**Model Optimization and Tuning Phase Template**

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| Project Title | Online Payments Fraud Detection 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** |
| Model 1 | Best hyperparameters vary by algorithm, but common ones tuned in fraud detection include:   * **Learning Rate**: Controls model updates per step. Too high overshoots; too low slows learning. | There’s no one-size-fits-all for fraud detection hyperparameters—they hinge on the algorithm and data. The goal is to spot fraud without too many false alarms. Tune carefully, test often, and track metrics like AUC-ROC to strike the right balance. |

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

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| **Model** | **Baseline Metric** | **Optimized Metric** |
| Model 1 | Fraud Rate (…) | AUC-ROC (Area Under the Receiver Operating Characteristic Curve) |

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

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| --- | --- |
| **Final Model** | **Reasoning** |
| Model 1 | Machine learning fights online fraud by learning from past transactions (fraudulent and legit) to spot red flags. Unlike static rules, it adapts to new tricks by fraudsters. This constant learning keeps online payments safer. |