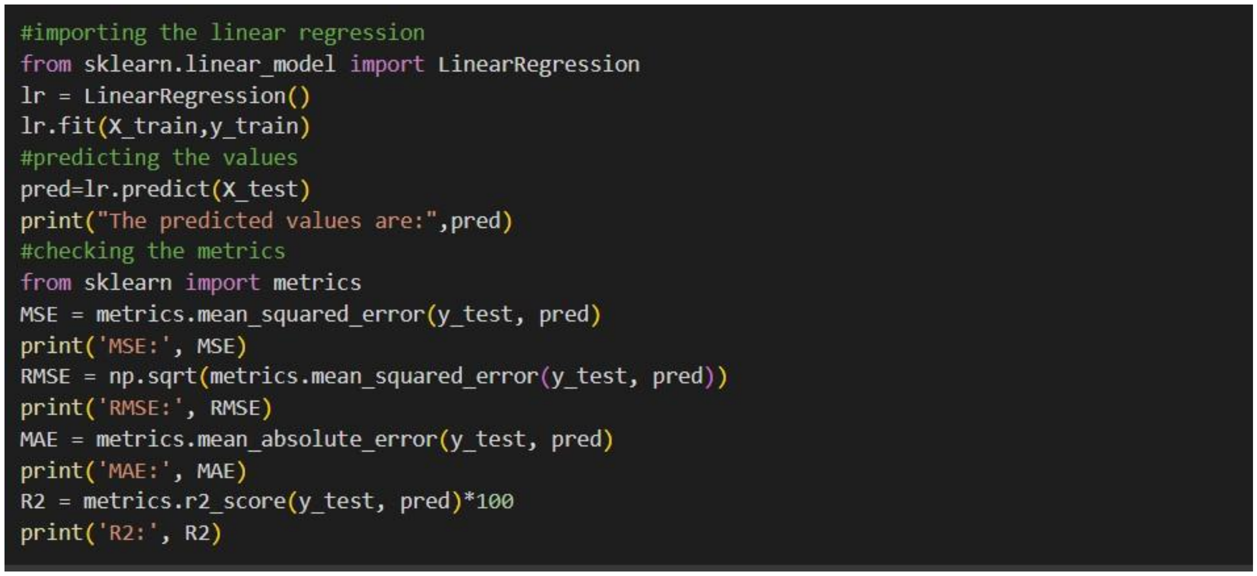
Model Development Phase

Date	1 July 2024
Team ID	740674
Project Title	Power Consumption Analysis for Households
Maximum Marks	4 Marks

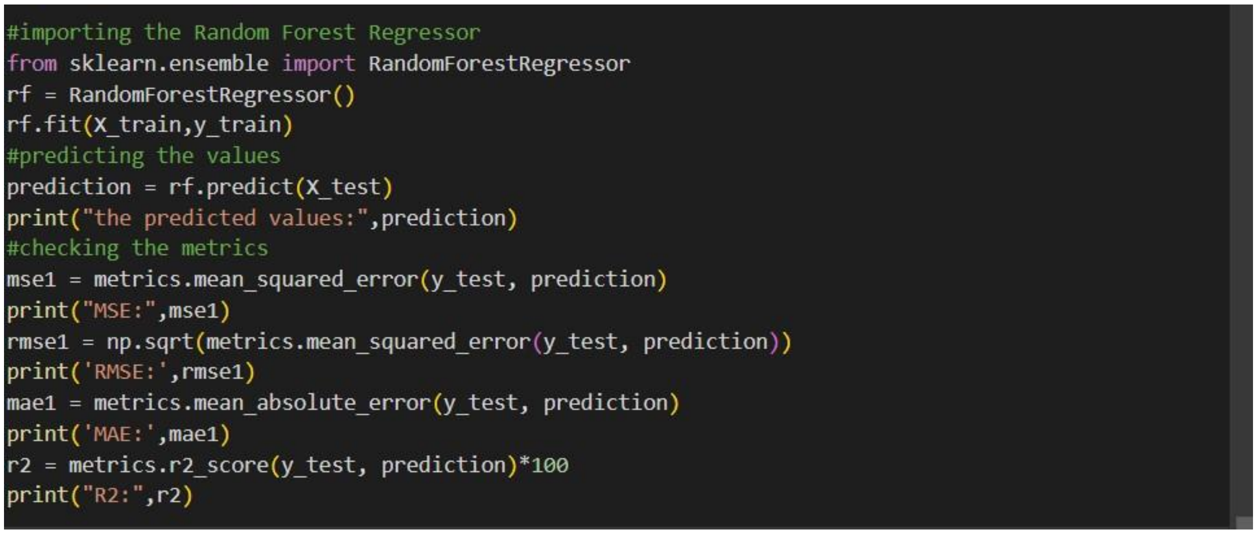
Initial Model Training Code, Model Validation and Evaluation Report

The initial model training code will be showcased in the future through a screenshot. The model validation and evaluation report will include classification reports, accuracy, and confusion matrices for multiple models, presented through respective screenshots.

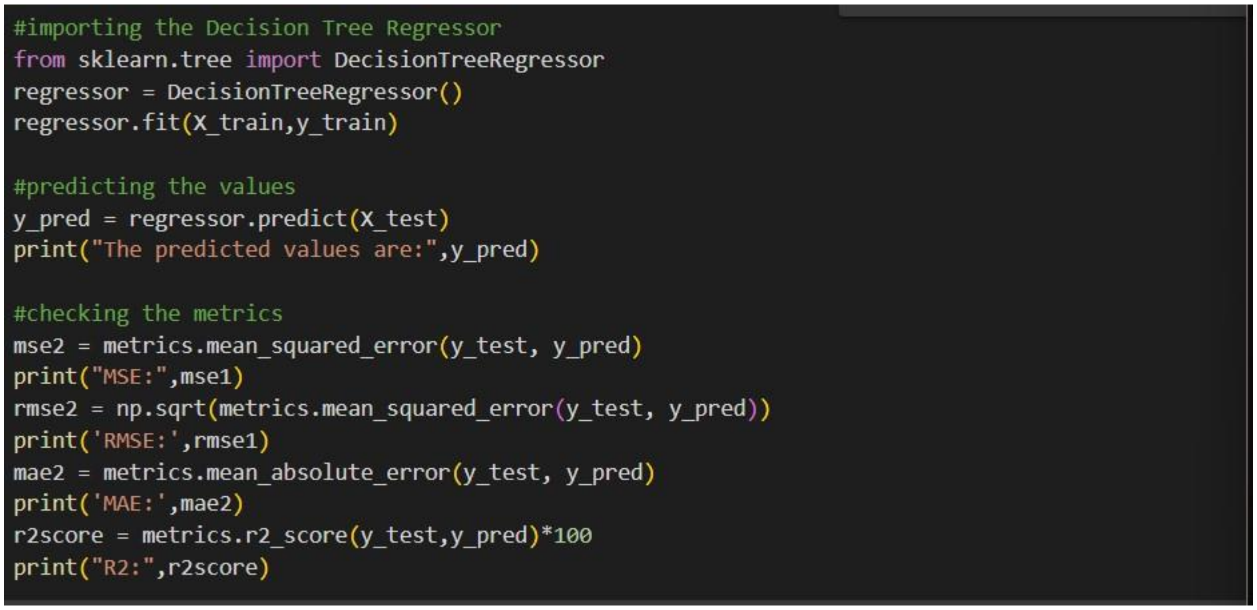
Initial Model Training Code:



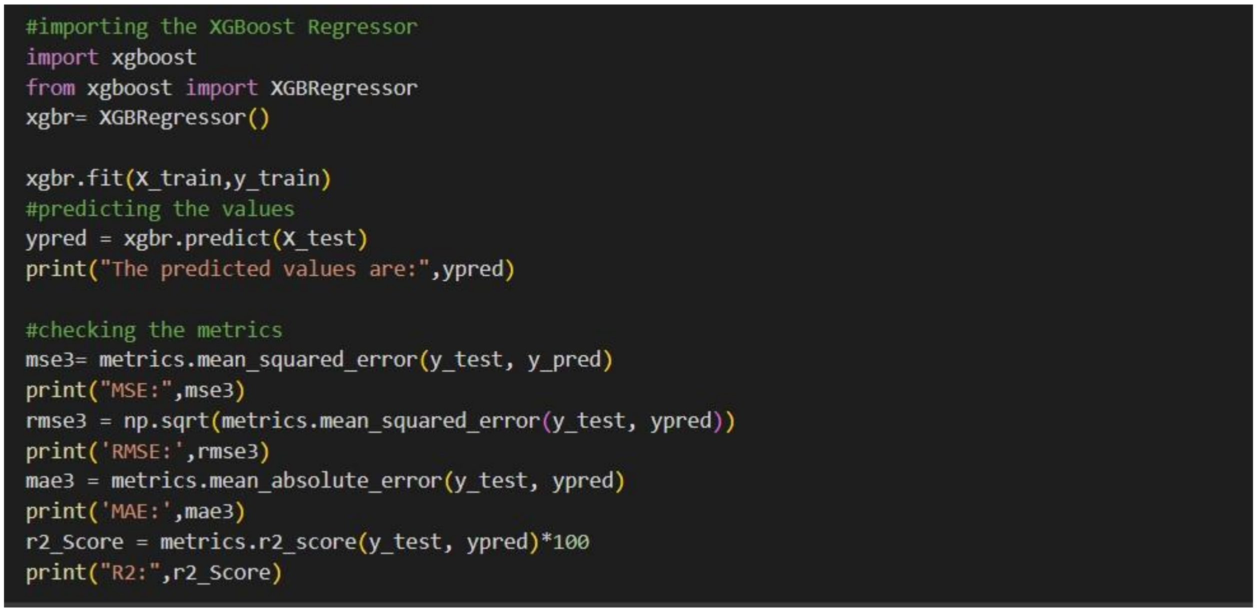
```
#importing the linear regression
from sklearn.linear_model import LinearRegression
lr = LinearRegression()
lr.fit(X_train,y_train)
#predicting the values
pred=lr.predict(X_test)
print("The predicted values are:",pred)
#checking the metrics
from sklearn import metrics
MSE = metrics.mean_squared_error(y_test, pred)
print('MSE:', MSE)
RMSE = np.sqrt(metrics.mean_squared_error(y_test, pred))
print('RMSE:', RMSE)
MAE = metrics.mean_absolute_error(y_test, pred)
print('MAE:', MAE)
R2 = metrics.r2_score(y_test, pred)*100
print('R2:', R2)
```



```
#importing the Random Forest Regressor
from sklearn.ensemble import RandomForestRegressor
rf = RandomForestRegressor()
rf.fit(X_train,y_train)
#predicting the values
prediction = rf.predict(X_test)
print("the predicted values:",prediction)
#checking the metrics
mse1 = metrics.mean_squared_error(y_test, prediction)
print("MSE:",mse1)
rmse1 = np.sqrt(metrics.mean_squared_error(y_test, prediction))
print('RMSE:',rmse1)
mae1 = metrics.mean_absolute_error(y_test, prediction)
print('MAE:',mae1)
r2 = metrics.r2_score(y_test, prediction)*100
print("R2:",r2)
```

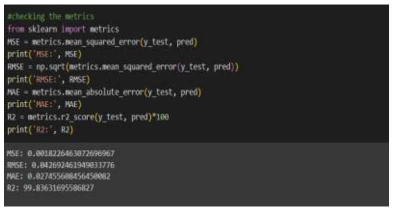


```
#importing the Decision Tree Regressor
from sklearn.tree import DecisionTreeRegressor
regressor = DecisionTreeRegressor()
regressor.fit(X_train,y_train)

#predicting the values
y_pred = regressor.predict(X_test)
print("The predicted values are:",y_pred)

#checking the metrics
mse2 = metrics.mean_squared_error(y_test, y_pred)
print("MSE:",mse1)
rmse2 = np.sqrt(metrics.mean_squared_error(y_test, y_pred))
print('RMSE:',rmse1)
mae2 = metrics.mean_absolute_error(y_test, y_pred)
print('MAE:',mae2)
r2score = metrics.r2_score(y_test,y_pred)*100
print("R2:",r2score)
```



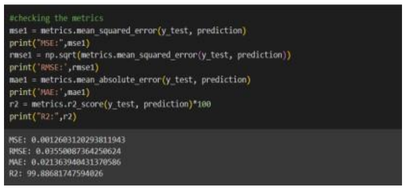
```
#importing the XGBoost Regressor
import xgboost
from xgboost import XGBRegressor
xgbr= XGBRegressor()

xgbr.fit(X_train,y_train)
#predicting the values
ypred = xgbr.predict(X_test)
print("The predicted values are:",ypred)

#checking the metrics
mse3= metrics.mean_squared_error(y_test, y_pred)
print("MSE:",mse3)
rmse3 = np.sqrt(metrics.mean_squared_error(y_test, ypred))
print('RMSE:',rmse3)
mae3 = metrics.mean_absolute_error(y_test, ypred)
print('MAE:',mae3)
r2_Score = metrics.r2_score(y_test, ypred)*100
print("R2:",r2_Score)
```

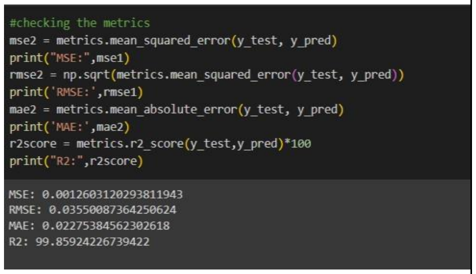
Model Validation and Evaluation Report:

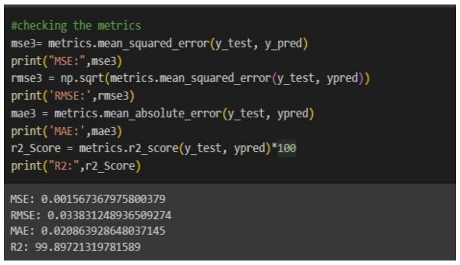
Model	Classification Report	Accuracy	Confusion Matrix
Linear Regression		99.83	-

```
#checking the metrics
from sklearn import metrics
MSE = metrics.mean_squared_error(y_test, pred)
print('MSE:', MSE)
RMSE = np.sqrt(metrics.mean_squared_error(y_test, pred))
print('RMSE:', RMSE)
MAE = metrics.mean_absolute_error(y_test, pred)
print('MAE:', MAE)
R2 = metrics.r2_score(y_test, pred)*100
print('R2:', R2)
```

```
MSE: 0.0018226463072696967
RMSE: 0.042692461949033776
MAE: 0.027455608456450082
R2: 99.83631695586827
```

Random Forest Regressor	
	`#checking the metrics`
	`mse1 = metrics.mean_squared_error(y_test, prediction)`
	`print("MSE:",mse1)`
	`rmse1 = np.sqrt(metrics.mean_squared_error(y_test, prediction))`
	`print('RMSE:',rmse1)`
	`mae1 = metrics.mean_absolute_error(y_test, prediction)`
	`print('MAE:',mae1)`
	`r2 = metrics.r2_score(y_test, prediction)*100`
	`print("R2:",r2)`
	`MSE: 0.0012603120293811943`
	`RMSE: 0.035500873642506024`
	`MAE: 0.021363940431370586`
	`R2: 99.88681747594026`
		99.88	-

Decision Tree Regressor	
	`#checking the metrics`
	`mse2 = metrics.mean_squared_error(y_test, y_pred)`
	`print("MSE:",mse1)`
	`rmse2 = np.sqrt(metrics.mean_squared_error(y_test, y_pred))`
	`print('RMSE:',rmse1)`
	`mae2 = metrics.mean_absolute_error(y_test, y_pred)`
	`print('MAE:',mae2)`
	`r2score = metrics.r2_score(y_test,y_pred)*100`
	`print("R2:",r2score)`
	`MSE: 0.0012603120293811943`
	`RMSE: 0.035500873642506024`
	`MAE: 0.022753845623026l8`
	`R2: 99.85924226739422`
		99.85	-

XGBoost Regressor	
	`#checking the metrics`
	`mse3= metrics.mean_squared_error(y_test, y_pred)`
	`print("MSE:",mse3)`
	`rmse3 = np.sqrt(metrics.mean_squared_error(y_test, ypred))`
	`print('RMSE:',rmse3)`
	`mae3 = metrics.mean_absolute_error(y_test, ypred)`
	`print('MAE:',mae3)`
	`r2_Score = metrics.r2_score(y_test, ypred)*100`
	`print("R2:",r2_Score)`
	`MSE: 0.0015673679758003 79`
	`RMSE: 0.033831248936509274`
	`MAE: 0.020863928648037145`
	`R2: 99.89721319781589`
		99.89	-