RECOGNITION ALGORITHM MICROCLIMATE USING ARTIFICIAL NEURAL NETWORKS

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The main parameter of climate that most affect Biotechnical facility is temperature. Research has established that the annual implementation ambient temperature is the implementation of non-stationary random processes with characteristics that differ from year to year. The analysis of individual sections of the annual implementations shown that they can be predicted because there are implementations of stationary random processes or stationary processes with additive deterministic components, ie quasi-stationary processes. Each of annual implementations can be represented as 60-90 of stationary or quasi-stationary sites. Analysis of all possible areas shows that any of them may be in one of five classes - the so-called frames. Set frames form a set of conditions - temperature patterns in terms of artificial neural networks.

The main function of the automated system is an appropriate response to perturbations. The temperature image defines a strategy Automated system management microclimate.

The purpose of research - solving the problem of pattern recognition microclimate using artificial neural network (ANN).

Materials and methods research. The values ambient temperature for a certain period of time (in the studies selected 4 days - 96 hours forming a thermal image that defines the strategy of automated control system. The image formed 32 temperature values (interval - 3 hours). Thermal images can be characterized by amplitude periodic oscillations throughout the day and the rate of change of the average value.

Results. Determination of thermal image of an artificial neural network is performed by the following algorithm.

Vibration amplitude *a1 ... a4* measured as the difference between the maximum and minimum values of temperature for each day.

Average daily temperatures value *s1 ... s4* defined as the arithmetic mean temperatures during the day.

The amplitude and for the image is defined as the arithmetic mean *a1 ... a4*.

Change in the average value of *k* is defined as the difference between the maximum and minimum value of *s1 ... s4*;

The magnitude and *k* is defined as the temperature class image.

Definition amplitudes implemented a network of three linear neurons. The first layer uses two neurons with input functions minimum and maximum. Balance these neurons must take constant with a value of l / n, where n - number of neuron inputs (to determine the daily amplitude n = 8). The second layer uses a linear neuron with a constant value scales: one neuron to the input function of the maximum and -1 to the input neuron function minimum.

To determine the class of the image used network layer neurons of the input function of the summation and sigmoid activation function.

Such a network requires initial training. Studies carried out with the teacher network Backpropagation. To study used a sample of 120 thermal images. Accuracy study was 3 %.

If you use a test network 500 thermal images of error was 5 %. Photos, incorrectly identified network had a value and k close to *a0* and *k0*, ie, in this case valid and misidentified images in reality not much different.

ANN is implemented in the programming language C #.

Conclusions

1. A recognition algorithm temperature images and Performance of artificial neural network.

2. The proposed ANN is trained easily and allows you to adapt to new conditions, completing retraining network.

3. Recognition Algorithm temperature images and its implementation as ANN recommended for use in automated systems management real agricultural production.