1. Problem Definition & Feasibility Analysis

Problem Definition

The primary objective of the project is to develop a predictive model using Long Short-Term Memory (LSTM) neural networks that forecasts future Bitcoin prices based on historical price data. The goal is to accurately predict the price movements of Bitcoin to aid in investment decisions and risk management.

Feasibility Analysis

- **Data Availability**:
  - Availability of extensive historical Bitcoin price data.
  - Need to ensure data quality and integrity for reliable modeling.
- **Technology and Tools**:
  - LSTM networks are suitable for modeling time-series data, capturing long-term dependencies.
  - Requires access to high computational resources, possibly involving GPUs or cloud services.
- **Model Complexity and Design**:
  - Importance of sophisticated feature engineering, including price history and technical indicators.
  - Requires extensive hyperparameter tuning to optimize model performance.
- **Regulatory and Ethical Considerations**:
  - Potential ethical concerns around market influence and manipulation.
  - Compliance with financial regulations is essential when deploying models for investment purposes.
- **Market Dynamics**:
  - Bitcoin’s high volatility introduces significant prediction challenges.
  - External factors such as market sentiment and geopolitical events can heavily influence price movements.
- **Expected Outcomes and ROI**:
  - Model accuracy needs to be high to be practically useful in trading scenarios.
  - Consideration of model maintenance and updates as market conditions change.
- **Risk Assessment**:
  - Financial risk due to model inaccuracies, especially in a volatile market like Bitcoin.
  - Technical risks associated with data security and model overfitting.