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Doctoral dissertation's abstract

Deep learning models and algorithms in the analysis of time series of milk powder prices

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Keywords: prediction, time series analysis, artificial intelligence, neural networks, milk market, prices, price prediction of skimmed milk powder.

The main goal of this doctoral dissertation is to design, implement and demonstrate the advantage over competitive solutions of a new hybrid algorithm for predicting the prices of skimmed milk powder against the background of the theoretical basis of the formation of agricultural markets, in particular the milk market.
Moreover, the aim was to present the theoretical basis of agricultural markets, in particular the milk market. Time series of skimmed milk powder prices are characterized by non-linearity, non-stationarity and high dynamic variability resulting from economic phenomena that are characteristic of a specific agricultural market, which is the milk market.
The combination of technical analysis and artificial neural networks made it possible to achieve a more accurate prediction than the previously used computational methods and, further, the designed algorithm can be used as a specialized tool that can provide its users with a more stable economic situation and, ultimately, higher profits.
Numerous variable factors leading to high volatility of the milk and butter market and complex non-linearity, dynamic variability and high irregularity caused objective difficulties for most of the tested predictive algorithms, thus justifying the need to apply the solution presented by the author of this paper.
Thanks to the use of artificial intelligence algorithm optimization techniques through the use of noise reduction of training data, an improvement was achieved also in the field of prediction compared to conventional convolution networks, which constituted the prototype model of the predictor used in the construction part of the work. It is worth noting that for the first time in the area of price prediction, convolutional neural networks have been used, so far used only in the area of image and sound classification. The use of the convolutional network concept along with the preliminary noise reduction of the training data eliminates the limitations of conventional predictive systems.