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ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS: NEW CONTEXT OF IDENTIFICATION

Inteligência artificial e redes neurais: novo contexto de identificação

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ABSTRACT

The current stage of humanity's development is characterized by an active digital transformation of processes that ensure its prosperous existence. Digital systems present users with functionalities that rely on artificial intelligence and neural networks, thus shaping their identification contexts. The article establishes potential threats to human beings that may arise from developing intelligent systems (e.g., threats to personal data, the value system, and culture). Particular attention is paid to current state regulation in AI development. Russia has developed and enforces its own Code of Ethics in the Field of AI and legislative acts regulating the development, introduction, and use of intelligent systems in different industries. The research substantiates the need to analyze the results delivered by AI systems based on the formulated questions to prevent the delegation of human intellectual activity to them. The study concludes that the development of AI needs to be studied with an interdisciplinary approach.
Keywords: Digital transformation, Artificial Intelligence Ethics, Innovative development, Human identity, Artificial Intelligence culture, Personal data, Big Data analytics

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INTELIGÊNCIA ARTIFICIAL E REDES NEURAIS: NOVO CONTEXTO DE IDENTIFICAÇÃO

Artificial intelligence and neural networks: new context of identification

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RESUMO

O estágio atual do desenvolvimento da humanidade é caracterizado por uma transformação digital ativa dos processos que garantem sua existência próspera. Os sistemas digitais apresentam aos usuários funcionalidades que dependem de inteligência artificial e redes neurais, moldando assim seus contextos de identificação. O artigo estabelece as possíveis ameaças aos seres humanos que podem surgir do desenvolvimento de sistemas inteligentes (por exemplo, ameaças aos dados pessoais, ao sistema de valores e à cultura). É dada atenção especial à regulamentação do estado atual no desenvolvimento da IA. A Rússia desenvolveu e aplica seu próprio Código de Ética no campo da IA e atos legislativos que regulamentam o desenvolvimento, a introdução e o uso de sistemas inteligentes em diferentes setores. A pesquisa comprova a necessidade de analisar os resultados fornecidos pelos sistemas de IA com base nas perguntas formuladas para evitar a delegação da atividade intelectual humana a eles. O estudo conclui que o desenvolvimento da IA precisa ser estudado com uma abordagem interdisciplinar.
Palavras-chave: Transformação digital, Ética da Inteligência Artificial, Desenvolvimento inovador, Identidade humana, Cultura de Inteligência Artificial, Dados pessoais, Análise de Big Data

INTRODUCTION

Artificial intelligence and neural networks are deeply embedded in the lives of modern people, providing automation, increasing the effectiveness and performance of processes, and improving decision-making in various industries (healthcare, education, transport, finances, etc.) (Belikova, 2024; Jiang et al., 2022; Mamedova, 2021). At the heart of this technology is a simulation of human intelligence by algorithms that are supposed to think and act like a human (make decisions, use visual perception, recognize speech, perform language translation, etc.) (Aggarwal et al., 2022; Lee et al., 2023). AI and neural networks have managed to transform the functionality of information systems, allowing them to use the patterns identified by processing and analyzing massive amounts of data to form personalized trends, predict changes from managerial decisions, aid in decision-making, and complete tasks (e.g., operate vehicles, manage indoor climate, control appliances, identify potential fraudulent activities in finance, and create customized development trajectories) (Krasnikova, Grankina, 2024; Logachev, 2024; Logachev, Smirnova, 2024).

According to statistics, the leaders in the Russian segment of AI-based software solutions are Sberbank, Yandex, and Mail.ru Group (Altemirova, 2023). Computer vision, business analytics, healthcare, and natural language processing are the most prominent areas of development, making up about 62% of the Russian sector of information companies (Iskanderova, 2023).

This dramatic development and introduction of AI in numerous spheres of human life has raised concerns among researchers, who associate it with substantive, psychological, cultural, and social threats (Federspiel et al., 2023; Selenko et al., 2022; Uysal et al., 2022). E.K. Belikova (2024) points out that these "concerns stem from a fear of technology per se, which can harm human nature purely with its non-human essence" (p. 2). Researchers argue that one substantive problem with the intensive use of AI is the risk of human beings losing their identity (Mirbabaie et al., 2022; Selenko et al., 2022; Strich et al., 2021). On the other hand, there is the issue of the lack of approaches to identifying AI itself: the detection of "unjust scenarios connected with discrimination and humans' excessive trust in intelligent systems" (Gracheva et al., 2023, p. 97). Regardless, AI is a technological phenomenon that can change various contexts (technological, socioeconomic, political, philosophical, and scientific), creating imbalances (e.g., the emerging problem of transfer between proactive zones and relatively inert or agitated spaces) (Avdonin, Silaeva, 2023; Mamedova, 2021). V.S. Avdonin and V.L. Silaeva (2023) suggest that these resulting imbalances have common features, regardless of their nature, which are associated with "growing concerns, anxiety, a feeling of instability, an invigorated search for a return to balance" (p. 130) and "the emergence of proactive zones complementary to the new technology that stand out against the general backdrop of a space that is more traditional and inert towards this technology or overcome with concerns" (p. 131).

Our study aims to identify key factors defining the context in which AI and neural networks are used in people's daily lives.

The theoretical significance of our findings lies in their contribution to knowledge on how AI and neural networks are integrated in various spheres of human life (in social, economic, and cultural contexts), which is crucial to understanding the mechanisms of human interaction with new technologies. These mechanisms can further be used in modeling in studies on human-computer interaction and cognitive science. Our results will make it possible to establish interdisciplinary links between different branches of science (e.g., psychology, sociology, philosophy, and political science) to develop a comprehensive approach to the definition of human interactions aided by AI and the impact of AI on human life.

The study’s practical significance is that its results will be instrumental in developing recommendations for ethical and responsible design, adoption, and operation of digital systems with AI functions by public and private companies.

1 METHODS

The study’s subjects are the processes of users' interaction with digital systems whose functionalities rely on AI and neural network algorithms. The necessary preconditions for a software product to be included in the study were as follows: the software product is not used in work activities to perform labor functions directly or assist them; its functionality is accessible for free or after registering in the system; the product is available and

permitted in Russia. Depending on the software's application sphere, the processes include processing user data to generate a response based on the data available to the system, creating recommendations for users based on their activity in the system, etc. The object under study was the data required by the processes involved in the functionality of the digital system.

The Russian software sector has many developments available to regular users. For this reason, a questionnaire was employed to identify the most popular digital systems. Respondents were divided into age groups, each of which was asked the following questions: what programs they use and how often; whether their results match the expectations; what data about themselves and their activities they are willing to make available for processing by digital tools; what data are already processed in this manner and why they granted access to it.

System analysis was used to determine the features of AI-powered software products' functioning and process the questionnaire results. This comparison was warranted to establish how the declared functionalities of software products transform with the actual features of their use and the degree of imbalance that arises from the exploitation of a digital tool and human life. System analysis provides an interdisciplinary approach to practical problems associated with organizational, economic, technical, and information aspects (Sarker, 2022; Toorajipour et al., 2021). System analysis is used in research connected with the design, development, introduction, and operation of software products to establish causal relationships that influence changes in process states or the emergence of problems, to investigate and detect systemic problems considering the constraints, risks, and uncertain conditions of the environment, to propose evidence-based decisions or recommendations for rational behavior in difficult operational management situations, etc. (Logachev, 2024; Logachev, Smirnova, 2024; Mamedova et al., 2022; Neumann et al., 2021).

2 RESULTS

Digital systems using AI are not merely tools used to perform tasks within the problem area; they impact social transformation. As such, they ought not to perform scenarios fraught with excessive manipulation or take advantage of human trust. The European framework for the regulation of the development and use of intelligent systems relies on a risk-oriented approach: the creation of a software product must be finalized or provided with additional guarantees by developers if there are risks of violation of human rights and freedoms (Gracheva et al., 2023).

In 2021, Russia adopted its own Code of Ethics in the Field of AI, which establishes general principles and standards of behavior for all parties involved in relations in the field of AI and creates an environment of trusted development of smart digital technologies. The Code prescribes that AI is to be developed consciously to serve the interests and rights of humanity and the individual. AI should benefit people, so such technologies should be used and implemented for their intended purpose, keeping in mind that the advancement of technology is above the interests of competition. It is critical to ensure maximum transparency and openness in information on the level of development of such technologies and their capabilities and risks. As of 2024, the Code was adopted by 851 organizations.

Aside from the ethical regulation of AI, there is also normative legal and technical regulation. These measures provide legal regulation of public relations transformed by intelligent systems. To this end, Russia has passed several federal laws that establish experimental legal regimes for the development of AI in healthcare (processing information on citizens' health, telemedicine, and pharmaceutics), the production and operation of unmanned vehicles, the provision of state and municipal services, the economy, industrial production, and agriculture, as well construction, repairs, and reconstruction. To formalize the integration of AI and ensure consistently high quality of software products powered by it, Russia is pursuing an AI standardization policy. More than 100 standards have been developed and introduced to ensure the normative and technical implementation of the Federal Project "Artificial Intelligence".

2024 was marked by the adoption of a National Standard of the Russian Federation describing requirements to technical specifications for the development of software products with AI functions to secure the performance of work and the provision of services or supplies. This National Standard defines requirements for the result of work on software product development and the process of all types of work relating to development, testing, delivery, and acceptance. The introduction of this standard is justified by the fact that the client is interested solely

in the end product and not in the way it is obtained. Thus, at the stage of developing technical specifications, there is a risk of substituting concepts associated with the customer's need for a software product involving AI.

In addition to the legal aspects associated with developing and introducing digital products with AI into all spheres of human life, the consequences of their use are important. These technologies influence the system of human identity, which is dynamic and includes the person's inner world, value system, spirituality, life attitudes, and needs (Belikova, 2024). The transformation of human identity is not a quick process and is virtually unnoticeable to a single generation. However, automation and informatization have significantly sped up these processes and digitalization has become an additional catalyst for further acceleration.

Information technology has freed humans from tasks associated with cognitive abilities. A modern person can afford not to remember information because it is readily available on their smartphone. For example, smartphones store information on the user's contacts and places they have visited, notify them of upcoming events or activities, etc. Internet access opens up even more opportunities to search for information, operate home appliances remotely, control and monitor objects, etc. In this case, the person shapes their information environment (e.g., creates calendar entries for events, configures video surveillance systems, and manages device settings). The main danger here lies in the security of this data, i.e., preventing attackers from gaining access to the data for illicit use.

The problem of unauthorized access to user data has not been solved with the active use of AI-powered digital systems, and additional problems have emerged that pose a much bigger threat to human identity. These systems require rules for presenting results to the user. A software product then needs to be tested on a dataset. Herein lies the main danger: the user does not know on what data the system is trained and what algorithms are used to generate solutions for the respective software product. This provides an opportunity to manipulate the person, changing their value system, attitudes in life, and inner world in the interests of some group of people. Thus, the person using such tools incurs additional responsibilities, since they must validate the obtained result against the query conditions and verify it. To do so, the user needs to have the competencies to distinguish between accurate and inaccurate information. The main risk group in this case is adolescents and young adults, whose limited life experience and age-related psychological characteristics can make them more open to false information.

In our study, students were presented with questions on topics studied earlier in the semester as part of a course on process modeling. The participants were allowed free access to digital resources to help them answer the questions. As a result, nearly all students resorted to neural networks (without using search engines or electronic reference materials). Below we present some of the questions and students' answers generated by neural networks:

1. A question related to image analysis. The students were asked to list all mistakes made when creating an algorithm flowchart. The presented image of the process flowchart had one error: in the graphical block "condition", the condition was not formulated (there was no text). Students used the answer formulated by the neural network, which described between five and eight errors. A popular "mistake" was that the "data input" block in the diagram had the wrong graphic symbol (trapezoid) when it should be a parallelogram. However, the image did show a parallelogram.

Professional competence in process modeling or even school-level knowledge of geometry suggest that this answer is wrong. However, the neural network did manage to correct itself and exclude this "mistake" from the answer after a few clarifying questions: "Is there a trapezoid in the image?" (answer "No"), "Is there a parallelogram in the image?" (answer "Yes"), and "Is the input block marked with a parallelogram?" (answer "Yes").

2. A question related to image analysis and data matching. An algorithm flowchart consisting of 10 graphical elements was provided for analysis. The question read as follows: "List all graphical elements in the algorithm flowchart and determine their number according to GOST 19.701-90". The right answer was "Terminator: 2; data block: 2; condition: 1; action: 5". The questionnaire results suggest that those students who used neural networks used the exact phrasing of the question in their prompt and submitted the resulting answer without checking if it was correct.

The submitted answers varied in word count and format since the neural network did not receive the requirements for the answer form. However, the content was similar: "The image shows a flowchart composed of ovals, rectangles, and rhombi connected with arrows". The number of geometric shapes was determined correctly (except for the number of arrows). In a dialog between the teacher and the neural network after the test, a partially correct answer was obtained after several clarifying questions: "What are the names of the graphical elements of

an algorithm flowchart?" (counting all the arrows required many more questions about the presence of connections between specific elements).

3. A freeform question. The students were asked to describe the theoretical significance of research on digital transformation in the public control and monitoring of water bodies. The answers were entirely formulated by the neural network and submitted by students without editing. Here is a fragment of one such answer: "1. Integration of data. The platform allows combining data from different sources (government agencies, scientific research, and public organizations), which contributes to a more complete and integrated understanding of the condition of water resources. 2. Improved decision-making. Systematized data and analytical tools help public and private organizations make better-informed decisions in water management, environmental protection, and sustainable development. 3. Increased transparency. The platform promotes the openness of data on the condition of water bodies, which strengthens public trust in state institutions and allows citizens to actively participate in monitoring and protecting water resources". The semantics of the presented fragment correspond to the question and are logically structured. However, it has generalized wording that confuses the concepts of theoretical and practical significance (e.g., answer point 3). To obtain a more precise answer, the content needs to be analyzed to clarify the results.

These examples demonstrate that the quality of the answers depended on how accurately the prompt was phrased and whether the generated answer was analyzed to check and clarify the result. The absence of such an approach raises concerns due to the distortion of information and users receiving false knowledge. Another danger of AI may lie in the changing needs of humans when using respective software products. For example, social networking algorithms generate recommended content based on the user's interests and general indicators and rules set up by developers. As a result, the user is presented with the same type of content, which may leave out socially significant information or information irrelevant to the interests of certain circles. Thus, the algorithm can form a distorted picture of the world.

AI-powered algorithms are actively used in e-commerce. This enables marketplaces to push products that the person may not need. For example, some products may appear higher in the search results, access to some positions may be restricted, and positive or negative images of products may be formed to achieve the desired outcome.

Metrics collected by digital software products from all devices linked to a user (e.g., smartphones, fitness trackers, smart home appliances) can be used against them by attackers who gain access to the resources where such data is stored and by developers who create algorithms for data processing and interpretation. For example, smartwatches record the user's vitals while running in the background (e.g., heart rate, blood oxygen levels). This data is then used by algorithms to register physical exercise or other activity. If the person does not analyze their own condition and instead relies solely on the data provided by these technical and software tools, they may face risks: deliberately (understating or ignoring the vitals) or accidentally (errors in algorithms during development, incorrect data reading due to not wearing the device correctly, etc.) creating conditions for overexertion, which adversely affects health and sometimes results in death; companies obtaining non-anonymized medical data to push certain products or services; attackers obtaining non-anonymized data to commit fraud.

3 DISCUSSION

Technical progress advances too fast for society or the state to respond. Innovations in technology change the economy's technological basis and fundamentally transform many social processes (Belikova, 2024). It becomes critical to understand and predict the inevitable social consequences and develop measures to ensure the most favorable conditions for society's successful and smooth transition to using the fruits of the technological revolution. Today's world is going through the Fourth Industrial Revolution where, in a narrow sense, virtual and physical production systems are flexibly interacting at the global level (Gusov, Repkina, 2019). In a broad sense, researchers are stretching the results of such a revolution to the synthesis of technologies in physical, digital, and biological processes (e.g., the creation of unmanned vehicles, the digitalization of the economy and social life, the creation of new materials with pre-determined properties) (Ivaldi et al., 2022; Yuan et al., 2021). The development of human capital as the chief resource of the Fourth Industrial Revolution will guarantee that the Russian economy is receptive to digitalization, robotization, and other technologies (Mahmood, Mubarik, 2020). Researchers emphasize the social factor as one that decides the nature of the responsiveness of social changes and the

development of production technologies (Barkova et al., 2017; Flores et al., 2020). Studies emphasize that new technology (innovative products) cannot be successfully introduced without a certain level of education and scientific knowledge in society, sufficient welfare, the presence of social groups that realize innovative processes, and favorable conditions for effective innovation activities (including entrepreneurial) (Gusov, Repkina, 2019; Popkova, Sergi, 2020).

Using AI and neural networks in innovative activities raises problems important for humankind. In its development, AI has reached the level of understanding complex data structures and interacting with them, creating the impression of making products similar to those made by humans and understanding their essence. Intelligent systems are actively used to improve services to citizens, tackle labor shortages, make economic forecasts, monitor risks, and detect fraudulent schemes (e.g., in the banking sector).

Notwithstanding, the possibility of AI being deliberately used to commit fraud has not been ruled out. This includes phishing; creating computer viruses capable of adapting to external conditions; spreading vast amounts of disinformation in free space; solving tasks that can harm people; collecting and processing user data to use it against them; creating high-quality copies of documents, signatures, or photos and passing them off as originals; imitating real people using the data available from audio and video messages in messengers or on social media, etc. (Lee et al., 2023; Uysal et al., 2022).

Factors where the danger may come from AI itself rather than how it is used are not out of the question. AI models are trained on test datasets, so it becomes difficult to prove errors when the diversity of their sets increases. Some solutions may be incomprehensible and difficult for a human, which makes it impossible to recognize errors in the generated data (Ooi et al., 2025). False and inaccurate information (regardless of how it is obtained) can find its way into open sources, becoming available for other neural networks to use in their training, and the ability of AI algorithms to learn and adapt by themselves will allow for the formation of goals that will covertly influence the AI's subsequent actions and decisions. Our findings confirm that humans may be tempted to outsource their intellectual activity to AI. At first glance and without clarification, the AI gave incorrect answers. This demonstrated that the results need to be additionally analyzed.

CONCLUSION

The active introduction of intelligent systems powered by AI and neural networks into human life is a momentous event for the development of society. The context of AI identification is a subject of the humanities; it is constantly transformed by new advances in AI algorithms. Psychology is interested in how human beings and their self-identities will transform under the influence of AI, sociology is concerned with unemployment rates, legal science questions who is to be held responsible for the decisions made by AI and whether robots can have rights, philosophy ponders whether a robot can be considered a person, etc. Identifying these contexts is an interdisciplinary task for the scientific community.

Regardless of the context of its identification, AI will continue to spur discussion in the scientific community and society in connection with the ethical, legal, and social consequences of using the results obtained with it. The fundamental driver of intelligent systems is data, making the AI system as smart as the data it is trained on. Therefore, it is paramount to determine the quality of data and the methods of its integration, which do not always rule out manipulation by those interested in certain outcomes.

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