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**Model Optimization and Tuning Phase Template**

| Date | 24 April 2024 |
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| Team ID | 740661 |
| Project Title | RESERVATION CANCELLATION PREDICTION |
| Maximum Marks | 10 Marks |

**Model Optimization and Tuning Phase**

The Model Optimization and Tuning Phase involves refining neural network 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 (8 Marks):

| **Model** | **Tuned Hyperparameters** |
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| Random Forest | The parameter grid (rfc\_param\_grid) for hyperparameter tuning. It specifies different values for the number of trees (n\_estimators), maximum depth of trees (max\_depth), and minimum number of features considered for splitting (min\_samples\_split).and minimum number of leafs(min\_samples\_leaf). GridSearchCV is employed with 5-fold cross-validation (cv=5), evaluating model performance based on accuracy (scoring="accuracy"). |
| Decision Tree | The parameters (params) define a grid for hyperparameter tuning of the Decision Tree Classifier (DecisionTreeClassifier), including max\_depth, min\_samples\_leaf, and criterion ('gini' or 'entropy'). GridSearchCV (dt\_model) is used with 5-fold cross-validation (cv=5), evaluating model performance based on accuracy (scoring="accuracy") |

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

| **Final Model** | **Reasoning** |
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| **Random Forest** | Random Forest model is chosen for its robustness in handling complex datasets and its ability to mitigate overfitting while providing high predictive accuracy.    Above two models Random Forest model have the highest accuracy among the models. |