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Cryptocurrency Price Predictor

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ABSTRACT :

The fluctuating nature of cryptocurrency markets presents a big challenge for investors who want to make knowledgeable decisions. This paper proposes a solution of deep learning-based prediction of Bitcoin price via Long Short-Term Memory (LSTM) networks. Based on historical data acquired from the CoinGecko API, the model predicts the price for the subsequent seven days and calculates a 7-day moving average to deliver a more solid analysis. The code implements Python with the use of libraries like TensorFlow, Keras, Pandas, and Matplotlib. The outcome shows encouraging predictive accuracy, which can provide potential advantages to traders and analysts in dealing with the cryptocurrency market.

Keywords: Bitcoin, Cryptocurrency, LSTM, CoinGecko, Moving Average, Deep Learning, Time Series Analysis, Forecasting

INTRODUCTION

Cryptocurrencies revolutionized the finance sector with their decentralized and speculative nature. Of these, the most well-known is Bitcoin (BTC). Though highly volatile, its future prices are a problem to predict due to high volatility. Conventional statistical models frequently fail to explain nonlinear behavior in financial time series. Deep learning models, and specifically LSTM networks, are more than capable for such an explanation. This project will create a predictive model for Bitcoin based on historical price data and deep learning methods.

LITERATURE SURVEY

Various methods have been investigated to predict cryptocurrency prices.Classical techniques involve ARIMA models and exponential smoothing.These methods are not effective in dealing with high-frequency, non-linear, and Noisy data. Recent research has employed machine learning models like Support Vector Machines (SVM), Random Forest, and Neural Networks.Out of them, LSTM models have exhibited great promise as they can Retain long-term dependencies in time-series data. This work is an extension of those on the foundations by Incorporating real-time data collection with strong predictive modeling.

LITERATURE REVIEW

Some methodologies have been utilized to predict cryptocurrency prices. Classic methods are ARIMA models and exponential smoothing. These methods are not effective when dealing with noisy, non-linear, and high-frequency data. Machine learning models like Support Vector Machines (SVM), Random Forest, and Neural Networks have been used by recent research studies. Among these, LSTM models have been extremely promising because of their capacity to maintain long-term dependencies in time-series data. This project improves upon those with the addition of real-time data acquisition coupled with solid predictive modeling.

SYSTEM DESIGN

- **Data Source**: CoinGecko API
- **Programming Language**: Python
- **Libraries**: Pandas, NumPy, TensorFlow, Keras, Matplotlib, Scikit-learn
- **Model**: LSTM
- **Output**: 7-day forecast and 7-day moving average plot

IMPLEMENTATION

- **Data Collection:** Data is retrieved from the CoinGecko API with historical data support for 365 days because of API constraints.
- **Data Preprocessing:** Dates are converted to a human-readable date format. Missing values are dealt with and a 7-day moving average is calculated.
- **Feature Scaling:** Normalizes prices between 0 and 1 by MinMaxScaler.

- **Model Structure:** The LSTM model features a single input layer, one or several LSTM layers, a dense output layer, and dropout regularization.
- **Training and Testing:** The data is divided into training and test sets in an 80-20 proportion. The model is trained for several epochs for improved convergence.
- **Forecasting:** Once trained, the model forecasts the subsequent 7 days of Bitcoin prices.

WORKING PRINCIPLE

The functionality of an IoT-based speed controller and light dimmer depends on internet-enabled real-time automation and control. Inputs from users are received by a microcontroller such as NodeMCU or ESP8266 via web interface or mobile application over Wi-Fi. For light dimming, the system utilizes a triac-based circuit that modulates the phase angle of the AC signal and therefore controls the amount of voltage supplied to the light and reduces its brightness. For motor speed control, the system generates PWM (Pulse Width Modulation) signals to alter the average voltage supplied to a DC motor and hence adjust its speed.

The microcontroller runs commands given by the user and accordingly sends control signals to speed or dimmer controller circuits. Sensors such as light, temperature, or motion detectors can be added to automatically control the operation of the system based on external states. The entire system operates efficiently by running user inputs or sensor input in real time, offering flexible and power-saving control of electrical appliances through IoT technology.

RESULT & APPLICATIONS

The system displays a graphical representation of the difference between actual and predicted prices. The 7-day moving average smooths out short-term noise, allowing clearer identification of trends. The model demonstrates good fit with actual prices, while small differences may arise due to the stochastic nature of financial data

ADVANTAGES & LIMITATIONS

- **Advantages:**

  Captures long-term relationships in price series.

  Offers a graphical representation of price patterns.

  Includes real-time data gathering from CoinGecko.

- **Limitations:**

  Restricted to 1-year historical data because of API limitations.

  Performance is dependent on hyperparameters and market conditions.

FUTURE SCOPE

- Use several cryptocurrencies for wider examination.
- Incorporate sentiment analysis based on social media information.
- Upgrade to CoinGecko Pro API for longer historical data.
- Implement as a web dashboard or mobile application.

CONCLUSION

This project proves the viability of forecasting Bitcoin prices with LSTM networks. With deep learning, real-time data access, and statistical methods such as moving averages, the system presents a viable solution for short-term cryptocurrency prediction. Further enhancements can make it more reliable and useful for commercial and academic purposes.

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