Model Optimization and Tuning Phase Report

Date	03 October 2024
Team ID	LTVIP2024TMID24963
Project Title	Time Series Analysis For Bitcoin Price Prediction Using Prophet
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
prophet	- changepoint_prior_scale - seasonality_prior_scale - holidays_prior_scale - seasonality_mode	- changepoint_prior_scale: around 0.05 to 0.1 - seasonality_prior_scale: around 10 - holidays_prior_scale: around 5 - seasonality_mode: multiplicative for financial data

Performance Metrics Comparison Report (2 Marks):

Model	Optimized Metric
Prophet	- **R-squared (R^2)**: 0.969 - **Mean Absolute Error (MAE)**: 1897.70 - **Root Mean Squared Error (RMSE)**: 2829.58

Final Model Selection Justification (2 Marks):

Final Model	Reasoning
prophet	The **Prophet** model was chosen for its capability to handle complex time series data with trends, seasonality, and holidays, making it suitable for Bitcoin price forecasting. Its high R^2 value (0.969) indicates strong predictive accuracy, capturing about 97% of the variance in Bitcoin prices. Additionally, the model's performance metrics (MAE: 1897.70, RMSE: 2829.58) demonstrate that it can make accurate price predictions with manageable error levels, making it well-suited for this financial time series task.