Project Design Phase-I

Solution Architecture

Date	3 November 2023
Team ID	SI-GuidedProject-609307-1697997262
Project Name	Project - Time Series Analysis For Bitcoin Price Prediction Using Prophet
Maximum Marks	4 Marks

Solution Architecture :

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions.

- **Solution:**

The user interacts with the UI (User Interface) to select the date as input. Selected Date input values are analyzed by the model which is integrated. Once the model is analyzed the input prediction is showcased on the UI. We will be Create or Collect the dataset based on this project, we will be creating an HTML File and building a web , for data processing we will build a Python Code.

- **Structure, Characteristics, Behavior:**

It consists of a dataset where Import necessary libraries, load Bitcoin price data, and prepare it for analysis. Use Facebook Prophet to model the time series data with appropriate characteristics (seasonality, holidays, etc.). Generate future price predictions and visualize the results. Create an HTML report to display the prediction charts, metrics, and insights, using libraries like Flask or Dash for web development.

- **Features, Development Phases and Solution Requirements:**

A) Features:

1) **Historical Bitcoin Price Data**: A dataset containing historical Bitcoin price data, timestamps and values.
2) **Notifications:** Send reminders for upcoming bitcoin and up to date prices.
3) **User Authentication:** Secure web page and updating every date with prices.
4) **Exogenous Variables:** Optional additional data like news sentiment, trading volumes, or other indicators that can improve the accuracy of predictions.

B) Development Phase:

1) **Data Collection:** Gather historical Bitcoin price data and any relevant variables.
2) **Data Preprocessing:** Clean, transform, and preprocess the data. Handle missing values and outliers.
3) **Model Building**: Implement the Prophet model in a programming language like Python (using libraries like Fbprophet). Configure the model with appropriate hyperparameters.
4) **Train,Testing And Evaluation**: Train the Prophet model using the training data. The model will automatically detect patterns and seasonality in the data. Use the testing dataset to evaluate the model's performance.
5) **Visualization and Reporting:** Create visualizations of the historical Bitcoin price data and the model's forecasts.
6) **Deployment:** We will use the model for real-time predictions, deploy it to a server or cloud platform. And Ensure That it can handle new data as it becomes available.

C) Requirements:

1) **Data**: Access to a reliable and up-to-date dataset of Bitcoin price data.
2) **Hardware/Cloud Resources**: Sufficient computing resources for model training and deployment if required.
3) **Monitoring**: If used in a production environment, implement a system to monitor model performance and retrain it periodically to adapt to changing market conditions.
4) **Security:** If handling sensitive data or deploying in a production environment, ensure data security and access control measures are in place.
5) **Data Backup**: Provide a backup Solution to prevent data loss.

- Solutions Delivered Via:

1) Prophet - Python
2) Machine Learning Algorithms - Random Forest, SVM
3) Data Analysis - Filter
4) Code will be done through - Jupyter Notebook or Google Colab
5) Model Integration - Flask

Example - Solution Architecture Diagram