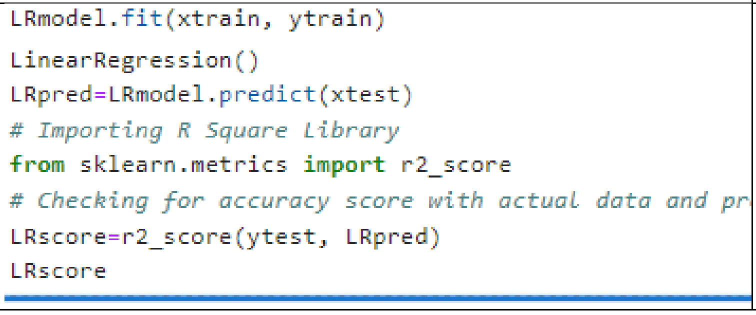
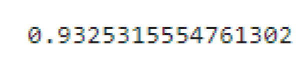
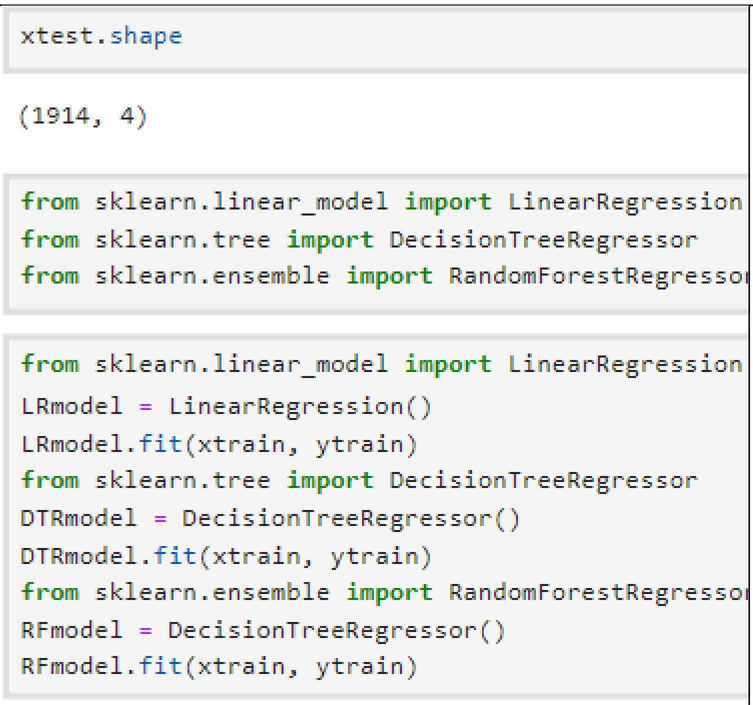
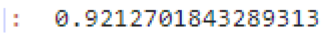
Date	15 March 2024
Team id	SWUID20240034764
Project title	Predicting Full Load Electrical Power Output of a Base Load Operated Combined Cycle Power Plant Using Machine Learning
Maximum marks	4 Marks

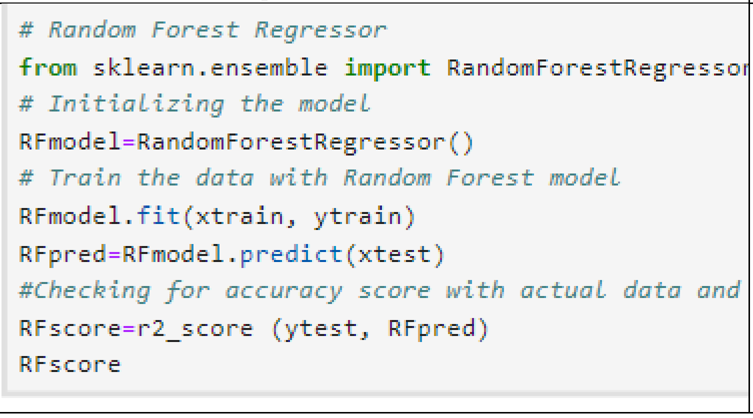
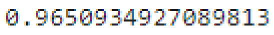
Model Optimization and Tuning Phase

The Model Optimization and Tuning Phase involves refining machine learning models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

MODEL	TUNED HYPERPARAMETERS	OPTIMAL VALUES

LR	 LRmodel.fit(xtrain, ytrain)
	LinearRegression()
	LRpred=LRmodel.predict(xtest)
	# Importing R Square Library
	from sklearn.metrics import r2_score
	# Checking for accuracy score with actual data and pr
	LRscore=r2_score(ytest, LRpred)
	LRscore
		 0.9325315554761302

DT	
	xtest.shape
	(1914, 4)
	from sklearn.linear_model import LinearRegression
	from sklearn.tree import DecisionTreeRegressor
	from sklearn.ensemble import RandomForestRegresso
	from sklearn.linear_model import LinearRegression
	LRmodel = LinearRegression()
	LRmodel.fit(xtrain, ytrain)
	from sklearn.tree import DecisionTreeRegressor
	DTRmodel = DecisionTreeRegressor()
	DTRmodel.fit(xtrain, ytrain)
	from sklearn.ensemble import RandomForestRegresso
	RFmodel = DecisionTreeRegressor()
	RFmodel.fit(xtrain, ytrain)
		
		: 0.9212701843289313

RF	
	# Random Forest Regressor
	from sklearn.ensemble import RandomForestRegresso
	# Initializing the model
	RFmodel=RandomForestRegressor()
	# Train the data with Random Forest model
	RFmodel.fit(xtrain, ytrain)
	RFpred=RFmodel.predict(xtest)
	#Checking for accuracy score with actual data and
	RFscore=r2_score (ytest, RFpred)
	RFscore
		
		0.9650934927089813

Final Model Selection Justification

Final Model	Reasoning
Random Forest	The random forest model was selected due to its robustness, accuracy, and ability to handle large, complex datasets with both numerical and categorical features. Its ensemble approach, combining multiple decision trees, helps reduce overfitting, can manage missing values and improve generalization with project objectives, justifying its selection as the final model