DEVELOPMENT OF ELECTRICAL FAILURE DETECTOR BASED ON ARTIFICIAL NEURAL NETWORK

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ABSTRACT

In the article Based on theoretical studies in the field of energy resource utilization, the regulation of the work processes of textile enterprise machines, the methods of modern automatic control theory and economical operation modes characteristic of electrical systems, mathematical modeling through artificial neural networks, determination of energy consumption of electrical systems, and the simulation model of the control system for increasing energy efficiency have been developed. . On the basis of the model, the variable parameters of the electrical behavior were obtained based on the input signals of the artificial neural network.

Keywords: Artificial neural network, electric drive, fault detector, mathematical model, control system, variable parameter.

On the creation of a fault detector based on an artificial neural network. A special scheme presented in Figure 1 was developed to determine the constant variables of the process.

Asynchronous motor based on insulation wear, case temperature, load increase and electrical parameters as the main indicators affecting operational reliability a layer allowing physical modeling of inter -circuit short circuits of the input network was obtained.

Based on the calibration parameters [1] included in the MATLAB program , it was possible to determine the levels of p and w for the reliability gradient value . Taking into account the malfunctions of electric motors, the decrease in the rotation speed of electric motors , vibration and noise in the electric motor, and the factors of short-term changes in their rotation speed , the tested motor f_s = 10-50 Hz from the frequency converter in the range provided , it operates at open speed under the control of $_s/f_{s=const}$. Load moment, as the results obtained in the study are of variable value M_{yu} =(0-1) M is arranged in the N range of variation. Of the loom, the set of convolutional layer allowed to determine the level of reliability, which showed that the developed method has a higher accuracy compared to the step and filling method [2] . At the same time convolutional neural network method, loom made it possible to choose three

main factors that have a significant impact on the reliability of the electrical system and the quality of the product:

-disruption of electrical circuits;

-reduction in speed of driving electric motors;

-significant change in load.

the convolutional neural network method using the Control System Designer package of the MATLAB program (Fig. 1).

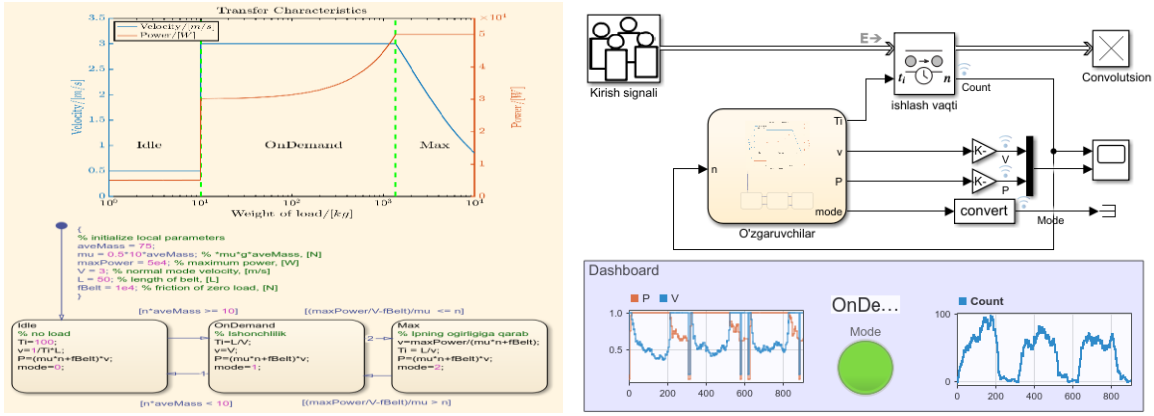


Figure 2. A model consisting of a set of convolutional layers

A model consisting of a set of convolutional layers (Fig. 2) consists of one layer and was considered for the loading of the weaving process. It is proven that the obtained values increase the reliability by 7% compared to other methods as a result of this model.

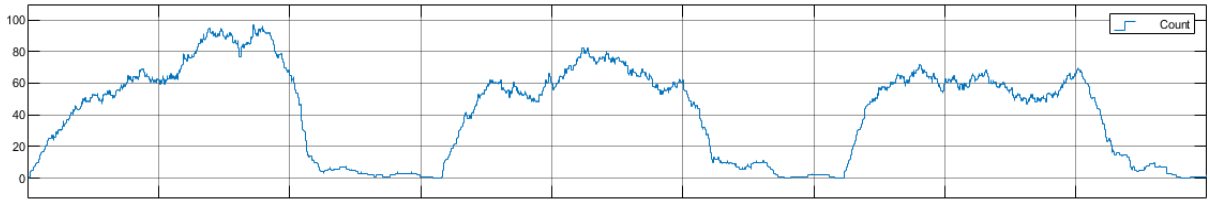
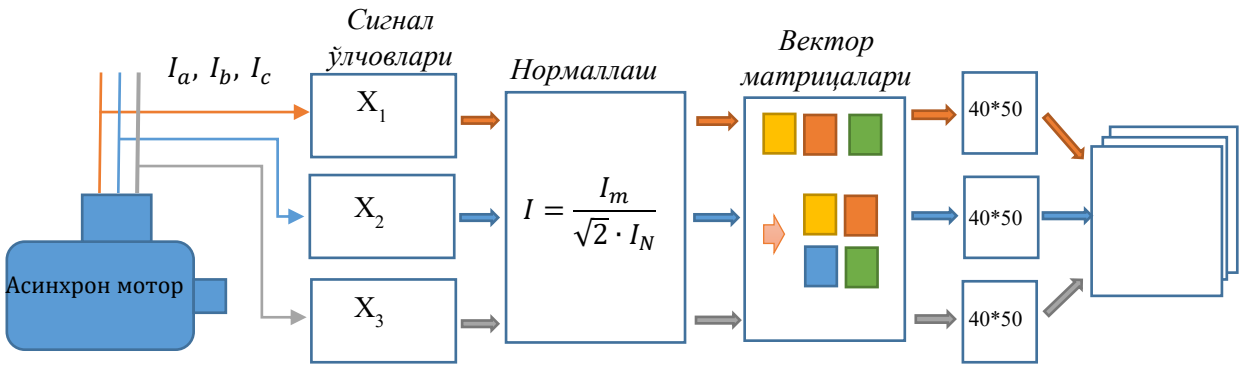


Figure 3. Reliability indicator obtained using the model

The development of classification of electrical and mechanical faults in the model forces the network input matrix to adapt accordingly. The difference between the size of the designed batch input matrix and the amount of data delivered to the network occurs with [4,5] . If the size of the input matrix is large, it significantly increases the loading time of the network, and if it is small, it cannot ensure the correct distribution of input data into classes. This limits the ability of the electrical system to detect electrical faults. Solving such a problem was solved by developing the schematic diagram shown in Figure 3.



4.Determining electrical faults of an asynchronous motor schematic diagram

electrical fault preprocessing algorithm are shown in Figure 4 . By developing a sequence of steps, the process of converting three matrices into a three-dimensional matrix was obtained.

Stage 1. The input parameters of a synchronous motor located in an electric drive are determined using measuring instruments . In the study , it is possible to determine the fault after measuring only 2000 samples of the diagnostic signal , which was two full cycles of the motor voltage at a speed change of 10 GHz . In the convolutional layer, induction motor vectors of size 1×2000 each to the nominal parameters of the tested motor come resurrected

Stage 2. In this case, each normalized vector (expressed in relative units) is converted into a 40x50 matrix . Therefore, the operation was performed for each of the asynchronous motors under study .

Stage 3. The final step of this procedure is to convert the three matrices containing the standardized induction motor samples into a three - dimensional .

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