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Shokhan A. K., Sashcheko A. O.

ARTIFICIAL NEURAL NETWORK IN MEDICINE

Scientific supervisor senior teacher Kazakov S. V.
Department of Foreign Languages
Belarusian State Medical University, Minsk

An artificial neural network (ANN) is used to simulate processes in the central nervous system (CNS) of higher organisms. As a rule, this is done by special software that simulates the behavior of individual neurons and their interaction with each other. The essential difference from classical statistical calculation methods is the learning ability of an ANN. This means that such a system initially does not contain any information, but extracts it from a number of known examples. Ideally, an ANN can generalize through repetitive training; that is, it alters the links within the neuron association so that it can properly classify later unknown data based on the learned rules. In addition, neural networks are less sensitive to disturbed or incomplete data. Artificial neural networks have been shown in other fields to be useful for predicting events and modeling complex time-dependent systems. Outside of medicine, they are used when the influencing factors for a particular outcome are not or only partially known and the relationships are non-linear and complex.

Medicine is changing radically right now - especially in the radiology departments of hospitals. Dozens of start-ups around the world are developing artificial intelligence, which searches medical images for tumors, dead brain tissue or broken bones.

The nets in question are crude replicas of the neurons that work together in the brain. Artificial neural networks consist of many layers with hundreds or thousands of nodes and links through which information is relayed. If a developer trains the nets with thousands of images of, for example, lung tumors, then the image information changes the weights within the network. As a result, the software learns to recognize which image pixels are healthy tissue and which ones are sick.

Achieving a comprehensive, data-sensitive digitization of the health service would greatly ease the burden on hospital staff. Through centralized device monitoring, biodata could be transmitted in real time and analyzed by an AI. Also basic functions of hospital organization, such as monitoring of material consumption, could be transferred to computer.

It would also be conceivable to expand decentralized medical care for immobile patients or even for those who are thousands of miles away. Where medical specialists and modern analytical tools are lacking, in the nearest future it may be enough to send a photo or a set of blood samples online to a data center and wait for the diagnosis. Life could be saved especially in medically underserved regions.