**Hyperparameter Tuning Results**

**Base Model**

RandomForestRegressor(n\_estimators = 25, max\_depth = 8,random\_state=0)

Root Mean Squared Error: 22.63155312168305

Mean Absolute Error: 7.243044541102144

R2 Score: 0.9434679431926907

**RandomSearchCV Model 1**

Best parameters: {'n\_estimators': 100, 'min\_samples\_split': 4, 'min\_samples\_leaf': 1, 'max\_features': 'auto', 'max\_depth': 64, 'bootstrap': True}

Root Mean Squared Error: 21.254181681628264

Mean Absolute Error: 7.204570962029298

R2 Score: 0.9501397047498457

**RandomSearchCV Model 2**

Best parameters: {'n\_estimators': 150, 'min\_samples\_split': 8, 'min\_samples\_leaf': 4, 'max\_features': 'auto', 'max\_depth': 4, 'bootstrap': False}

Root Mean Squared Error: 29.092804595446978

Mean Absolute Error: 8.905147796035507

R2 Score: 0.9065805623668411

**GridSearchCV Model**

bootstrap': True, 'max\_depth': 4, 'max\_features': 'auto', 'min\_samples\_leaf': 1, 'min\_samples\_split': 4, 'n\_estimators': 10

Root Mean Squared Error: 21.074775771242003

Mean Absolute Error: 7.92994682894163

R2 Score: 0.9509778907199073

**HalvingRandomSearchCV Model 1 (Best Model)**

**Best parameters: {'n\_estimators': 150, 'min\_samples\_split': 4, 'min\_samples\_leaf': 1, 'max\_features': 'auto', 'max\_depth': 8, 'bootstrap': True}**

Root Mean Squared Error: 20.64914158503755

Mean Absolute Error: 6.9980242812722615

R2 Score: 0.9529380332308035

**HalvingRandomSearchCV Model 2**

Best parameters: {'n\_estimators': 10, 'min\_samples\_split': 4, 'min\_samples\_leaf': 1, 'max\_features': 'auto', 'max\_depth': 6, 'bootstrap': True}

Root Mean Squared Error: 21.013478598008444

Mean Absolute Error: 7.240909204014372

R2 Score: 0.9512626431436153

**HalvingGridSearch**

Best parameters: {'bootstrap': True, 'max\_depth': 8, 'max\_features': 'auto', 'min\_samples\_leaf': 1, 'min\_samples\_split': 4, 'n\_estimators': 200}

Root Mean Squared Error: 20.908130502682088

Mean Absolute Error: 7.015046848650944

R2 Score: 0.9517500938462473