**Model Optimization and Tuning Phase Template**

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| Date | 11 July 2024 |
| Team ID | SWTID1720162737 |
| Project Title | Predicting Compressive Strength Of Concrete 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):

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| --- | --- | --- |
| **Model** | **Tuned Hyperparameters** | **Optimal Values** |
| Linear Regression | --- |  |
| Ridge Regression | --- |  |
| Lasso Regression | --- |  |
| Random Forest Regression | GridSearchCV got the higher accuracy. |  |
| Decision Tree Regression | --- |  |
| Gradient Boosting regression |  |  |
| XGBoost Regression | RandomizedSearchCV got the higher accuracy. |  |

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

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| --- | --- |
| **Model** | **Optimized Metric** |
| Linear Regression |  |
| Ridge Regression |  |
| Lasso Regression |  |
| Random Forest Regression |  |
| Decision Tree Regression |  |
| Gradient Boosting regression |  |
| XGBoost Regression |  |

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

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| --- | --- |
| **Final Model** | **Reasoning** |
| XGBoost Regression. | ‘XGBoost Regression’ the best performance and generalizability on unseen data, considering factors beyond just raw accuracy. |