

## Model Optimization and Tuning Phase Report

Date	07 JULY 2024
Team ID	740078
Project Title	Slop sense: utilising resort features for regression modelling
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
KNN	<pre>from sklearn.cluster import KMeans wcss_list=[]  for i in range(2,11):     kmeans=KMeans(n_clusters=i,init='k-means++',random_state=42)     kmeans.fit(new_df)     wcss_list.append(kmeans.inertia_) plt.plot(range(2,11),wcss_list,marker='o') plt.title('The Elbow Method Graph') plt.xlabel('Number of clusters(k)') plt.ylabel('wcss_list') plt.show()</pre>	<pre>cluster_assignments.value_counts()</pre> <pre>0    4685 3     610 4     132 2       33 1       18 Name: count, dtype: int64</pre>

LR	<pre>!pip install scikit-learn import pandas as pd from sklearn.linear_model import LinearRegression from sklearn.impute import SimpleImputer  imputer=SimpleImputer(strategy='mean') x_train=imputer.fit_transform(x_train) x_test=imputer.transform(x_test)  LR=LinearRegression() LR.fit(x_train,y_train)</pre>	2.4538768184408024
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### Performance Metrics Comparison Report (2 Marks):

XGB	<pre>models=[]  models.append(('Linear Regression',LinearRegression())) models.append(('KNeighborsRegressor',KNeighborsRegressor())) models.append(('Support Vector Regression',SVR())) models.append(('Random Forest Regressor',RandomForestRegressor())) models.append(('XBG Regressor',XGBRegressor()))  d={}  for name,model in models:     model.fit(X_train,y_train)     score=round(model.score(X_test,y_test)*100,4)     d[name]=score</pre> <p>✓ 4.1s</p>
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### Final Model Selection Justification (2 Marks):

Final Model	Reasoning
XGB Boosting	<p>XGBoosting in a resort setting, you can gain valuable insights, improve operational efficiency, and enhance the overall guest experience!</p> <ul style="list-style-type: none"> <li>- Predicts room occupancy, guest satisfaction, and revenue optimization</li> <li>- Analyzes feedback, reviews, and demographics</li> <li>- Identifies loyal customers and preferences</li> <li>- Predicts equipment failures for maintenance scheduling</li> </ul>