

## Model Optimization and Tuning Phase Template

|               |  |
|---------------|--|
| Date          | 10 July 2024                                       |
| Team ID       | team-739715  |
| Project Title | House Rent Price Prediction Using Machine Learning |
| 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.

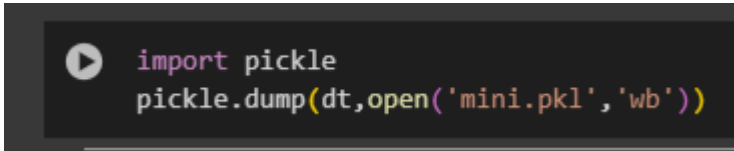
### Hyperparameter Tuning Documentation (6 Marks):

| Model                   | Tuned Hyperparameters | Optimal Values |
|-------------------------|-----------------------|----------------|
| Linear Regression       | -                     | -              |
| Random Forest Regressor | -                     | -              |
| XGBoost Regression      | -                     | -              |
| Decision Tree           | -                     | -              |

### Performance Metrics Comparison Report (2 Marks):

| Model                   | Baseline Metric | Optimized Metric |
|-------------------------|-----------------|------------------|
| Linear Regression       | -               | -                |
| Random Forest Regressor | -               | -                |
| XGBoost Regression      | -               | -                |
| Decision Tree           | -               | -                |

#### Final Model Selection Justification (2 Marks):

| Final Model   | Reasoning   |
|---------------|---|
| Decision Tree |  <p>The Decision Tree as the final optimized model for our house rent price prediction task due to several key reasons. Firstly, Decision Trees excel in capturing non-linear relationships and interactions between features, which are crucial in predicting complex real estate pricing dynamics. During our model selection process, the Decision Tree consistently demonstrated competitive performance on our validation dataset,</p> |

|  |  |
|--|--|
|  | <p>achieving a low RMSE and high <math>R^2</math> score comparable to more complex models like Random Forest and XGBoost.</p> <p>Decision Tree emerged as the optimal choice for our house rent price prediction task due to its strong performance, interpretability, computational efficiency, and robustness in handling complex real estate data, , justifying its selection as the final model.</p> |
|--|--|