

POPULAR MACHINE LEARNING ALGORITHMS FOR CRYPTOCURRENCY PRICE PREDICTION

Nowadays, machine learning is a popular field of knowledge that helps to resolve different complex problems or find solutions for tasks that cannot be done by any alternative method. Therefore, the mentioned technology is valuable both for scientific research and for practical challenges. Its wide application in different spheres caused the invention and development of different algorithms designed to solve specific practical tasks. However, each method has its own advantages and disadvantages, so it is important to analyze its features and apply the most efficient one based on the goals of our research or the problem that we are trying to solve.

After comparing different neural network models along with traditional technical analysis, researchers discovered that artificial intelligence can identify important features and use them during future price forecasting. This capability allowed neural networks to overperform traditional technical analysis methods demonstrating that machine learning may be more effective for price forecasting task.

The most popular algorithm that is used for solving different regression problems is linear regression. Linear regression determines a linear correlation between a dependent variable and an independent one. The training process involves fine-tuning the parameters of the linear equation to accurately reflect the relationship between these variables. This type of algorithm is used for tackling various tasks. However, using a straight-line model often can lead to excessively conservative forecasts regarding future asset prices.

In addition to linear regression, researchers often analyze the application of ensemble machine learning methods to predict future cryptocurrency prices. Numerous algorithms belong to this category with random forest and XGBoost standing out as notable examples.

Random Forest is a type of ensemble machine learning method that involves the creation of a certain number of decision trees during the model training. The prediction process with this algorithm consists of 2 phases: generating results from each of the created trees and determining the final result through the processing of the obtained data according to the predefined strategy.

XG Boost is an algorithm that is also based on the decision trees, but it has some unique features. Unlike random forest, which relies on an ensemble of trees trained in parallel during the learning process, this algorithm creates sequential trees. Each of these trees learns from the errors of its predecessor. Consequently, it assembles a set of decision trees that have been improved from the mistakes of predecessors during the learning process and this ensemble is used for prediction generation.

Besides the mentioned algorithms, there is a specific type of neural network that was purposely developed to solve issues with the prediction of the data series. It is known as RNN (recurrent neural network). Its main feature is the use sequences of prior data to produce outputs. For example, it can analyze price changes within a specific timeframe and identify possible moments of a trend reversal or confirmation. Application of RNN becomes efficient when extraction and usage of the context from previous data is crucial during the output generation. Conversely, it may be ineffective to analyze long time frames due to the less relevance of the older data. Additionally, using the longer time series can result in reduced sensitivity of the model to the drastic changes in the data. It's a significant drawback during the cryptocurrency price predictions because this type of digital asset tends to be a very volatile.

As a result, LSTM (Long Short-Term Memory) network architecture [1] was developed to overcome the mentioned RNN's disadvantages. It enables analysis of the prior data along with the use of gates. These gates help the model to manage their state in order to control the relevance of the extracted features and patterns. This neural network architecture became widely spread because it allows receiving the benefit of RNN application while eliminating some drawbacks that are inherent to common recurrent neural networks.

So, there are different neural network architectures available for solving diverse tasks including cryptocurrency price predictions. However, it's important to comprehend the specific characteristics of the problems that should be resolved and to use the best methods for that. Forecasting the asset price is a complex task and it is impossible to develop a system that will constantly produce precise forecasts. However, the selection of the most suitable methods enables significant improvement in its performance.

References

1. S. Biswas, M. Pawar. Cryptocurrency price prediction using neural networks and deep learning. 7th International Conference on Advanced Computing and Communication Systems (ICACCS). 2021. Vol. 1, P. 408–413.