

Application of Machine Learning to Determine the Optimal Strategy in an Online Auction for the Rent of Computing Resources

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The Amazon EC2 platform allows users to purchase the right to lease computing resources using a Vickrey auction (such resources are called *spot instances*), this approach allows users to significantly reduce costs when using Amazon virtual machines on a regular basis compared to buying resources directly (*on-demand instances*).

The best choice model considered in the paper allows customers to minimize the expected costs of renting a computing resource based on the spot price distribution function. The most suitable price distributions in an Amazon EC2 auction are the normal distribution and its mixtures. To automate and speed up the process of determining the number of components for a mixture of normal distributions and estimating its parameters, a classification machine learning model based on convolutional neural network is developed.

For training and testing of the neural network, data from the Amazon EC2 price history for 2020 were collected and processed. The resulting samples were filtered and marked up using the BIC criterion. As a result of training the model, the accuracy obtained on the test sample was achieved equal to 89%. The resulting machine learning model allowed us to achieve a significant increase in the speed of building an optimal strategy, in comparison with classical methods for determining the type of probability distribution density function.

To test the effectiveness of the obtained model, a comparison was made

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between the time of building an optimal strategy using a convolutional neural network and classical methods for determining the type of probability distribution function. As a result, the use of a convolutional neural network has significantly reduced the time spent on building optimal strategy bids.