ARCHITECTURE ENERGY EFFICIENT GREENHOUSES CONTROL SYSTEM USING NEURAL AND ROBOTIC SYSTEMS

V. Kozyrskyy, I.Bolbot

Control systems with classical methods of choice microclimate parameters do not include changes disturbing actions, including temperature, at facility Biotechnical throughout the period of the process plant maintenance (animal) product. The use of such systems, while ensuring the proper performance of a biological object can reduce the energy costs only 5 % compared with systems that synthesized based on intelligent approaches. Therefore, the actual problem is of such software and hardware management, which would have increased the effectiveness of industrial biological objects.

The purpose of research - analysis of existing and development of new energy-efficient control system architecture greenhouses using neural network analysis and robotic systems.

Materials and methods of research. Mathematical and software and hardware intellectual management of industrial poultry houses as biological objects showed the true trend of this approach. Created Temperature frames and images were tested positive at the production facility.

Process management system maintenance of biological objects consisting of subsystems decision (PPR), which includes a block pattern recognition (Bro), block decisions (BDP), the control unit (CU); local control system (LSU), consisting of local automatic control device (LAUP), actuators (RE) facility management (OC).

In Brough images are determined based on the signals on the projected daily temperature changes and disturbances of Hydrometeocentre data from temperature sensors outside business premises in the last 20 hours for fixed implementations and processes 40 hours - for quasi by comparing images of possible implementations in the database.

Type the recognized image is transmitted to the BDP in the database is stored for each image possible courses of action and indicators of the quality control (Wb)

for each action of the productivity, material and energy consumption in physical units. In the BDP input data value components of profit C, considering the methods of game theory and statistical making the choice of optimal management strategy.

However, it was found that the classification algorithm based on statistical pattern-making has a certain disadvantage - considerable insensitivity to the beginning of the change of one image to another, which can lead to significant financial losses. While stationary at a certain temperature conditions it requires predictive quality is achieved.

Based on the necessity of adequate analysis of the early changes of one image to another, to solve this problem was offered the use of mathematical tools probabilistic neural networks.

Results. To set the beginning of the change of one image to another using a special case Bayesian networks - probabilistic neural networks (probabilistic neural networks - PNN). This is - a kind of neural networks effectively used to solve classification problems where the probability density classes belonging estimated using nuclear approximation

In solving problems of classification of outputs of the network can be usefully interpreted as an assessment of the probability of whether an item belongs to a certain class. The network actually learns to estimate the probability density function.

In all cases, the use of production accrue neural networks process information (knowledge base) and occasionally carry out "relearning" in the new data.

However, even taking into account the advantages of neural network analysis, to achieve energy-efficient greenhouses management is necessary to eliminate a number of shortcomings:

˜ technological information management system gets a small number of local-permanently installed sensors, creating an opportunity for neperedachi control unit, in terms of action on the object disturbing influences of anthropogenic and natural origin, accurate information about the actual technical parameters of deviation from regulations about maintenance of biological of objects;

˜ to obtain data from all production areas need significant number of permanently-installed sensors (calculation is based on the type of production), which causes considerable investment, operating costs and reduced reliability management system as a whole.

Are such drawbacks due to the fact that technological parameters of biological object (temperature, humidity, fumes, etc.) coming from sensors perceiving elements are mounted on a mobile robot complex, which moves horizontally across the manufacturing area. Data in real time are transmitted to the control unit, objectively providing real-time.

This control system operates as follows: the signal from stationary perceiving elements enters the filtration unit signal (outdoor temperature, solar radiation, etc.), which is based on Hilbert-Huang transform. The feature of this unit is in need of adequate representation of data with the possibility of formation of adaptive basis, which functionally depend on semantic component of the signal, and not be pre-selected and the same as in classical approaches.

Purified from noisiness information signal enters the block neural network time series prediction. At the stage of training the neural network input data is broken down into the following components: training, test, test.

Estimated value of natural disturbance transmitted to block decisions. Processing of the data transmitted to the mobile robot control unit. With control unit change the specified action is carried out or change optimal - for new image management strategies at the local automatic control device.

Conclusions

Improving greenhouse management systems architectures by including neural blocks in the intelligent subsystem solutions and robotic systems technology information collection will expand the list of budget effectively natural disturbances and ensure increased profit from the sale of products while minimizing energy costs.