EXPANSION OF THE USE OF NEURAL NETWORKS IN ENGINEERING

V.G. Kontsevich, Ph.d.; V. Degtyar

Neural network is one of the directions of research in the field of artificial intelligence based on trying to reproduce the human nervous system.

Artificial neural networks are widely used in solving various tasks and actively applied where common algorithmic solutions are ineffective or impossible. Among the challenges that rely on artificial neural networks, are the following: recognition of texts, contextual advertising on the Internet, spam filtering, inspection of suspicious transactions by credit card, security systems and video surveillance systems — and this is not all.

Principle of artificial neural network based on our understanding of the brain. In nature, these are neurons cells that serve as basic units of processing in the brain. They are closely interrelated and interact through the grid navigation, which is called "synopsis". One neuron receives signals (entrance) of many other neurons, and subsequently he decides to generate or not electric pulse (exit) on the basis of received signals.

In computing terms, we can simulate this kind of process using linear algebra. Information comes into the system as a vector (a column of numbers), where each element of this vector is "neuron". Connections between neurons (synopses) are represented by the matrix. It is called the transformation matrix, which modifies the elements of the original vector. When the neural network processes data, it just grabs the biggest matrix and multiplies its input vector. Key to the whole problem is figuring out what elements of the matrix must be converted.

Much of the researches in the field of neural network technology belong to engineering problems. In this area there is a tendency to replace production modules with high levels of automation, and it requires increasingly more intelligent and self-regulative machines that would be able to handle a large range of parts, to collect and configure various devices, to assess the quality of the product while minimizing human-control and intervention of the operator.

S.V.Podolkova – *EL Adviser*