Model Optimization and Tuning Phase Template

Date	10 July 2024
Team ID	739894
Project Title	Predicting the Compressive Strength of Concrete
Maximum Marks	10 Marks

Model Optimization and Tuning Phase

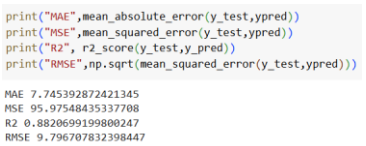
The Model Optimization and Tuning Phase involves refining machine learning models for peak performance. It includes optimized model code, fine-tuning hyperparameters, comparing performance metrics, and justifying the final model selection for enhanced predictive accuracy and efficiency.

Hyperparameter Tuning Documentation (6 Marks):

Model	Tuned Hyperparameters	Optimal Values
Linear Regression	No Hyperparameters used	----------
Gradient Boosting Regressor	No Hyperparameters used	----------

Model	Accuracy	Metrics

Linear Regression	`lr = LinearRegression()`
	`lr.fit(x_train, y_train)`
	`LinearRegression()`
	`lr.score(x_train,y_train)`
	`lr.score(x_test,y_test)`
	`0.7459334448168664`
		`ypred=lr.predict(x_test)`
		`from sklearn.linear_model import LinearRegression`
		`lr=LinearRegression()`
		`lr.fit(x_train,y_train)`
		`mse=mean_squared_error(ypred,y_test)`
		`print("mean squared error:",mse)`
		`r2_lr=r2_score(ypred,y_test)`
		`print("r2 score",r2_lr)`
		`mean squared error: 95.97548435337708`
		`r2 score 0.4230393880803491`

Gradient Boosting Regressor		

Performance Metrics Comparison Report (2 Marks):

Final Model Selection
Justification (2 Marks):

Final Model Selection	Reasoning
Gradient Boosting Regressor	The Gradient Boosting model was selected for its superior performance, exhibiting high accuracy than linear regression. We chose the Gradient Boosting Regressor because it gives very accurate predictions, can handle complex patterns in data, and avoids overfitting. It works well with different types of data and allows us to see which features are most important. This makes it a reliable and effective model for our task