

## **8. ARTIFICIAL INTELLIGENCE IMPLEMENTATION AND DEVELOPMENT**

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The information about the development and implementation of Artificial Intelligence is presented in the paper. The structure of neural networks and the principles of their work are considered.

Throughout history, people have constantly created increasingly convenient tools to make their work easier. People strive to automate everything, and today people are developing technology capable of producing mental activity like human beings. This concept is called Artificial Intelligence.

Artificial Intelligence (AI) is a branch of computer science based on rapidly evolving technologies that allow a system, machine, or computer to perform intelligent tasks, such as simulating human behaviour, autonomous learning, responding to emotions, forecasting and decision-making. There are different approaches to build AI. It can be based on rule-based systems, statistical models, machine learning, and deep learning. All of them are used for different purposes. Rule-based systems allow AI to work only using pre-prepared rules that are created by experts. It does not permit AI to act completely independently and go beyond what is allowed. The statistical model is used in a wide range of areas where it is important to predict probable events based on the analysis of current data. Machine learning uses computer systems to perform tasks without explicit instructions, relying instead on patterns and logical inferences [1].

The work of AI is directly related to neural networks and their development. Neural networks are algorithms built on the principles of imitating the work of neural connections used by living organisms for data processing. Neural Networks are arranged as follows. They have three types of units: input units, hidden units, and output units. Units form layers, including one input layer, one output layer, and many hidden ones. The input units are used to get the information “from the outside” – from pictures, sounds, or texts. The hidden units perform the data processing function. The purpose of the output units is to return processed data. Each unit has a “weight” and connections with other units. When the parameters are changed, the system operation changes. To find the best combination of weights and connections, specialists use learning algorithms [2].

Neural network learning algorithms are used to develop AI. They evaluate the success of the work performed based on the output of the neural network and the “sample”. Based on this assessment, the learning algorithm modifies the neural network by changing the “weights” of the components and creating or deleting connections between them. It is planned to develop such neural network learning methods as transfer learning, deep learning, reinforcement learning, and sequential learning. Transfer learning is necessary to reduce the information base required for training. Deep learning is a subset of machine learning designed to simulate the work of the human brain, allowing it to make predictions or decisions without being explicitly programmed. Reinforcement learning permits AI to find the most effective ways to solve the task. Sequential learning allows neural networks to learn new skills without losing old ones. This can help make the process of creating AI faster and cheaper, making it more accessible and widespread [1].

One of the main directions of AI development today is the creation of a more human-like AI that can be realized by developing Emotional Intelligence. Emotional Intelligence (EI) involves the imitation of emotions, the analysis of speech for emotional colour, and the analysis of emotions based on facial expressions. This may lead to the appearance of advanced versions of more human-like voice assistants. However, this does not encompass all perspectives of EI. The use of emotional intelligence by AI can be divided into two directions: contact and non-contact. The contact method is based on obtaining data such as pulse and perspiration. This method is used in criminology and medicine. The non-contact method is based on the data collection of human facial expressions and gestures. It can be used for face recognition and social networks [3].

Summarising all of the above, AI is shaping the future of humanity across nearly every industry, and its capabilities continue to expand at an unprecedented rate. There are a lot of prospects for AI development, which are connected with the improvement of neural networks, their functionality and effectiveness. If the development of neural networks for AI continues, then in the future, AI will be able to perform a lot of tasks without the need for human intervention, and it will continue to act as a technological innovator for the foreseeable future.

References:

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