Research on Neural Cells in Artificial Intelligence

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Abstract

This article provides information about the general classification and structure of artificial neural networks and the tasks they solve. The areas where artificial neural networks and their applications are used were also discussed.

Keywords: Artificial neuron, artificial intelligence, machine learning, artificial superintelligence, intellectual activity.

Introduction

In today's advanced technology era, artificial intelligence and neural network technologies have an important place in the life of society. Artificial neural networks are actively used to solve complex problems when traditional algorithmic solutions are ineffective or impossible. The capabilities of modern computers allow to perform various calculations at a speed that is tens of orders of magnitude higher than the capabilities of the human brain. However, a number of non-computational tasks, even trivial to humans, remain too challenging for computer technology.

Materials and Methods

The goal of designing artificial neural networks is to build a computational structure or algorithm that works according to the principles of natural intelligence. The following characteristics of neural networks can be included in the main ones.

1. Neural networks, similar to human and animal brains, are made of many simple elements that perform elementary actions and are interconnected by various connections.

2. Neural networks are able to improve (learn or adapt) their work using examples.

3. The neural network solution to the problem does not require the developer to create an algorithm for solving the problem and programming it. Neural networks typically use examples of "correct" cases to generate a method for solving a problem. At the same time, the network can detect hidden patterns in the task that are unknown to the developer.

Artificial intelligence (AI) is a modern field of computer science that studies the problems of creating algorithms and software that can think like humans and imitate their mental activity.

Programs built on the basis of algorithms created for artificial intelligence can summarize information and draw conclusions using accumulated experience and samples, identify connections between information, and be trained based on the experience gained. Artificial intelligence systems can never replace humans, but they can increase their capabilities.

There are basically two main concepts in artificial intelligence systems:

1. Neural networks

2. Machine learning

Neural network, in essence, represents a mathematical model that reflects the activity of a human biological neural network in a reduced form, and the implementation of a mathematical model as a program. And machine learning is a set of special algorithms, which show the basis of the property of neural networks - the ability to self-learn based on data from experiments.

The more data arrays available for neural training, the easier it is for the training algorithms to identify connections and patterns between the data, while the results are closer to the expected values. will be close. There are several types of artificial intelligence, among which three main categories can be distinguished:

Narrow artificial intelligence (artificial narrow intelligence, ANI). It is a special software-hardware complex focused on a specific field. For example, a computer program can beat a chess champion, but that program can only do so much.

General artificial intelligence (artificial general intelligence, AGI). Artificial intelligence of this category consists of a human-like software and hardware complex, that is, it can perform tasks that a human can perform. General artificial intelligence is the ability to copy the ability of human thinking, it performs tasks such as obtaining data, extracting the necessary information from the flow of data, comparing different solutions to a problem, learning quickly, using accumulated experience. Artificial superintelligence (ASI). This category of artificial intelligence is a software-hardware complex that surpasses human intelligence in almost all areas, including scientific inventions, general knowledge, and social skills. Currently, humanity is successfully using elements of artificial intelligence in various fields:

✓ aware of various obstacles in his way and action against them

✓ self-driving (autopilot) cars

✓ in development;

✓ in the development of unmanned aerial vehicles that move independently along a given route;

✓ in navigators that determine the route using a voice command;

✓ in the application of spam filters used in e-mail sorting;

✓ in translator programs;

✓ in text, voice and video recognition systems, text to voice message

✓ widely used in reflective programs and other directions.

When it comes to artificial intelligence, we need to have a good understanding of concepts like artificial intelligence, machine learning, and artificial neural networks. At the same time, it is necessary to talk about how these terms are related to each other.

Artificial intelligence (artificial intelligence, AI). Artificial intelligence is the science that deals with the technology of creating intelligent machines, implemented in the form of software that can run on supercomputers, personal computers, smartphones or other computing devices. Artificial intelligence in a word -

it is a complex of hardware and software. Artificial intelligence systems can perform some creative human functions in addition to computational tasks.

Machine learning is a branch of artificial intelligence that studies different methods of building learning algorithms. Learning algorithms are algorithms that change (learn) depending on the input data and the final results. Machine learning is a very broad field of knowledge. Because if we interpret the concept of "teaching" in different ways, we can get interesting results every time. However,

Among the many paradigms and approaches of machine learning, artificial neural networks stand out as a very interesting direction. Artificial neural networks (ANN) are simplified models of biological neural networks of the human brain.

The history of AI can be divided into three stages:

1950s–1970s, Neural Networks (NN): During this period, neural networks, also called artificial neural networks (ANNs), were developed based on the human brain that mimic human biological neural networks. A NN usually has three layers: an input layer, a hidden layer, and an output layer. To use NN, you need to train the NN with a large amount of data. After training, NN can be used to predict results for unseen data. During this period, NNs attracted a lot of attention. After the 1970s, when AIs failed to deliver on their promise, funding and research activities were severely curtailed, known as the AI boom. It was called the winter of AI.

AI is often confused with data science, big data, and data mining. The figure below shows the relationship between AI, machine learning, deep learning, data science, and mathematics. Both mathematics and data science are related to AI, but different from artificial intelligence. Data science mainly focuses on data which includes big data and data mining. Data science can use machine learning and deep learning to process data.

AI is already widely used in many aspects of our lives. Personal assistants such as Amazon's Alexa, iPhone Siri, Microsoft Cortana, Google Assistant and the most popular ChatGPT rely on AI.

Online entertainment services like Spotify and Netflix also rely on AI to figure out what you might like and recommend songs and movies. Other services such as Google, Facebook, Amazon and eBay analyze your online activity to deliver targeted ads. For example, a friend of mine once searched for Arduino boards during the day at work, and in the evening, when he got home, no matter what websites he visited, there were ads for Arduino boards!

Results and Discussions

Recently, the most popular AI application is ChatGPT, which uses natural speech processing (NLP), developed by OpenAI. As shown in the figure below, OpenAI was the market leader in 2022, invested $1 billion, and ChatGPT has accumulated more than 266 million users since its launch in November 2022.

Currently, there is a stable direction of intellectualization of computers and its software. The main functions of future computers are to solve problems of a more non-computational nature, i.e. logical inference. It is aimed at solving the problems of output, knowledge base management, intellectual interface support and other issues. Intellectualization of computers requires special hardware (for example, neurocomputers) and software (Expert systems, knowledge base, problem

solvers, etc.) is done at the expense of creation. The concept of "artificial intelligence system" can be defined as follows. A system is intellectual if three basic functions are implemented in it:

l. Knowledge presentation and processing function. The artificial intelligence system should be able to collect knowledge about the surrounding environment, classify and evaluate them in terms of pragmatics and non-contradictions, determine the processes of receiving new knowledge, and new knowledge with the knowledge stored in the database. should determine the connections between them.

2. Reflection function. The artificial intelligence system should create new knowledge by means of logical conclusion and demonstrate the mechanism of legality in the accumulated knowledge, obtain generalized knowledge based on individual (personal) knowledge and logically plan its activities.

3. Communication function. The artificial intelligence system communicates with a person in a language close to him and receives information from channels analogous to the reception of the surrounding environment by a person (primarily visual and audio), "for himself" or something know how to formulate an explanation of personal activity at the person's request (i.e., answer questions such as "How did I do this?"), to the person in his memory. It includes the help of stored knowledge and the logical means of reasoning.

In my conclusion, all human behavior is based on neural networks. It is the function of neural networks to sense reflexes, senses, vision, speak, run, and all other senses. Neural networks process information, store in memory, work in the nervous system, receive impulses plays an important role in making and sending. For the most part, we would probably say that there has been a tremendous improvement in every branch of the life, therefore everybody should keep up with the cutting-edge technology devices and their functions as well.

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