**Bitcoin Price Prediction Project Report**

**1. Introduction**

The goal of this project is to develop a predictive model for Bitcoin prices using historical data. The approach involves implementing a Long Short-Term Memory (LSTM) neural network, a type of recurrent neural network (RNN), to capture temporal dependencies in the data and make accurate price predictions.

**2. Data Loading and Preprocessing**

* **Data Source:** Bitcoin price data is loaded from the provided CSV file ('BTC-USD.csv'). The dataset includes two columns: 'Date' and 'Close' prices.
* **Data Preprocessing:**
  + The 'Date' column is converted to datetime format, and the data is sorted by date.
  + Only 'Close' prices are kept for analysis.
  + The data is normalized using Min-Max scaling to bring values within the range of 0 to 1.

**3. Sequence Generation**

* Sequences of historical prices are created for training the LSTM model.
* A sequence length of 10 days is chosen, meaning the model is trained to predict the next day's price based on the previous 10 days.

**4. Model Architecture**

* The LSTM model architecture is designed as follows:
  + Two LSTM layers with 50 units each.
  + The final layer is a Dense layer with a single unit for regression.
* The model is compiled using the Adam optimizer and mean squared error as the loss function.

**5. Model Training**

* The data is split into training and testing sets (80% training, 20% testing).
* The model is trained for 20 epochs with a batch size of 32.
* Training and validation loss are monitored to evaluate model performance.

**6. Model Evaluation**

* The model is evaluated on the test set to assess its generalization performance.
* Mean Squared Error (MSE) is used as the evaluation metric.

**7. Results and Visualization**

* Training loss and validation loss are plotted over epochs to visualize model performance during training.
* Predictions are made on the entire dataset, and the results are plotted against the actual prices.

**8. Conclusion**

* The LSTM model demonstrates the ability to capture temporal patterns in Bitcoin prices.
* Evaluation metrics such as MSE provide insights into model accuracy.
* The visualizations help in understanding the model's predictive performance.

**9. Future Improvements**

* Experiment with different hyperparameters to optimize model performance.
* Explore alternative neural network architectures.
* Consider incorporating additional features or external factors for more comprehensive predictions.

**10. References**

* Data: - https://finance.yahoo.com/quote/BTC-USD?p=BTC-USD&.tsrc=fin-srch