Model Optimization and Tuning Phase Report

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| Date | 15 June 2024 |
| Team ID | 739990 |
| Project Title | Auto Insurance Fraud Detection |
| Maximum Marks | 10 Marks |

**Model Optimization and Tuning Phase**

Optimizing and tuning a model for smart home temperature control involves several critical steps to ensure its efficiency and accuracy. First, focus on data preparation, which includes cleaning the data to remove inconsistencies, missing values, and outliers. Feature engineering is essential in this phase, where you identify and create relevant features such as indoor temperature, outdoor temperature, humidity levels, time of day, seasonality, occupancy status, and weather forecasts.

**Hyperparameter Tuning Documentation (6 Marks):**

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| **Model** | **Tuned Hyperparameters** | **Optimal Values** |
| Decision Tree | - | - |
| Random Forest | - | - |
| **Logistic Regression** |  |  |

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| --- | --- | --- |
| KNN | - | - |
| Navie  Bayes | - | - |
| **Support**  **Vector**  **Machine** |  |  |

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

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| --- | --- |
| **Model** | **Optimized Metric** |
| Decision Tree | - |

|  |  |
| --- | --- |
| Random Forest | - |
| **Logistic Regression** |  |
| KNN | - |
| **Navie Bayes** |  |
| **Support**  **Vector**  **Machine** | - |

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

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| --- | --- |
| **Final Model** | **Reasoning** |
| Decision Tree | A decision tree is an effective model for auto insurance fraud detection due to its simplicity and interpretability. It classifies claims by recursively splitting data based on features like claim amount and policyholder age, creating a clear decision path. Handling both numerical and categorical data without requiring scaling, decision trees are versatile. They can, however, overfit the training data, so pruning is necessary. Evaluating the model with metrics like precision f-1 score etc, ensures its reliability. Decision trees offer a robust starting point for detecting fraudulent claims in auto insurance. |

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