IMPORTANCE OF PYTHON LANGUAGE IN DEVELOPMENT OF ARTIFICIAL INTELLIGENCE

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The introduction of artificial intelligence technologies in various fields has become an urgent demand at the current pace of society's development. The integration of various intellectual technologies is a key factor in this era. The article examines the use of the Python programming language in the implementation of artificial intelligence technologies.

Keywords: artificial intelligence, big data, machine learning, deep learning, Python libraries, intelligent systems.

Introduction. The most dangerous aspect of the modern world based on artificial intelligence is that it is based on the principle of "Winner Takes All". This is a factor that increases social tension and international conflicts. In the international arena, the competition for the database is expanding, as is the struggle for oil and other fuel resources.

The main factor of development in the globalized world is determined by technical and technological progress. Also, the scientific and technological network, economy and security have been developing synchronously, interacting with each other for several centuries. Today, a new factor in social and economic life - artificial intelligence - has rapidly entered and actively participates in our daily life. For example, Google can remember and recommend the most searched commands. Corporations collecting such huge data are actively interfering in political, social and economic processes by reanalyzing it. Database control has become a major goal of many governments[1].

Artificial intelligence means an intelligent artificial system that performs logical and creative human functions. The term can also be applied to any technology that exhibits characteristics associated with the human mind, such as learning and problem solving. An ideal characteristic of artificial intelligence is the ability to evaluate and take actions that have the best chance of achieving a specific goal.

The world of AI is almost limitless, and it's becoming more and more powerful thanks to growing engineering and computing capabilities. Various narrow functions, tasks and activities can already be performed at the level of human capacity and above, sometimes reducing the need for humans[2].

According to research, in the next fifteen years, AI technologies will have a greater impact on society than any other possible advancement and will bring about changes on the scale of a global revolution. This is characterized by two different impact segments: first, AI technologies will have a significant impact on companies and employment. In this regard, groups of closely connected companies and organizations that make decisions based on big data will emerge, which will lead to increased global competition between them. Second, humans will be able to enjoy unlimited additional benefits thanks to artificial intelligence.

Some cases that have occurred in the system of international relations in recent years show that military security and defense systems are becoming directly and indirectly dependent on AI technologies. In particular, with the withdrawal of US troops in 2021, the change in the political balance did not occur only in Afghanistan. A similar process took place in Iraq. This international trend is also explained by the migration of political and economic centers. More importantly, these changes took place not only from a geographical point of view, but also from a technological point of view. The discovery of drones and their successful use in several operations has shown that it is no longer beneficial for the United States to maintain bases in many regions that cause large costs. If a military operation in Afghanistan or Iraq becomes necessary, Washington is sure that it can

do it with the help of unmanned vehicles launched from Qatar. As Z. Brzezinski noted in "The Great Chessboard", maintaining troops in Afghanistan or Iraq in the modern world has lost its importance for the United States even to compete with Moscow or Beijing. The reason for this is explained by the fact that the field of competition has moved from land, sea or air spaces to cyberspace or outer space. As soon as keeping large contingents on the ground lost its relevance, the US and other Western countries began to gradually evacuate their troops. The reduction in the number of ground troops in war zones requires armies to rely more on cutting-edge digital technologies, including artificial intelligence[3].

AI has the potential to reduce human involvement in warfare. First, AI can transform the allocation of human and machine resources needed to engage in war and war-related operations. Second, artificial intelligence affects the speed of operations, which paradoxically reduces decision-making time. Arguably, no new military technology has received more attention from experts than drones over the past decade, as drones rise to prominence as the most prominent technological tool in modern information age warfare.

The trend observed in recent military operations also prompted a fundamental change in strategic priorities. In the short-lived war between Azerbaijan and Armenia in the fall of 2020, the Azerbaijanis destroyed Armenian tanks using cheap, unmanned drones supplied by Turkey. These devices hit the target without endangering the operator's life. According to some experts, it was in the Karabakh war that the influence of drones gained importance at the level of "changing the tactical game"[4].

As drones drastically reduce the human factor and financial costs, states will be more likely to go to war in the future. This means that if the drone revolution is to take place, countries will have to significantly rethink their defense policies. Combat unmanned drones were once the main "chip" of military powers, but today small countries are increasingly trying to acquire them. Throughout the military history of mankind, there were periods when a single weapon system became a symbol of the entire war era. The long bow used by English archers in the Middle Ages confused other enemy forces. Also, the role of technological innovation has been significantly important in the military success of the United States. During the American Civil War, US President Abraham Lincoln used the modern telegraph system to communicate with his military, coordinate strategy, and move troops.[5]

Literature analysis and methods. Even today, the introduction of AI technologies in the field of defense is seen as a revolution. This revolution is different from the previous military revolutions due to the fact that AI technologies will be used first in the social spheres, and then in the military spheres. Weapons with previous military technological potential, such as nuclear weapons, are characterized by the fact that they were first used in the military sphere and later integrated into the networks of everyday life. This also made it possible to save funds for research in the field of defense during this period. Like the secret weapons of Hitler's Germany before World War II, drones or robots based on artificial intelligence have the potential to change the balance of the world. Therefore, research in this field of technology should be transparent, and the weapons developed should be limited by international law, as in the nuclear weapons regime. Because increasingly advanced technologies can increase threats to the future of humanity [6].

• Closely related technologies, such as artificial intelligence and various machine learning algorithms, have become major topics of discussion both among experts and in society at large. The Python language is widely used for the development of artificial intelligence. Some general information and interesting facts about the language and its creator:

• The creator of the Python language is the Dutch programmer Guido van Rossum. In our time, the beginning of work on such a popular language began by chance. "In December 1989, I was thinking about what to do during the Christmas holidays. The office was closed. So I started to improve my ABCs at home. I didn't even think that something else serious would happen during the work." Guido later recalled.

• The name of the language has nothing to do with reptiles. Guido van Rossum named his work after the Monty Python series. In addition, this name follows the tradition of naming programming languages after famous people.

• In creating Python, van Rossum followed principles that have had a significant impact on the software industry. He used simplified English (a foreign programmer can't spend a lot of time improving his English) as a supporter of open source. Finally, van Rossum strove for code brevity and ease of use.

• There are 19 sets of words that capture the spirit of the language - the Zen rules of Python. It is hosted on the official Python website. Zen of Python also opens in the Python console application when you enter the import command.

• In recent years, Python has become the most popular language taught in schools in many countries. 6 out of 10 parents surveyed would rather have their children learn Python than French.

• Python is one of the few programming languages that has been declared the official language of Google due to its efficiency.

• Since way back in 1989, Python has found a distinct spread in three areas:

• web development;

• processing of large data arrays (Big Data), machine learning, data analysis and visualization;

• create automation scripts.

In web programming, Python allows you to create the entire backend of an Internet resource. Backend is an internal component of the Internet resource. This is a database stored on a remote server computer. According to the user's request, information is obtained from such a database and transferred to the browser on his computer. And the data received here is processed by the second component of the site frontend.

Discussion. The use of Python has expanded thanks to the Django and Flask frameworks written in this language. Framework is a software shell that simplifies and speeds up the solution of common tasks. Examples of resources created in Django are Instagram, Disqus, Mozilla, The Washington Times, Pinterest. The Flask framework was used to create influential resources such as LinkedIn, Netflix, and Uber .

Also, the use of Python has shown itself well in writing analyzers - programs for collecting and organizing data placed on sites. Collecting data from various sites is called web scraping. The process is often used by analysts of various profiles in their work. But today, information is all around us, so it needs to be collected by experts in many professions. Python offers the programming language as a tool to facilitate this process. Web scraping is an automatic bot capable of quickly and reliably copying large streams of data from sites and pasting them into a specific table. Web scraping with Python is easy to do and the benefits are huge. Imagine that now you don't need to collect manually and spend several hours

in a row, everything is available automatically. Get millions of data points from the internet in minutes and use it to your advantage. And if the flow is small, web scraping can do the job in seconds.

Another area where Python is in demand is scripts for automating routine processes. A script is a short program containing a certain sequence of actions. A good example of a script is the macros in Google Sheets. Another example of using a script is email processing.

One area where this programming language is in high demand is machine learning. These technologies are closely related to artificial intelligence, neural networks and deep learning. Machines are already fully capable of learning when performing automated analysis of certain amounts of data. At the same time, the need for programming is minimized during machine learning. Many libraries are suitable for this task, such as Numby, PyTorch, Pandas, etc. With their help, you can easily perform all mathematical calculations, because. they are able to do them automatically without human help. All that remains is to analyze the obtained results and choose the optimal solution for further tasks.

In Chinese art, there is such an amazing artifact as the "Canton Ball". It is a sphere carved from ivory with several other spheres inside. In addition, each of the spheres rotates freely relative to its neighbors. We will arrange the discussed technologies in the following order: artificial intelligence -> machine learning -> neural networks -> deep learning.

The outer circle of such an imaginary canton ball would be artificial intelligence. Each subsequent technology on our list is built on the same as the previous one. Thus, machine learning is a part of artificial intelligence. Deep learning is a part of machine learning and neural networks are the basis for deep learning algorithms. Therefore, artificial intelligence is closely related to machine learning. Progress in the field of artificial intelligence is highly dependent on the availability of convenient and powerful programming tools.

Thus, Python has the best support for machine learning among all programming languages in its arsenal. This "miracle weapon" is TensorFlow, Keras, Scikit-learn artificial intelligence libraries specially created for machine learning. A library is a set of functions that allow you to solve a specific task in a program. The library saves the programmer from repeatedly "reinventing the wheel", that is, writing

code for routine, repetitive tasks. For example, the most common learning algorithms are already built into Scikit-learn.

The following fact speaks about the role of Python language in the development of artificial intelligence. According to Google Trends, in recent years interest in the field of machine learning, and indeed in the Python language, has skyrocketed worldwide. This event came a year after the release of the TensorFlow machine learning library[7].

The Python programming language has a simple and easy-to-understand syntax (a set of rules that define what arrangement of characters creates a valid expression). A large team of programmers formed around him, developing and popularizing the language. That is, on the one hand, development requires the use of artificial intelligence in all areas of life, on the other hand, there are a large number of specialists who can solve these problems using the Python language. Programming with the use of artificial intelligence also gives good results in the formation of e-commerce processes. The development of non-traditional commerce has a positive effect on the structure of the labor market of Uzbekistan. Industrialization of advanced information technologies will create thousands of new jobs. The stabilization of the economy of Uzbekistan, the strengthening of the competitiveness of goods and services, and the development of e-commerce at the same time will lead to an increase in the export potential of our country. Electronic commerce ensures the improvement of the standard of living of the population, the development of fields such as marketing and management.[8]

E-commerce web pages can be created in different directions. It can be created using ready-made platforms. Examples of ready-made solutions include WooCommerce plugin on WordPress platform, VirtueMarket platform on Joomla platform, OpenCart platform, OcStore platform, 1cBitrix and many others. The advantages of these platforms are that users without experience in web programming will be able to create their own online magazines without too much difficulty.[9]

When the created online magazine is required to be professional, it is necessary to turn to web programming. As one of them, the Django framework working in the Python programming language can be cited as an example.[10]

Results. Applying artificial intelligence in software requires an existing database. Currently popular voice assistants such as Yandex Alisa and Microsoft Siria can easily start a conversation with people. In order for them to be able to start a conversation, as mentioned above, a previously formed audio database is useful. When the user asks the AI a question, the voice is analyzed and converted into text. The most optimal of the possible alternatives for the generated text is selected and the audio response for this option is returned to the user. As you can see, this process is actually not very complicated[11]. Important aspects in this process are:

- the user's audio, i.e., converting it into error-free text if the speech is viewed as audio;
- semantic analysis of the finished text, if necessary, analysis of what is being said on the basis of previous dialogues with the user;
- creating a list of possible answers to this text;
- choosing the most optimal answer based on the dialogue;
- return the appropriate sound from the audio database to the user for the selected response text

Until now, such an audio database has been formed in developed countries, in particular, in English, French, German, Russian and other languages. But there is no Uzbek language database in this regard. It can be said that artificial intelligence programs in the Uzbek language are not developing precisely because of the lack of a database.
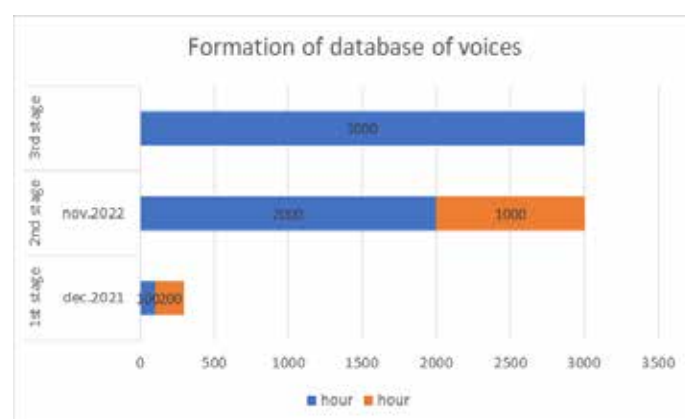

Figure 1. Sound database formation graph

According to the latest information, the newly established Uzbekvoice.ai team has started to solve the above problem (Fig. 1). The database of sounds is open source and anyone can use it in their project. Uzbekvoice.ai team completed the 1st stage in December 2021. The goal was to collect 100 hours of audio data. As a result, more than 200 hours of audio data were collected. In Phase 2, the goal was to

collect 2,000 hours of voice data and it was completed on November 13, 2022. As a result, more than 1000 hours of audio data were collected. Next is the 3rd stage. The goal of Phase 3 is to collect 3,000 hours of audio data. In order to use the voice database, a database of 10,000 hours should be formed[12].

People who know any Uzbek language can participate in the formation of the voice database. For this, you need to register on commonvoice.mozilla. org and select the Uzbek language from there. The interface shows only two options. The first is to read the text and write it down, and the second is to listen to the voice and compare it with the text. In order not to bore users, the tasks are divided into 5.
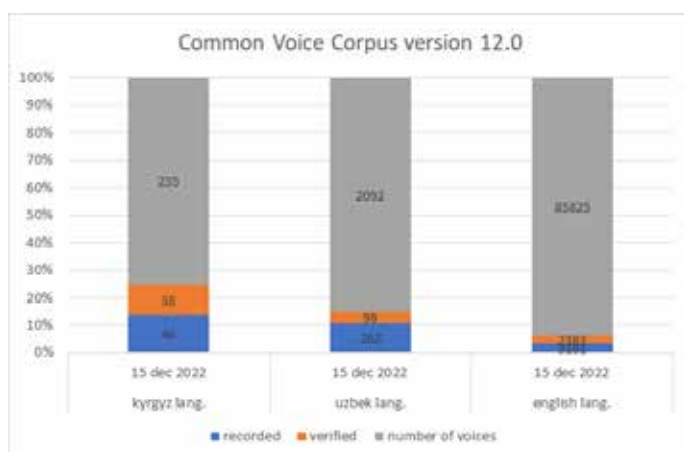

Figure 2. Common Voice Corpus version 12.0

In the download section of the dataset, the following information can be provided for comparison (Fig. 2): Total recorded hours in the Kyrgyz language according to the interpretation of "Common Voice Corpus 12.0" as of December 15, 2022 - 46 hours, the number of hours checked - 38 hours, and the number of votes is 255. This situation is as follows in the Uzbek language: according to the interpretation of "Common Voice Corpus 12.0" as of December 15, 2022, the total number of recorded hours is 262 hours, the number of recorded hours is 99 hours, and the number of voices is 2092. When we compared this situation to the English language, we saw the following results: according to the interpretation of "Common Voice Corpus 12.0" as of December 15, 2022, the total number of written hours is 3161 hours, the number of hours checked is 2383 hours, and the number of voices is 85,825.

According to the Uzbek language database "https:// commonvoice.mozilla.org/uz/languages", 38% have been checked. There are 148,606 sentences in the database. Comparing this data to the English data, 75% were checked and there were 1,659,715 sentences.

Conclusion. In conclusion, the most dangerous aspect of the modern world based on artificial intelligence is that it is based on the principle of "Winner Takes All". This is a factor that increases social tension and international conflicts.

Also, the competition for the database will expand in the international arena, such as the fight for oil and other fuel resources. And it is not surprising that cyber security has become part of the integrity of countries.

There are several things that need to be done in the development of artificial intelligence in the Uzbek segment. In particular, it is necessary to develop and enrich the database of sounds like the above. As far as possible, it is necessary to make artificial intelligence think like a human. An artificial intelligence capable of thinking in Uzbek will be necessary to be able to make the right decision. It will be possible to use this artificial intelligence in various suitable fields later.

Artificial intelligence has become an almost exclusive use of the Python programming language in the last 5-10 years. Although the language itself appeared in the last century. A combination of factors contributed to this development:

• the need to process and analyze a large amount of data has arisen for the development of civilization. It is impossible to answer this problem without machine learning and artificial intelligence technologies;

• At that time, the Python programming language acquired all the necessary tools for solving problems in the field of Artificial Intelligence;

• ease of learning and ease of use have made this language popular among programmers. And a whole army of people ready to work in the field of Artificial Intelligence has been formed.

All these factors, which have resonated in recent years, have made the Python language and artificial intelligence technologies almost inseparable concepts in society's perception.

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