риканцам. Аналогично, в отечественной истории введение НЭПа за несколько лет вывело страну из состояния кризиса (голод в Поволжье и т.п.), обусловленного ужасами гражданской войны, «военного коммунизма» и продразвёрстки. Разумеется, в условиях враждебного окружения и политически ангажированных «санкций», государственный контроль в стратегически важных отраслях должен сохраняться. Нельзя впадать ни в одну из крайностей, ни в «частную», ни в «государственную»; только здоровая конкуренция между ними на основе принципов справедливости способна обеспечить высокое качество продукции как основу экономического процветания.

Artificial intelligence and systems analysis

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Introduction

The relevance of studying the growing role of artificial intelligence in system analysis is due to the general trend of development of a smart society in line with the Industry 4.0 and Industry 5.0 programs. Artificial intelligence is defined as the science and technology of creating intelligent machines and intelligent computer programs [1]. Artificial intelligence is based on the logical components of human thinking, as well as the functioning features of the nervous system, which has a data processing center (brain and neurons) and the periphery of receptors [2]. But artificial intelligence is not necessarily limited to biologically plausible methods.

Intelligence refers to a person's ability to think through feedback mode to adapt to new situations, learn, apply abstract concepts and use knowledge to control the environment. Artificial intelligence is engaged in the development of digital systems that have the functions of understanding language, learning, reasoning, and solving problems based on feedback. Artificial intelligence includes a number of algorithms and software systems, the distinctive property of which is that they can solve some problems in the same way as a person thinking about their solution

would do. In the context of the relevance of the topic of artificial intelligence, the topic of transforming systems analysis practices has become popular. It formed the main purpose of writing this article.

Main part of the study

Artificial intelligence combines a complex of related technologies. These include natural language processing, machine learning, expert systems, virtual agents (chat bots and virtual assistants) and recommendation systems. Speech technologies recognize and automatically translate texts; recognize and generate speech [3]. Computer vision technologies find, track, classify and identify objects; extract data from images and analyze the information obtained [4]. They are used for object recognition, video analytics, image and video content description, gesture and handwriting recognition, and intelligent image processing.

Data analysis technologies (Data Science) extract knowledge, find patterns in data and make predictions [5]. They use methods of statistics, econometrics and machine learning, Deep learning. A special role is given to generative artificial intelligence [6]. The subject of study is the risks of using artificial intelligence technologies [7]. Since supporting artificial intelligence requires large investments in computing power, data processing infrastructure, and training of professional personnel, there is a threat of a monopoly in the market. There is also a risk of leakage of information that is used to train artificial intelligence.

There is a risk of biased or discriminatory decisions being made when artificial intelligence communicates with consumers. As a result, the user must be protected from unsafe or ineffective systems. Automated systems should be developed in consultation with various communities, stakeholders, and subject matter experts to identify issues, risks, and potential impacts of the system. Systems must undergo testing before deployment to identify and mitigate risks, and ongoing monitoring to demonstrate their safety and effectiveness.

Users should not face discrimination from algorithms, and systems should be used and developed on an equitable basis. Depending on the specific circumstances, algorithmic discrimination may violate legal protections. Designers, developers,

and implementers of automated systems must take proactive and consistent steps to protect individuals and communities from algorithmic discrimination and to use and design systems in an equitable manner.

The user should be protected from data misuse with built-in protections, and they should have control over how their data is used. Systems analysts must seek the user's permission and respect their decisions regarding the collection, use, access, transmission and deletion of their data in appropriate ways and to the greatest extent possible. If this is not possible, alternative design-based privacy protections should be used [8].

The user must be aware that the automated system is being used and understand how and why it contributes to the results that affect him. Designers, developers and implementers of automated systems should provide publicly available, plain language documentation that includes a clear description of the overall operation of the system and the role automation plays, a notice that such systems are being used, the person or organization responsible for the system, and an explanation results which must be clear, timely and accessible.

The user should be able to cancel services where necessary and have access to a specialist who can quickly review and resolve problems. The user should be able to reject automated systems in favor of human alternatives where appropriate. We are talking, first of all, about research aimed at solving fundamental problems that arise when using artificial intelligence technologies, including bias (the AI bias phenomenon), the possibility of causing harm and abuse [9].

Machine translation, speech recognition, natural language text processing, computer vision, and car driving automation are based on deep learning. It is a subset of machine learning characterized by the use of neural network models that mimic the functioning of the human brain. Therefore, any neural network model is trained on large data sets, but how it uses them remains unclear to its creators, which is one of the most important problems for many deep learning applications. The reason is that such a model works with images formally, without any under-

standing of what it does. Therefore, attention to the phenomenon called AI bias has noticeably intensified.

The development of the use of AI leads to the adaptation of technologies in classical sectors of the economy along the entire value chain and transforms them, leading to the algorithm of almost all functionality, from logistics to company management. Artificial intelligence has become a catch-all term for applications that perform complex tasks that once required human input, such as communicating with customers online. The term is often used interchangeably with its subfields, which include machine learning (ML) and deep learning [10].

Machine learning focuses on creating systems that learn and develop by processing and analyzing data. Machine learning always involves the use of artificial intelligence, but artificial intelligence does not always mean machine learning. There are several stages to developing and deploying machine learning models, including training and inference. AI training and inference refers to the process of experimenting with machine learning models to solve a problem. A machine learning engineer can experiment with different candidate models to solve a computer vision problem such as detecting bone fractures in X-ray images. To improve the accuracy of these models, the engineer will feed data into the models and adjust the parameters until they reach a given threshold. These training needs, measured by model complexity, are growing exponentially every year.

Infrastructure technologies key to AI training at scale include cluster networks such as RDMA and Infini Band, GPU compute, and high-performance storage. Machine learning projects are often computationally intensive. They are also complex to create and require expertise, which is in high demand but in short supply. Knowing when and where to include these projects, and when to turn to a third party, will help minimize these difficulties. Built-in artificial intelligence tools help automate the decision-making process based on algorithms.

Artificial intelligence is self-healing autonomous databases and ready-made models for image recognition and text analysis in various data sets, as well as digital assistants and administrators. Thus, chat bots are used to communicate with

customers [11]. Through linguistic processing, they analyze customer questions and provide answers and information. Chat bots can learn. IT operations streamline monitoring with a cloud-based platform that integrates all data and automatically monitors for thresholds and anomalies. Analytics tools with a visual user interface make it easy to query the system and provide clear results.

To make the most of the capabilities of artificial intelligence and overcome obstacles to the successful implementation of new technologies, a team culture of systems analysis is necessary [12]. In a team culture platform, business analysts and data scientists collaborate to define tasks and goals; Data engineers provide management of the data and platform for performing analysis; Data scientists prepare, explore, visualize and model data using a specialized platform; IT system architects provide infrastructure management for data exploration both locally and in the cloud; Application developers deploy models in applications to create data-driven products. As a result, adaptive intelligence has become in demand [13].

Adaptive, intelligent applications help you make better business decisions by leveraging real-time internal and real-time external data and highly scalable infrastructure. Applications enable you to offer better products, recommendations and services to your customers and increase your profits.

Companies are actively combining statistical methods with technical concepts such as machine learning and artificial intelligence to extract insights from big data, drive innovation, and change the way decisions are made [14]. Ready-made solutions, tools and software help automate the decision-making process based on algorithms. These can range from stand-alone databases that use machine learning to perform self-recovery, to ready-made models that can be used to solve problems such as pattern recognition and text analysis. All this helps companies accelerate time to value, increase productivity, reduce costs and improve relationships with customers.

Ineffective processes can prevent a company from realizing the full potential of artificial intelligence. Data scientists may face challenges in obtaining the resources and data needed to build machine learning models. Problems may arise

when interacting with colleagues. Data scientists have to deal with numerous open source tools. Application developers are sometimes forced to completely rewrite the code of learning models to integrate them into applications.

The list of AI-based tools is constantly expanding, forcing IT professionals to devote more time to supporting the data science department by updating the work environment. Existing standards limit what data scientists can do. Managers are not always able to fully assess the return on investment in artificial intelligence. Therefore, they do not provide sufficient levels of support and funding to create an effective integrated ecosystem.

In a broad sense, systems analysis is applied to the study of social, economic, organizational, technical and human-machine systems. It is in demand when developing, making and justifying decisions related to the design, creation and management of complex, multi-level and multi-component artificial systems. Systems engineering studies the design, creation and operation of structurally complex systems of any scale and purpose.

The theoretical and methodological basis consists of a systems approach and general systems theory, as well as research methods involving mathematical logic, mathematical statistics, algorithm theory, game theory, situation theory, information theory, heuristic programming and simulation modeling. An important feature of system analysis is the unity of the formalized and informal research tools and methods used in it.

In a narrow sense, system analysis is included in the IT analytics infrastructure [15]. In this infrastructure, the business analyst, systems analyst and data analyst play an important role. A systems analyst communicates with business analysts or customers to clarify business requirements. His responsibilities include developing functional requirements and describing system operation scenarios (Use Case).

He interacts with the designer to develop the system interface design. He analyzes methods of data exchange between systems (integration), design Databases, API interfaces with developers, and participates in the development of system ar-

chitecture. His tasks include setting tasks for the front end (websites, web and mobile applications), back end, preparing technical documentation for the project, and demonstrating the system to the customer.

The results of the work are technically developed task statements for developers, as well as technical documentation for the project. A systems analyst accompanies tasks from business needs to release. He gives a demo to the customer. A business analyst works with business stakeholders, potential and current application users. Stakeholders may include business owners, partners, and department heads. A business analyst is focused on finding ways to optimize employee costs, speed up processes, increase profits and other business benefits. He analyzes business processes and determines how and what to change in order to develop the customer's business through automation.

Conclusion

Artificial intelligence technologies have created a team synergy model in which systems analysts collaborate with business analysts and interact with business stakeholders and potential users to obtain business and user requirements and then translate them into technology requirements. They do this by analyzing and researching existing applications. They also define the data flows that are used in business processes. They design databases and research software protocols in order to organize the interaction of systems. Explore how introducing new features can affect the behavior of a running system. The technical details that systems analysts delve into are needed to assign tasks to programmers.

Also, their understanding of the technical details of the project helps programmers understand implementation features that can affect the estimation of task completion times. System analysts draw up design documentation and pass it on to the development team, who begin work on creating a new system. Systems analysts play an important role in ensuring consistency between business requirements and technical capabilities of systems.

A data analyst works with data that is collected by automated systems: databases, log files, social networks and others to find patterns, trends and draw conclusions about them.

They analyze large volumes of data to extract valuable business insights. Data analysts collaborate with business analysts, systems analysts, and other stakeholders to understand what data is needed and how it can be used to make business decisions.

They analyze data using a variety of methods and tools, including statistical analysis, machine learning, and data visualization. Their work includes developing and implementing algorithms and models to analyze data, creating reports and graphs that help present information in a clear way. Data analysis help IT companies identify new opportunities, optimize processes, predict results and make decisions based on analyzed real information.

Each analyst has his own area of responsibility in IT companies. The roles of a business analyst and a systems analyst overlap and it often happens that one person in the company is engaged in business and systems analysis. Their main area of responsibility is collecting business requirements, analyzing them and assigning tasks to developers. A data analyst is another position that is associated with the processing and analysis of large volumes of data and has almost no overlap with the tasks of a systems and business analyst. But if the results of data analysis reveal the need to improve the system, then the data analyst can assign the task to the developers himself or through a system analyst.

The term BI stands for business intelligence and refers to special software used to automate business processes in the field of assessing statistical and economic indicators [16]. BI analysts can monitor parameters that tell about a company’s activities, identify the strengths and weaknesses of its work, and also offer a series of solutions for effective transformation and development. Experts of this profile help make commercially intelligent decisions by collecting and visualizing information. The main soft skills are communication and initiative. The first will

allow you to extract study and convey information in the most correct form, the second will allow you to seek answers to questions by any means.

Knowledge from various fields of computer science, machine learning, mathematics, statistics, software development and business knowledge created a direction called Data Science. Data scientists create tools to solve business problems through analysis and artificial intelligence algorithms. Engineers of this profile are in demand everywhere: from retail to the banking sector. For example, in retail, they study audience behavior and form models for selecting optimal prices, thereby increasing average checks. Literally every company wants to work with people who know how to collect, process, correctly interpret, visualize and communicate commercially important data to colleagues. The Product owner also plays an important role [17].

Having experience in joint corporate activities with synthetic people plays an important role. These people are actively created by commercial companies specializing in the virtual avatar market. Their creation takes place in a studio based on a physical individual. His reading of a pre-prepared text, which contains all sound phonemes, is recorded on video. Once the raw data is ready, engineers run the material through machine learning models.

Artificial intelligence uses the script and filmed video to create a full-fledged character replica. It combines facial expressions and gestures with voice. Voice data is synchronized with facial expressions. Hands and body move in accordance with the placed accents. The double can pronounce any text with the generation of the corresponding video sequence.

AI bankers are being developed that will advise clients in physical bank offices. It is based on the convergence of deep learning, natural language processing, computer vision, robotics and other technologies.

Deep learning focuses on a computer program's ability to learn from data and perform complex tasks. This technology is used in the development of synthetic humans. Using deep learning, a computer program can be trained to recognize patterns and perform complex tasks with greater accuracy than humans. Natural

language processing (NLP) technology is used to create synthetic humans. It allows a computer program to understand and interact with natural language [18].

Computer vision allows a computer program to perceive and interpret visual information. Robotics provides equipment to perform tasks that require physical movement and manipulation. Thanks to them, computer programs can explain their decisions and interact with people in mental ways.

Synthetic humans (Digital Humans, Artificial humans Synthetic humans) refer to photorealistic virtual models of people endowed with body, voice, facial expressions and artificial intelligence. These are robots that do not have a physical embodiment and can only interact with the user from the monitor screen. It can be either a double of a real person or a virtual robot with a unique appearance generated by a neural network.

Synthetic humans are a product based on patented algorithms with elements of artificial intelligence [19]. The developer clones the facial expressions, gestures and conversational style of specific people. Subsequently, digital clones can exist in a virtual environment and perform various tasks at the request of the customer.

Synthetic people are used in public space as brand ambassadors and artists. Digital models are in demand in the fashion segment. A virtual modeling agency creates digital models with artificial intelligence at the request of clients [20].

Game changers include virtual hosts and virtual celebrities. Banks are hiring digital employees for the position of digital consultant. A digital consultant helps clients obtain mortgage loans in real time. The digital clone communicates with clients around the clock, giving them advice and forecasts.

Digital assistants have created the prospect of digital humans empowered by artificial intelligence. Motion capture technology has reached a high level. Graphics engines allow you to create realistic graphic artifacts. There are also specialized applications for working with digital people. To implement the cognitive functions of synthetic people, machine learning is used, in particular, speech recognition and generation methods, NLP for the dialogue subsystem and GAN for generating a unique appearance.

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