

COMPUTER-BASED ARTIFICIAL INTELLIGENCE SYSTEMS

Ivanko A.F., Ivanko M.A., Vinokur A.I., Kulikova E.V.

Moscow Polytechnic University, Moscow, e-mail: alekfed@mail.ru, mihaleks@mail.ru, alex.vinokour@gmail.com, elena@kulikova.pp.ru

Modern information technologies are actively being introduced into the life of our society. Begin to find the use of not only the achievements of the latest electronics and innovative technologies, but also artificial intelligence systems and computer training for students and schoolchildren. The article considers the concept of machine learning and the areas where machine learning can be effectively implemented [1]. Particular attention is paid to examples of the integration of machine learning into information systems and services. Based on the analysis of implementation, its effectiveness and practical application, the relevance of using computer machine learning is determined.

Keywords: computer learning, information technology, machine learning; business, security, the medicine

Modern conditions in which information systems operate assume the use of unstructured data and effective means for working with them [2]. They collect and process huge amounts of rapidly arriving digital information and analyze it, finding certain patterns that allow the development of systems for classification and forecasting. Most often, the aggregate of such facilities is called big data [3].

Recently, the use of machine learning, which is based on big data, has become popular. This technology is widely used due to the fact that there is a wide range of areas where it can be used to solve problems. In our work, we propose to consider and tell you more about these areas and the very concept of machine learning, because today most companies are actively using or studying computer technologies, since this has become a priority for new business projects and the development of modern companies [4]. Without a doubt, it can be said, it is a promising trend of modern times.

Machine learning concept

Machine learning is associated with the development of artificial intelligence—new scientific discipline, which emerged in the late 1950s. Even then, the idea of creating computer models and algorithms that can self-educate on the basis of incoming data and knowledge was born. This technology differs from classical static data analysis in that it uses methods and learning algorithms. In this technology we start from the hypothesis that all the subsets of homogeneous data show the same dependencies between attributes, and the distribution of attribute values does not change its character on the whole set. input data. Based on this idea, we can create an algorithm that can later be applied to new data sets without additional resource-intensive calculations. Thus, the essence of machine learning is to train the system in the course of the algorithm so that the

algorithm can correctly match the set of input parameters and knowledge and produce the corresponding result [5].

The learning process is divided into the following stages:

- Data collection;
- Giving data to a form ready for use;
- Splitting data into two groups: data to use algorithm and data to evaluate its actions;
- Training;
- Efficiency mark;
- Optimization.

Machine learning includes advanced statistical methods for solving regression and classification problems with multiple dependent and independent variables. These methods include the Support Vector Machines (SVM) method for classification and regression, the Bayes method for classification, and the k-Nearest Neighbors (k-Nearest Neighbors, KNN) method for regression and classification. Today they are at the stage of development, but it is expected that in the future their number will only grow, since solving various tasks requires different ways of machine learning.

Depending on the specifics of the task, the learning of the algorithm may be limited in time or may be an endless process. In the latter case, it is necessary to determine a certain stage in the evolution of the algorithm, allowing one to say that it is trained enough to produce the correct result. In conjunction with the methods for solving problems, we can obtain algorithms with predictive ability or algorithms to identify patterns in the data. The former are trained on a large data array of a certain system in the past, and then they try to simulate the behavior of this system on a different time interval. And the algorithms that reveal patterns help to restore or approximate the unknown function $y = f(x)$, which determines which result (the value of the function y) corresponds to the input parameters (argument x). It is important to understand that

the input parameters and the result can be arbitrarily diverse. Unlike predictive algorithms, they are not based on the chronology of the occurrence of events, but are based on qualitative parameters using the virtual event proximity function.

There are a huge number of areas where machine learning can be used. The process of informatization leads to a rapid increase in the volume of data in science, business, transport, and health care. The problems that arise in this process are often reduced to learning from precedents. A finite set of precedents (objects, situations) is given, for each of which some data is collected (measured). Precedent data is also described as its description. The totality of all available descriptions of precedents is called a training set. It is required for these private data to reveal general dependencies, patterns, interrelationships inherent not only in this particular sample, but in general all precedents, including those that have not yet been observed [6].

Based on this, it can be said that the goal of machine learning is the partial or complete automation of solving complex problems arising in various fields of human activity through the systematization, processing, analysis of gigantic information volumes.

Application in business

In companies that use the capitalist mode of production, the main means to increase profits is to reduce costs or increase sales. Machine learning can handle these tasks. First, the technology allows to reduce the time for the implementation of any internal technical processes, reducing the burden on employees or increasing the speed and volume of work without expanding staff. For example, by automating the completion and verification of input data in forms or feedback. Machine learning can also be used for predictive analytics. Many internet marketers rely on this method because it allows you to analyze every aspect of customer relationships. Due to this, it is possible to determine the most important moments in the sales process, more effectively attract customers and provide a high level of service [7].

As an example, you can call the service Google Analytics 360 Suite created for marketers. It uses data from Google Analytics, AdWords or DoubleClick Search, which allows you to collect information about your users. The service can analyze data to evaluate each ad and based on this information, you can optimize expenses, create an effective bundle of marketing channels, get to know your target audience and find new potential customers [8].

Use in medicine

Medicine and health care is the most promising area in terms of the introduction of machine learning technology. Working with data on diseases, symptoms and patients, it will be able to increase the accuracy and speed of diagnosis, and monitor the condition of patients. Machine learning algorithms can also help with predictions about how molecules behave and with what probability they will form new connections, which can accelerate the development of medicines. Machine learning can also improve organization in hospitals. For example, analyzing such data as a person's age, his address and distance to a hospital, weather conditions, one can predict the likelihood that a person does not come to the doctor's appointment and change the reception schedule.

In 2016, the British company DeepMind opened the DeepMind Health division and created a system that processes tens of thousands of medical records to highlight the necessary information. These data are used for research to create algorithms based on machine learning technologies that can detect early signs of disease [9]. DeepMind Health did not stop at this and developed the The Streams app, which contains tools that simplify the work of the doctor. This application provides real-time information about patients and sends it to doctors so that they can provide the best care for patients. It also increased the speed of patient enrollment, the results of medical examinations and the work of the hospital.

Cybersecurity application

Machine learning quickly found application for computer security. In most cases, computer-aided learning techniques are used in spam filtering, traffic analysis, and the detection of malicious software. In the security industry, there is a dispute over the benefits of antiviruses, since evil-minded people are able to bypass their protection. Therefore, large preference is given to machine learning methods that can automatically process large amounts of data with signs of threats and allow you to make decisions quickly. The main property of using this technology is that they do not replace specialists working in the field, but expand their capabilities [10]. This is due to the fact that they will learn to repel new threats, studying the already successfully repelled old attacks, inefficiently, since the defense systems already know how to repel such attacks. As soon as there is a new threat that can bypass the defense, the experts study this attack, as well as the signature for its detection. At present, the

main role of machine learning in information security is to create predictions about possible attacks with high accuracy so that experts can repel an attack in advance.

In order for a model to learn to recognize threats, it is necessary to input large amounts of data at the input. This may include Internet traffic, network flows, blogs, email messages, user activity, and more [11]. The accuracy of the forecast depends on the amount and variety of data. Further, the necessary signs are searched for in dataset. Depending on the problem being solved there may be hundreds of different signs. For example, the pre-name, the sender and his e-mail address, IP address, network session duration, protocol used, time of day, and others. On the basis of these signs, projections of attacks are compiled [12].

The main advantage of machine learning is the ability to quickly recognize patterns and anomalies in large data slices. More than this, this happens in real time, which increases the efficiency of the technology.

Information security company Distil Networks has created a machine learning technology to protect web applications from attacks based on misuse of interfaces. Distil Networks customers are provided with access to the infrastructure that analyzes the patterns of attacks in real time based on the traffic of a specific site.

This helped her take precedence in the protection of web resources [13].

Application in the social sphere

Machine learning opens up new opportunities that can be implemented in software and technical products. Social networks, such as Facebook, VK, Twitter and Instagram, use intelligent search robots based on AI and machine learning to rank publications and enhance user interaction [14].

Many search engines use machine learning to speed up and optimize search to make it easier for users to search for the right information. It is about simplifying complex filter systems, implementing voice and video search. Previously, at the request of the “flower shop” from the search engine was of little use, now when you enter a request, it will show us a map with the nearest shops, addresses and work times.

Thanks to machine learning, people have the opportunity to use personal assistants such as Siri, Alice, Google Assistant, Amazon Alexa, Microsoft Cortana. They use natural speech processing technology and can answer questions, execute commands, make recommendations. Some personal assistants study user information and learn their preferences in order to more effectively execute user commands [15].

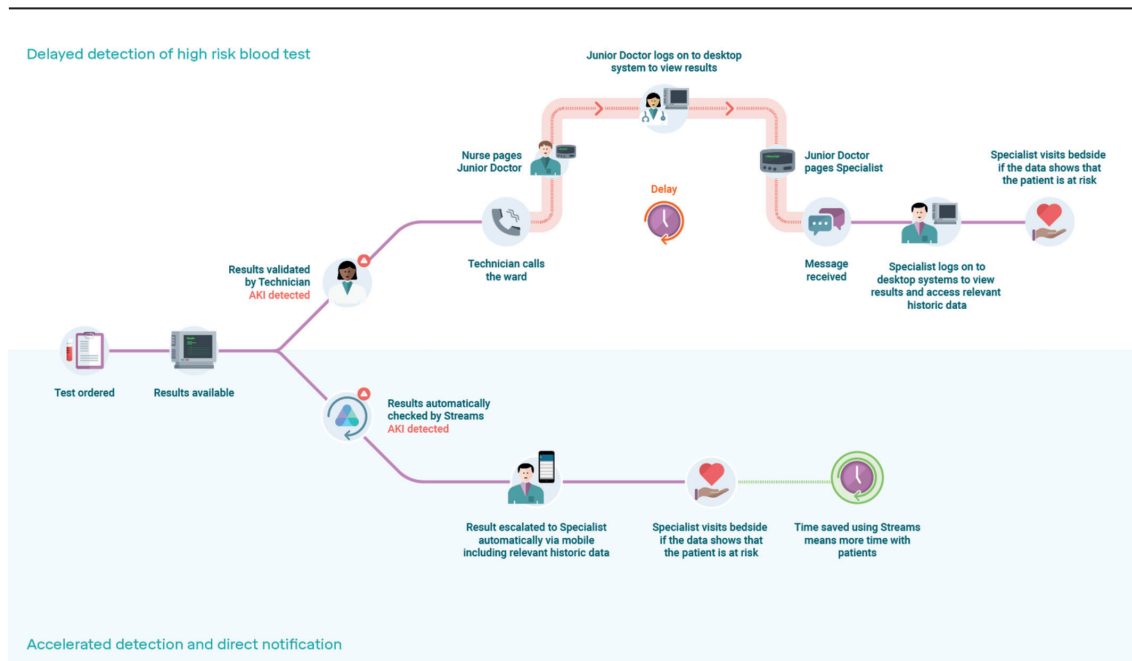


Fig. 1. An example of how Streams saves time



Fig. 2. Top web security companies

A great example of integrating machine learning into a service is Spotify. In 2017, the company acquired machine learning startups, then it added the ability to recommend music to users – the Discover Weekly playlist. Each playlist is made up taking into account the musical tastes of a particular user, and every week it is updated with 2 hours of new music. As a result, even the company itself was surprised at the results, which brought a new function, because it picked up surprisingly good recommendations, unlike its competitors.

Conclusion

Machine learning has become a part of modern technology due to the fact that there are a huge number of areas where it is necessary to analyze all the data where no one can handle. In this regard, there are already great practical successes in this area, which we have already described. The possibilities and scope of machine learning can be scary, but it is im-

portant to know that this is just a one-of-a-kind tool for finding answers to important and complex questions. Without a doubt, this technology has enormous prospects for creating innovative tools and improving the lives of people all over the world.

Now we can only say that machine learning is only at the beginning of its path. It is not yet known what innovations it can bring and where is the border where machine learning can no longer be used effectively.

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