IMPROVING THE SMART BUILDINGS ENERGY EFFICIENCY WITH GRADIENT BOOSTING MODEL

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In the promotion of modern real estates with a high level of energy consumption are the most important assessment of their energy efficiency. Increasing the level of technology in commercial buildings with digital infrastructure of accounting, control and management (smart meters) energy consumption has led to increased availability of data produced by the digital sensors. An increasing number of owners and managers of development projects are attracted to the information thus obtained for a variety of studies of energy consumption characteristics such as fault detection and diagnosis, heating, ventilation, fault detection and diagnosis, as well as air conditioning optimization. All this opens up huge opportunities for the use of advanced mathematical models and machine learning methods that would improve the accuracy of forecasts of electricity consumption by commercial buildings, and thus improve estimates of energy saving [1].

One of the most powerful algorithms in machine learning is gradient boosting (GB), which is widely used in various fields such as digital economy and Finance, robotics, computer vision systems, etc. In this paper a new model of energy consumption profile is proposed both for a separate building and for business complexes, as well as its forecast for periods from one day to a week. To evaluate the effectiveness of this method, advanced computer experiments were conducted to test real-world data on the energy consumption of commercial buildings. For this purpose, different periods of model training were used, and its prediction accuracy was analyzed by several criteria simultaneously. The results showed that the use of GB improved the accuracy of energy savings forecasting in more than 80% of cases compared to regression analysis and random forest models.

References

1. *Shchetinin E.Yu.* Cluster-based energy consumption forecasting in smart grids // Springer Communications in Computer and Information Science (CCIS), Springer, v.919, 2018, p. 445-456.