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Deep Learning Methodology for Prediction of Long-Term Dynamics of Financial Derivatives

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Algorithms for predicting the dynamics of stock options and other assets derivatives for both small times (where one plays on market fluctuations), and medium ones (where trade is stressed at the beginning and closing moments) are well developed, and trading robots are actively used for these purposes.

Analysis of the dynamics of assets for very long time-frames (of several months order) is still beyond the scope of analysts as it is expensively prohibited, although this issue is extremely important for hedging the investments portfolios.

In the paper the dynamic processes in the stock market in long-term periods are considered. Pricing of portfolio investments dynamics is made on the basis of neural networks using the deep learning and soft computing methodology. It does not require heavy computational resources, and their relatively low accuracy is not a disadvantage in tasks where only trends are subject to consideration.

Operation with two and three layers neural networks produced until recently still unfitting results. However, emergence of the suggested approaches with specialized processors and software for learning the multi-layer networks has changed the situation. The most important factor is a high quality trained artificial neural network and its ability to predict for a long time-frame without retraining. The number of layers in experiments reached 250. For network input data the real S&P500 price series was taken dated from 1950 till 2017 with several one-day steps.

Model predictions vs true S&P500 price performance has demonstrated practically acceptable compliance.

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