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Leveraging Machine Learning for Cryptocurrency Price Forecasting

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Abstract:

Digital currencies are increasingly recognized as viable alternatives to traditional fiat money, with cryptocurrency trading emerging as an enticing avenue for investors seeking potentially lucrative opportunities. Accurate price prediction holds paramount importance in optimizing returns on cryptocurrency investments, given the intricate nature of price fluctuations over time. In response to this imperative, we introduce a novel hybrid deep learning model, which combines the capabilities of a one-dimensional convolutional neural network (1DCNN) and a Stacked Gated Recurrent Unit (GRU). This hybrid architecture effectively encodes historical cryptocurrency price data into a meaningful high-level representation through 1DCNN and captures long-term dependencies within the data using the Stacked GRU component. Our comprehensive evaluation, conducted across three diverse cryptocurrency datasets (Bitcoin, Ethereum, and Ripple), demonstrates the superior performance of the proposed 1DCNN-GRU model, showcasing its ability to outperform existing techniques with notably reduced Root Mean Square Error (RMSE) values: 43.933 for Bitcoin, 3.511 for Ethereum, and 0.00128 for Ripple.

Introduction:

Bitcoin is a highly encrypted virtual currency used by many investors around the world. Satoshi Nakamoto invented Bitcoin in 2009. Thus, Bitcoin is a blockchain-based currency that contains a public record of all transactions conducted under supervision. Many researchers have worked in this field to predict and analyse bitcoin price trends and patterns. At first, it was difficult to accurately represent values and make fact-based predictions due to the very small amount of data and the limited range of algorithms and tools. As the scope of the field expands, scientists are hard at work developing models for: This gives your insight into your monetary value estimates. A literature search consisting of several important works in each field yielded very remarkable results. As noted, the market has high volatility, which offers opportunities in terms of forecasting. Authors from

propose a solution to the double spending problem using distributed peer-to- peer servers. The author claims that Bitcoin is the world's most valuable cryptocurrency and is traded on more than 40 exchanges worldwide that accept over 30 different currencies. The research in the paper shows that the authors performed Bayesian Neural Network (BNN) results by time series analysis of Bitcoin processes. Paper proposes that a model for forecasting time series data is based on the concept of a sliding window using an artificial neural network (ANN) technique, Radial Basis Function Network (RBFN). Certain limitations are noted, such as the introduction of hybrid or ensemble techniques with new capabilities. Article attempts to identify and understand daily trends in the Bitcoin market by collecting, normalizing and

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8953:656X

mapping the best features of the Bitcoin price. The authors of used a Long Short-Term Memory (LSTM) rolling window model to select input characteristics such as macroeconomics, global currency ratios, and blockchain information to predict the price of Bitcoin. In the author explores his approach to neural network ensembles, called selective neural network ensembles based on genetic algorithms, using a backtracking

strategy. The author of conducts research on binary classification algorithms such as Generalized Linear Models (GLM), SVM and Random Forest.

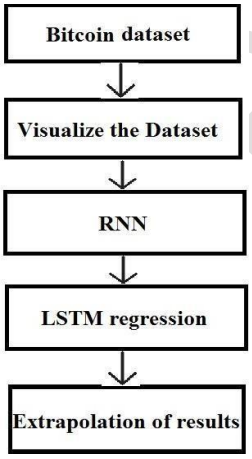
The main stage of analysis is to know and identify the day-to-day trends in the Bitcoin market and to understand its best qualities.

Circulating Bitcoin Price. Uses Recurrent Neural Networks and LSTM Benchmark ARIMA Models.

This proposed work applies a long short-term memory (LSTM) regression algorithm on captured cryptocurrency datasets to predict cryptocurrency (Bitcoin) prices by analyzing the datasets and applications. We tend to demonstrate the use of a recurrent

neural network (RNN) model that we use. of deep learning algorithms. Therefore, the dataset used for this study consists of various parameters of Bitcoin data values. The goal of this research is to design a model that can consistently predict the price of Bitcoin. It is very difficult to estimate an exact price. So let's simplify the problem. You are just trying to predict whether the price will rise, fall or stay the same within certain limits. Predictive analytics are performed based on values obtained from specified algorithms. The purpose of the proposed model is to create a model that leads to accuracy in Bitcoin price prediction by including RNN elements.

Brief descriptions of the various parts provide an overview of how this workflow is put together. The second part presents various works related to this field. The third section presents the generalized methodology used in this work. In the fourth section, we will understand the proposed methodology we adopted to achieve our goals.



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Problem Statement:

Unlike traditional banknotes, which can be printed based on market demand, cryptocurrencies have a limited supply.

This is to prevent printer inflation and currency devaluation. However, due to the limited supply cryptocurrency, it is expected that it will take a long time to happen because 80% of the cryptocurrency was already mined by mid-July 2018. Performing such extensive calculations in demolition order may lead to

lower returns future. Price management is a very difficult task in the cryptocurrency space. With the popular ones accepting and predicting the prices of cryptocurrencies for the past few years, other cryptocurrencies or what we call digital currencies have also become a reality and become mainstream in price prediction. Control cryptocurrency appreciation with machine learning and technical trend indicators. Bitcoin and Ethereum are two of the most well- known cryptocurrencies used in development various applications and further explored by banking companies for implementation.

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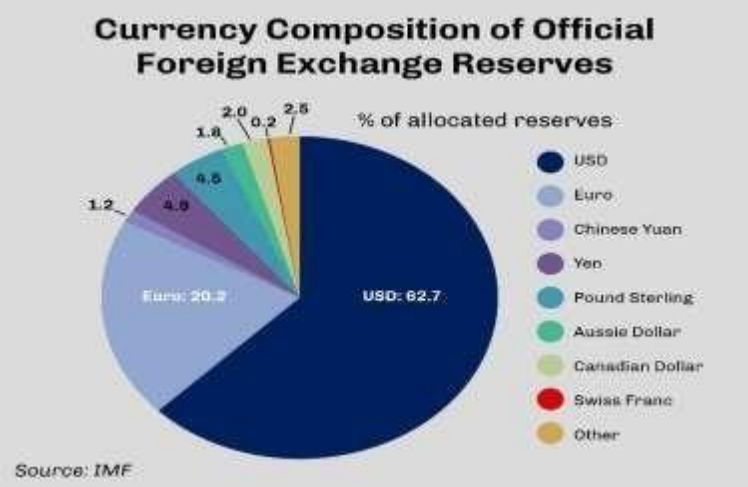
8953:656X

Background:

The financial evaluation of the company is based on certain foundations, which are qualitative and quantitative data. As explained in these factors are examined by analysts and traders to assess whether an asset or company will perform well and whether an investment can be made. In addition to these technical indicators traders also rely on market sentiment and investor sentiment. These are feelings that also affect technical indicator because it can be used to generate profits by predicting short-term price movements. These predictions are irrational investment decisions, but the results they produce suggest so Decisions were driven by emotion rather than reality. This paper points out that the basis for the outcome of major democratic events such as elections can have a significant impact on stock market performance. We've all seen a few examples of this, like the stock market rising when a pro-market government was elected. report submitted speculation about the impact of the US midterm elections on the US stock market. The the report includes excerpts from various bank executives and an in-depth analysis of past stock performance during election period that was directly affected by the election results. However, since stocks tend to be more volatile, attempts have also been made to disprove these

assumptions. That's not why the winners may have some say, but also because of the consequences that follow political decisions. may not be enforced now due to changes in government rhetoric following the election results.



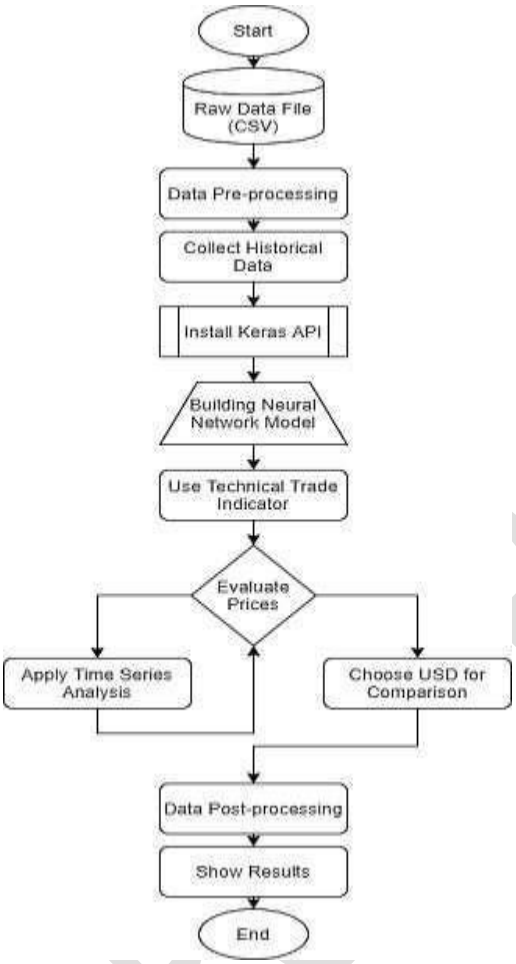
Methodology:

Bitcoin (BTC-USD) price data was originally collected by Kaggle [16]. The collected data was compared with Coinbase data to avoid unnecessary discrepancies. The first data collection was manual. Kaggle

8953:656X

ditched the API library previously used in Python and seamlessly retrieves and stores data directly via API calls to your website. However, over time it has become clear that the existing data has value and even if corrected, will affect the predictions, producing erroneous results. So we switched to using the REST API. This turned out to be important because now the results obtained are more accurate and meaningful. I used

API for retrieving this Kaggle bitcoin history record. The resulting datasets were averaged into a single dataset for consistency, filling gaps created by missing data in the datasets. This collected data is provided to Keras for prediction purposes.

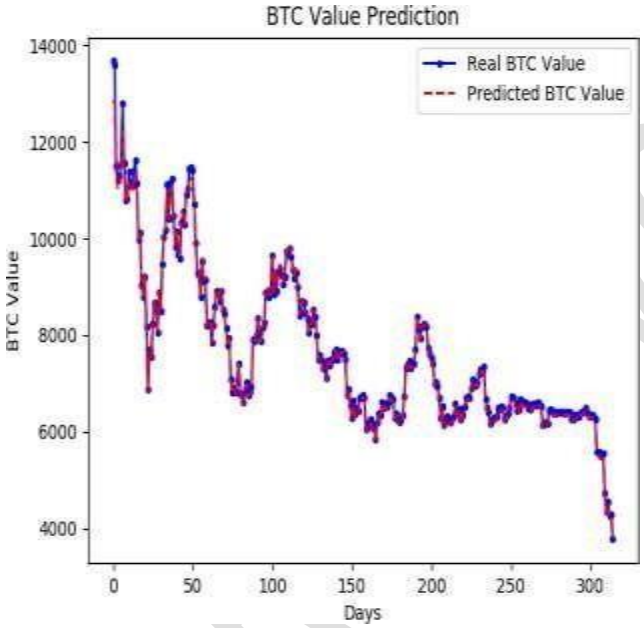


Result:

We used a neural network algorithm to achieve almost accurate price prediction. This will help you decide whether to buy a cryptocurrency or not. From this chart, you can observe the price fluctuations

8953:656X

of Bitcoin for the last month of April from the sample test room for this study. As explained above, this volatility in cryptocurrency prices is due to several factors. This decline in the price of Bitcoin can be attributed to the positive technical trading indicators for the cryptocurrency, as the government readily accepted. This, combined with stronger global currency indices, may have contributed to the decline. Unlike the stock market, where one of the reasons for a company's stock to crash is an exuberant event, there is no specific reason or event that indicates the cause of a cryptocurrency's decline. One possible reason here is price correction of cryptocurrency and other digital currencies which have brought down the exchange price by 5 to 10 time as predicted by the technical trade indication graphs below



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8953:656X

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