

ARTIFICIAL NEURAL NETWORKS AND DEEP LEARNING

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The purpose of this paper is to study the principles of neural networks working and deep learning, to analyze their structure and learn the details of mechanisms these systems use.

The relevance of this report was confirmed by the statistics being formed according to the results of the research that was made at Belarusian State University of Informatics and Radioelectronics. People were asked general questions about deep learning, neural networks, and their usage. According to the results, 84% of participants consider it difficult to give the answer.

Nowadays the fields of high technologies and robotics have the significant influence on our life as their development moves in very fast rates. That is why the importance of getting acknowledged with the types of neural networks and their application is critical in further development in the fields mentioned above. Neural networks differ in structure, mechanisms they use and spheres where they are applied.

Convolutional neural networks are designed as systems that use the convolution principle to learn from pixel data to more sophisticated structures such as edges, followed by basic and complex shapes.

Recurrent neural networks apply recursion method to expand over time. They apply the same data many times. This process forms a directed cycle, creating a kind of internal memory. It helps to use long chains of dependencies.

Deep neural networks have multiple hidden operating layers between the input and output data. This approach provides opportunity to express the object as an amount of primitives.

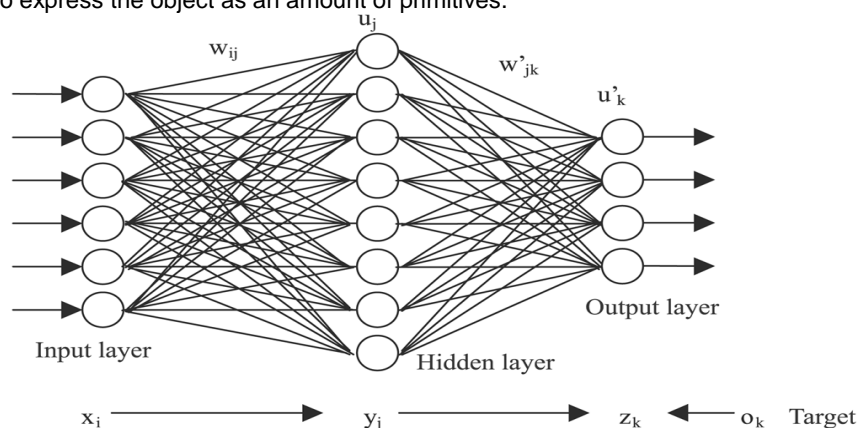


Figure 1. General scheme of Artificial Neural Network

Ordering and analyzing information gives us opportunity to make the following conclusions:

a) Convolutional neural networks are the most useful ones in computer vision and object recognition because of their structure.

b) Recurrent neural networks can be efficiently applied in language modeling according to their long short-term memory.

c) Deep neural networks are universal because of their flexible structure. The fields of usage can vary from social network filtering to automatic medical diagnosis.

d) Due to the specific features of all mentioned types, they cannot be represented as systems with intelligence in the full sense of this word.

The conclusions which were made allow us to define where to apply specific types of neural networks. This information could be used as a guide in choosing the right type of neural network to use in definite cases.

References:

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