Model Development Phase Template

Date	15 March 2024
Team ID	xxxxxx
Project Title	Predictive Modeling for Fleet Fuel Management using Machine Learning
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:

```python
# Initialize and train a RandomForestRegressor
rf = RandomForestRegressor(random_state=42)
rf.fit(X_train, y_train)
y_pred_rf = rf.predict(X_test)

# Initialize HistGradientBoostingRegressor
hgb_reg = HistGradientBoostingRegressor(random_state=42)
hgb_reg.fit(X_train, y_train)
y_pred_hgb = hgb_reg.predict(X_test)
```

Model Validation and Evaluation Report:

Model	Classification Report	Accuracy	Confusion Matrix
Random Forest Regressor	```[67]: # Calculate the R2 score` `print(f"Random Forest Regressor R² Score: {r2_rf}")` `print(f"Random Forest Regressor Mean Squared Error: {mse}")` `print(f"Random Forest Regressor Mean Absolute Error: {mae}")`  `Random Forest Regressor R² Score: 0.5889485334633298` `Random Forest Regressor Mean Squared Error: 0.3442496727207985` `Random Forest Regressor Mean Absolute Error: 0.42989086039086077```	60	```print("Classification Report:")` `print(class_report)`  `print("Confusion Matrix:")` `print(conf_matrix)`  `Classification Report:` ` precision recall f1-score support` ` 0 0.77 0.72 0.74 32` ` 1 0.41 0.44 0.43 27` ` 2 0.34 0.33 0.34 30` ` 3 0.59 0.61 0.60 28`  ` accuracy 0.53 117` ` macro avg 0.53 0.53 0.53 117` `weighted avg 0.53 0.53 0.53 117`  `Confusion Matrix:` `[[23 7 0 2]` ` [4 12 10 1]` ` [3 8 10 9]` ` [0 2 9 17]]```
HistGradient Boosting Regressor	```: # Calculate the R2 score for the best model` `r2_best_gbr = r2_score(y_test, y_pred_best_gbr)` `mse = mean_squared_error(y_test,y_pred_best_gbr)` `mae = mean_absolute_error(y_test, y_pred_best_gbr)` `print('Best GradientBoosting R2 Score:', r2_best_gbr)` `print('Best Hyperparameters:', grid_search.best_params_)`  `Best GradientBoosting R2 Score: -9.383042721509119` `Best Hyperparameters: {'learning_rate': 0.01, 'max_depth': 5, 'min_samples_leaf': 1, 'min_sam`  `# Calculate the R2 score for the best model` `print(r2_best_gbr)` `print(mse)` `print(mae)`  `-9.383042721509119` `13.229675735887355` `3.503621355028696974```	53	```: print("Classification Report:")` `print(class_report)`  `print("Confusion Matrix:")` `print(conf_matrix)`  `Classification Report:` ` precision recall f1-score support` ` 0 0.77 0.72 0.74 32` ` 1 0.41 0.44 0.43 27` ` 2 0.34 0.33 0.34 30` ` 3 0.59 0.61 0.60 28`  ` accuracy 0.53 117` ` macro avg 0.53 0.53 0.53 117` `weighted avg 0.53 0.53 0.53 117`  `Confusion Matrix:` `[[23 7 0 2]` ` [4 12 10 1]` ` [3 8 10 9]` ` [0 2 9 17]]```