

SECTION 3. INFORMATION AND COMMUNICATION TECHNOLOGIES

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THEORETICAL ASPECTS OF SELECTING A MACHINE LEARNING METHOD FOR CRYPTOCURRENCY PRICE PREDICTION

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Abstract

The article explores the application of machine learning techniques in forecasting cryptocurrency prices. It delves into theoretical considerations for selecting suitable machine learning methods, reviews existing approaches, and examines the factors influencing cryptocurrency prices. The study includes an overview of an intelligent application developed for cryptocurrency price prediction using gathered data and applied machine learning models. The findings are valuable for investors and financial market participants in making informed decisions regarding cryptocurrency trading.

Keywords: machine learning techniques, cryptocurrency price forecasting, intelligent application, investors, cryptocurrency trading.

Introduction

Choosing a machine learning method to predict cryptocurrency rates requires careful consideration of the theoretical aspects that influence the forecasting results. The modern world is full of information that can be difficult to analyse. Therefore, when choosing a method, the following aspects should be taken into account:

1. The nature of the data. When considering cryptocurrency data, it is important to find out what characteristics of the data we will use for forecasting.

It can be price time series, trading volume, news, social media data, etc. Different machine learning methods can be more or less effective depending on the characteristics of the data.

2. Type of task. Forecasting cryptocurrency rates can be viewed as a regression or classification task. In the first case, we are trying to predict the numerical value of the exchange rate, while in the second case, we are trying to determine the direction of price movement (growth, decline, stability). The choice of method will depend on the specific type of task.

3. Model-based approaches. There are various machine learning models for forecasting, including linear regression, neural networks, ensemble methods, recurrent neural networks, etc. Each of them has its advantages and limitations. The choice of a particular model depends on the characteristics of the data and the task at hand.

4. Evaluation of results. It is important to be able to evaluate the results of the forecasting. For this purpose, you can use various metrics, such as root mean square error (RMSE), mean absolute error (MAE), coefficient of determination (R^2), etc.

5. Risk management: Cryptocurrencies are characterised by high volatility, so it is important to consider the risks associated with course forecasting. Machine learning methods may not always predict all aspects of market behaviour, so it is important to consider their forecasts as one of the sources of information for decision-making.

The cryptocurrency market is one of the most dynamic and unpredictable areas of the financial sector, which attracts considerable interest from both investors and researchers. Significant volatility in cryptocurrency rates creates incredible opportunities for profitable transactions, but at the same time introduces great risks for market participants. In this regard, the continuous improvement of analysis and forecasting methods is becoming an extremely important task.

Machine learning methods that can be used to for cryptocurrency forecasting include linear regression and number series analysis. Linear regression is one of the simplest and most common methods in statistics. It is suitable for predicting numerical values based on a linear relationship between them and the input variables. The analysis of numerical series includes the analysis of the dynamics of cryptocurrency rates over time. It can be used to detect cycles, trends, and seasonality in the exchange rate. Ensemble methods, such as random forest or gradient boosting, combine the results of several underlying models to obtain a more accurate forecast. These methods are particularly effective when there is no single dominant model.

A graphical example of linear regression, time series analysis, and Random Forest ensemble method are shown in Fig. 1.

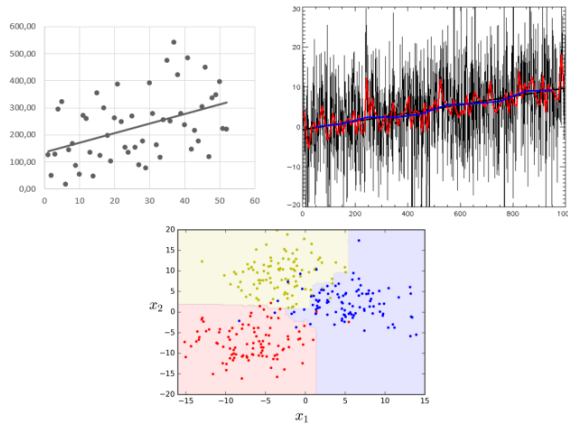


Figure 1. An example of linear regression, numerical series analysis and ensemble method

Algorithm for finding cryptocurrency rates using machine learning can be a complex process that includes the following steps:

1. Data collection. Collecting a large amount of historical data on cryptocurrency rates – price data, trading volume, market conditions, and other relevant indicators.

2. Data processing. Data should be processed and prepared for further analysis. This may include cleansing the data from missing values, normalising prices and other variables, and possibly feature engineering to identify useful information.

3. Model selection. After data processing, it is necessary to choose a machine learning model to predict cryptocurrency rates. It can be the already discussed linear regression, neural network, ensemble methods, or other models, depending on the characteristics of the data and the task at hand.

4. Model training. Model training involves providing appropriate input and output data for the model and adjusting its parameters for optimal performance.

5. Evaluation of results. After training the model, it is necessary to evaluate its results on a test data set. This can be done using various metrics such as RMSE, MAE, and others.

6. Testing and debugging. After evaluating the results, you may testing and tuning of the model may be required to improve its performance. This

may involve changing model parameters, selecting a different model, or adding new features to the dataset.

7. Use the model for forecasting. The final step is to using the training model to predict future values.

Conclusions

Forecasting cryptocurrency rates using machine learning methods is a relevant and promising area of research. In the process of developing algorithms for finding cryptocurrency rates, it is necessary to take into account the various theoretical aspects discussed in this paper.

The application of machine learning methods allows to analyse large amounts of data efficiently and make forecasts for the future with high accuracy. This can be a useful tool for both investors and traders in the cryptocurrency market, helping them to make informed and feasible decisions based on objective data. A promising research in this area is the improvement of cryptocurrency rate forecasting algorithms, which opens up new opportunities for success in the financial markets.

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