

# Predicting the Price of Bitcoin using LSTM Recurrent Neural Network

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**Abstract:** *In this paper, we tried to estimate the Bitcoin price precisely taking into consideration various parameters that affect the Bitcoin value. In our work, we pointed to understand and identify daily changes in the Bitcoin market while obtaining insight into most appropriate features surrounding Bitcoin price. We will predict the daily price change with highest possible accuracy. The market capitalization of publicly traded cryptocurrencies is currently above \$230 billion. Bitcoin, the most valuable cryptocurrency, serves primarily as a digital store of value, and its price predictability has been well-studied. For the first phase of our investigation, we aim to understand and identify daily trends in the Bitcoin market while gaining insight into optimal features surrounding Bitcoin price. Our data set consists of various features relating to the Bitcoin price and payment network over the course of five years, recorded daily. For the second phase of our investigation, using the available information, we will predict the sign of the daily price change with highest possible accuracy with deep learning algorithm such as long short term memory for greater accuracy. Compared with benchmark results for daily price prediction, we achieve a better performance, with the highest accuracies of the statistical methods and deep learning algorithms. Deep Learning models includes Long Short-Term Memory in RNN for Bitcoin price prediction are superior to statistical methods.*

**Keywords:** Bitcoin, Machine Learning, Recurrent Neural Network, Deep Learning, Long-Short Term Memory, etc

## I. INTRODUCTION

A digital currency called bitcoin aspires to do away with the need for central authorities like banks or governments. Bitcoin, on the other hand, makes use of blockchain technology to enable user-to-user transactions over a decentralised network. It's crucial to understand how bitcoin's price has fluctuated in the past. You can get an idea of where things might go in the future from this. An area of artificial intelligence known as machine learning (ML) allows computers to "SELF-LEARN" from training data and get better over time without having to be explicitly programmed. Detecting patterns in data and learning from them allows machine learning algorithms to develop their own predictions. Recurrent neural networks (RNNs) and feedforward neural networks (FNNs) are the two deep learning designs that are most frequently utilised. Since each node in the hidden layer receives its output as input at each time step, the RNNs are known as recurrent networks (RNNs)... this is necessary to calculate the initial hidden state, which is initialised to zeroes by default. Modelling time-dependent and sequential data issues, such stock market forecasting, machine translation, and text synthesis, is possible with recurrent neural networks. Recurrent Neural Networks (RNN) are the most advanced algorithm for sequential data and are the foundation of Google voice search and Apple's Siri. Due to its internal memory, the algorithm retains its input, which makes it ideal for solving machine problems.

## II. OVERVIEW OF BITCOIN

In 2009, Bitcoin was initially made available as a means of exchange. After that, a peer-to-peer network called Bitcoin was created to create a system for electronic transactions. Since then, bitcoin, a well-known kind of digital currency, has seen a tremendous increase in both usage and value. There is no need for a third party to function as a middleman

because payments made using Bitcoin travel directly from one party to the other. Public key, which functions like an address or account number and allows any user or account to receive bitcoins, is one of the two components of any bitcoin wallet. Anyone can send bitcoins using a private key, which functions like a digital signature. While the private key must be kept by the owner, the public key can be distributed to anybody. In the event that the private key is compromised or stolen, bitcoin is lost.

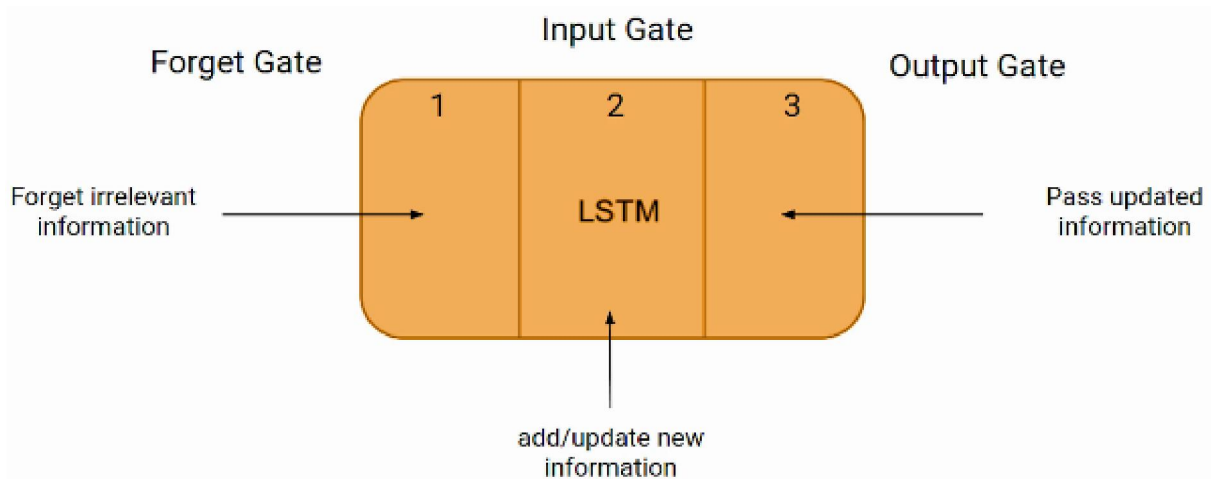
### III. MACHINE LEARNING

A subfield of AI and computer science called ML focuses on using data and algorithms to simulate how humans learn, gradually increasing the accuracy of the system. Machine learning is data driven technology. Large amounts of data are daily produced by organisations. So, organisations make better decisions by seeing remarkable relationships in the data. The rapidly expanding discipline of data science includes machine learning as a key element. Algorithms are trained using statistical techniques to produce classifications or predictions and to find important insights in data mining projects. ML techniques enable computers to train on data inputs and make use of statistical analysis to produce values that fall inside a given range. In order to automate decision-making processes based on data inputs, machine learning enables computers to develop models from sample data.

### IV. RECURRENT NEURAL NETWORK (RNN)

An artificial neural network that employs sequential data or time series data is known as a RNN. These deep learning algorithms are included into well-known programmes like Siri, voice search, and Google Translate. They are frequently employed for ordinal or temporal issues, such as language translation, natural language processing (nlp), speech recognition, and image captioning. RNN use training data to learn, just like feedforward and convolutional neural networks (CNNs) do. Their "memory" sets them apart since it uses data from earlier inputs to affect the current input and output.

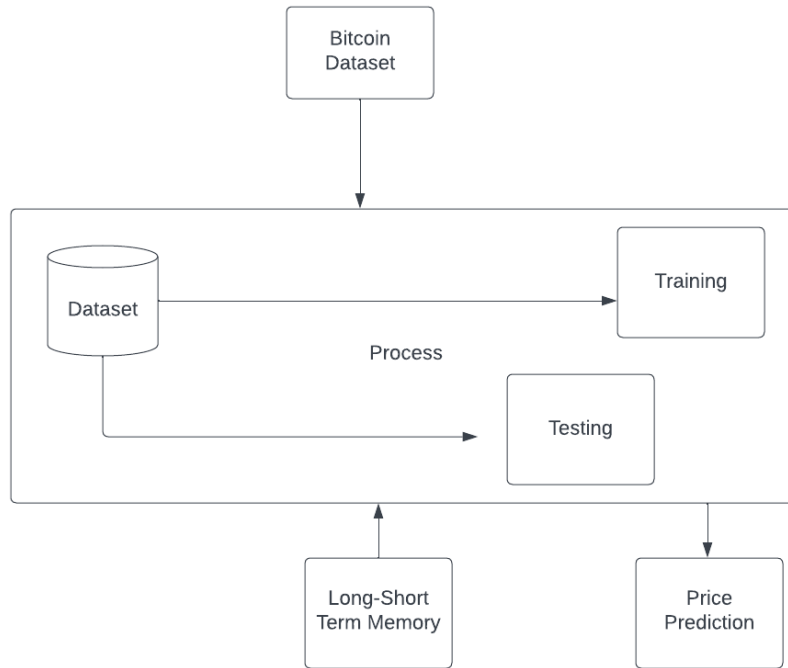
### V. LONG-SHORT TERM MEMORY ALGORITHM



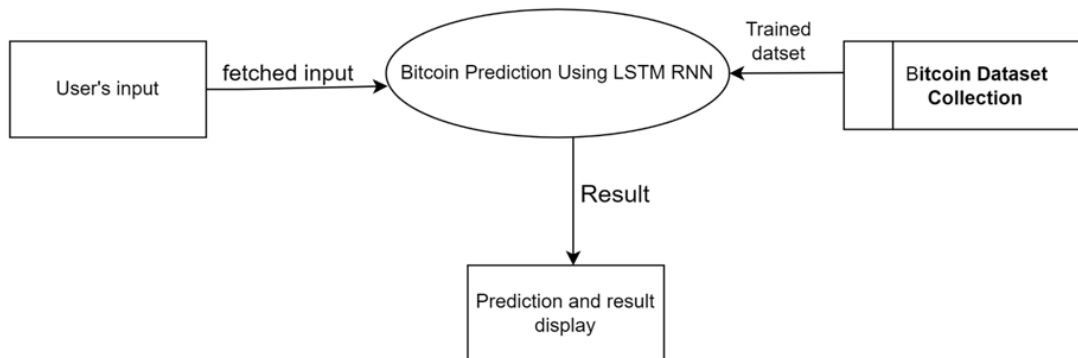
A deep learning, sequential neural network called long short-term memory networks enables information to endure. The Keras library can be used to implement LSTM in Python. Due to the diminishing gradient, RNN have the drawback of being unable to recall long-term dependencies. Long-term dependency issues are specifically avoided when designing LSTMs. The LSTM network architecture is composed of three parts, each of which has a distinct role. Prior to being used in applications in the real world, LSTM models must be trained using a training dataset.

**VI. METHODOLOGY**

**6.1 System Model**



**6.2 Data Flow Diagram:**



ML involves using complex algorithms and models to analyze large amounts of data and identify patterns that can be used to predict future price movements. Machine learning models can be trained on historical price data and other market data to make predictions about future price movements.

- **Analyze historical data:** Look at the past trends and patterns in Bitcoin's price history. The time period can be daily, hourly, or even minute-by-minute data, depending on your needs. Historical data of Bitcoin prices, typically going back several years and provide a large dataset for training the LSTM model. To make accurate predictions, the real-time data on Bitcoin prices can be needed.
- **Monitor market news and events:** Keep track of the latest developments in the cryptocurrency market, including news related to regulations, adoption, and new products. These can have a significant impact on Bitcoin's price.
- **Data Preprocessing:** Data preprocessing is the process of transforming raw data into an understandable format. It is also an important step in data mining as we cannot work with raw data. The quality of the data should be checked before applying machine learning algorithms. The process includes cleaning, normalization and split the data into training set and testing set.

- **Develop a prediction model:** Use machine learning algorithms and statistical models to predict Bitcoin's future price based on historical data, market trends, and external factors.

## VI. CONCLUSION

The use of LSTM in RNN to forecast the price of bitcoin has produced encouraging results. RNNs are a sort of neural network that can analyse sequential input, which makes them ideal for examining Bitcoin's historical price data. Using LSTM in RNN has the advantage of being able to recognise long-term dependencies in time-series data and produce precise predictions. LSTM is the best model for forecasting the price of Bitcoin because it can recall information from past and use it to affect forecasts about the future.

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