THE ANALYSIS OF THE ROLE OF ARTIFICIAL INTELLIGENCE IN THE DEVELOPMENT OF UKRAINE'S EDUCATIONAL SECTOR

АНАЛІЗ РОЛІ ШТУЧНОГО ІНТЕЛЕКТУ В РОЗВИТКУ ОСВІТНЬОГО СЕКТОРУ УКРАЇНИ

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The burgeoning utilization of Artificial Intelligence (AI) across various industries has prompted the urgent need for regulatory frameworks to safeguard ethical standards and privacy, and promote responsible innovation, particularly in the realm of education. This paper examines the multifaceted applications of artificial intelligence, delineating its capabilities in processing massive datasets and delivering accurate outcomes across sectors such as healthcare, business, military, supply management, and agriculture. Through a detailed analysis of artificial intelligence methodologies and systems – including knowledge representation, robotics, and machine learning – the study underscores achievements like Deep Blue's chess victory, while also considering its creative prowess in generating music and literary works.

Focusing on the educational sector, the research outlines the integration of international artificial intelligence services like Grammarly and Google Forms and explores the associated benefits including personalized learning and immediate feedback, alongside the potential risks of misinformation and employment impacts. The paper evaluates prevailing artificial intelligence regulations in Europe, China, and the USA, noting Ukraine's affinity for the European model, and comments on the European Union's pending "AI Act". Ukraine's Ministry of Digital Transformation has shaped its regulatory vision through the AI Road Map, aimed at fostering business innovation while protecting individual rights, with full enactment expected by 2027.

The findings assist in understanding the complex role of artificial intelligence, guiding further academic inquiry and informing policymakers as Ukraine advances towards creating a nuanced, effective framework for artificial intelligence in the educational sector. This framework aims to ensure ethical AI use and data protection, mitigate bias, and uphold transparency, facilitated through ethical guidelines, teacher training, and public awareness initiatives, with international cooperation as a key strategic element.

Key words: artificial intelligence, AI Road Map, educational sector, European AI Act, AI regulation.

Зростання обсягів використання штучного інтелекту (ШІ) у різних галузях людської діяльності викликало нагальну потребу в нормативно-правовій базі для захисту етичних стандартів, конфіденційності та сприяння відповідальним інноваціям, особливо в сфері освіти. У статті досліджується застосування штучного інтелекту, окреслюються його можливості в обробці масивних наборів даних і одержанні точних результатів у таких секторах, як охорона здоров'я, бізнес, військова сфера, управління постачанням і сільське господарство. Завдяки детальному аналізу методологій і систем штучного інтелекту, включаючи представлення знань, робототехніку та машинне навчання, в статті зазначаються такі досягнення штучного інтелекту, як перемога Deep Blue у шахах, а також його майстерність у створенні музики та літературних творів.

Зосереджуючись на освітньому секторі, дослідження описує інтеграцію міжнародних платформ і досліджує пов'язані з цим переваги, включаючи персоналізоване навчання та миттєвий зворотний зв'язок, а також потенційні ризики дезінформації та впливу на роботу працівників освітньої галузі. У статті вивчається чинне регулювання штучного інтелекту в Європі, Китаї та США, відзначається прихильність України до європейської моделі, а також коментується «Акт Європейського Союзу про ШІ», який очікує на розгляд. Міністерство цифрової трансформації України сформувало своє бачення за допомогою «Дорожньої карти штучного інтелекту», спрямованої на сприяння бізнес-інноваціям із одночасним захистом прав особи, повне впровадження якої очікується до 2027 року.

Отримані результати допомагають зрозуміти складну роль штучного інтелекту, скеровують подальші наукові дослідження та інформують дослідників, оскільки Україна просувається до створення правової основи для застосування штучного інтелекту в освітньому секторі, що спрямована на забезпечення етичного використання штучного інтелекту, захист даних, пом'якшення упередженості та підтримки прозорості, сприяючи етичним рекомендаціям, навчанню педагогів та запровадженню ініціатив із підвищення обізнаності громадськості в галузі ШІ, а також із міжнародним співробітництвом як ключовим стратегічним елементом подальшого розвитку освітньої галузі.

Ключові слова: штучний інтелект, Дорожня карта ШІ, освітній сектор, Європейський акт про ШІ, регулювання штучного інтелекту.

Problem statement. Over the past decades, Information Technologies, especially Artificial Intelligence (AI), have rapidly evolved and permeated every facet of our daily lives. From business and banking to medicine, education, entertainment, agriculture, and the Armed Forces, AI has become a ubiquitous force. Recognizing the transformative potential and the risks associated with AI, Ukraine has actively embraced its implementation, leading the Ministry of Digital Policy to devise a comprehensive Road Map for regulating AI usage in the country [1].

Due to the irreversible development of artificial intelligence, as well as the risks it carries along, the task of regulating AI has become urgent. Thus, in May 2023 Open AI CEO Samuel Harris Altman called the American Congress to regulate artificial intelligence immediately, because he identified it as a force of potential danger when arguing in favour of

additional government regulation, noting advancements in labour, health care, and a sector of the economy that AI could support – adding that regulatory intervention by governments would be "critical" to prevent and mitigate negative impacts of artificial intelligence [2]. Several big and influential countries started to regulate AI aiming to keep it within ethical, legal, and safe borders.

As technological advancements continue to shape the landscape of education globally, Ukraine is at the forefront of integrating artificial intelligence into its educational system. The implementation of AI holds tremendous promise for enhancing learning experiences, personalizing education, and preparing students for a future dominated by technology. However, the rapid evolution of artificial intelligence in education also necessitates a robust regulatory framework to ensure ethical practices, protect students' privacy, and foster responsible innovation.

Analysis of the last research and publications. Ukrainian and foreign researchers, such as Burdayev V. P., Leshcheva I. A., Hlybovets M. M., Oletskiy O. V., Hlynskiy Ya. M., Ryazhska V. A., Zaychenko Yu. P., Sakhnuk P. A., Anil K. Jain, Jianchang Mao, Mohiuddin K. M., Rassel S., Norvig P., Krenke D., Kroll Ad., Migas S. S., and many others have extensively explored AI's classification methods, models, and structures. Notable Ukrainian researchers like Bukov V., Gurevych R., Osadchiy V., Kadimia M., Spirin O., Khomenko V., and Shevchenko L. have delved into integrating information-communication technologies into the educational process. Their research serves as the foundation for understanding and implementing artificial intelligence effectively.

The research aim is to substantiate the features of artificial intelligence usage in various spheres of our lives, and in the educational sphere in particular, for the effective appliance of the Road Map.

Results and discussion. Artificial intelligence itself is the complex of particular systems, based on the given data, that can fulfil certain tasks, such as studying, concluding, calculating probability, foreseeing events, and others. All these functions are aimed at making the work of people easier because artificial intelligence can process big amounts of data faster and present the results precisely. The simplest way to understand the way artificial intelligence works is to make acquaintance with scoring algorithms, which are used in statistics to solve maximum likelihood equations numerically. These algorithms, named after Ronald Fisher, are used for detecting the solvency of potential clients by different credit institutions, such as credit units or banks. These big data consist of a great number of different aspects, such as our displacements, the circle of communication (given by a mobile operator), the place of work, incomes, credit history, and so on. AI processes all these data and produces the final result. For example, if the owners of iPhones more often pay back their credits, the new credit for them will be agreed upon with a higher degree of probability. Moreover, erstwhile it was necessary to have several departments of specialists for processing needed data, but now artificial intelligence can perform alone the same task within some minutes. A chatbot based on artificial intelligence has also become very popular. It can identify natural language with the help of text or voice, it can also analyse it and issue answers, based on the data, that were learned during processing. If somebody notices the mistake, he/she can indicate it. After that, AI will memorize it, and use the corrected data.

Also, artificial intelligence is being successfully used in medicine. It can diagnose the illness and predict the course of the disease. People in business foresee the future trends of the market, detect rascals, and control the quality of the products with the help of artificial intelligence. It is also widely and effectively used in the military sphere for demining, for recognizing enemy positions, based on satellite images; for the work of drones, for finding information about war criminals, and for face recognition which helps people to identify dead soldiers.

Very often, AI can be applied to supply planning. For instance, the system DART (Dynamic Analysis and Replanning Tool) was applied by the US Army at the time of the crises in the region of the Persian Gulf to provide automatic planning, supply of weapons and other goods, and perform schedules of transportation. That system covered simultaneously almost 50,000 cars, units of cargo, and employees; that system had to take into consideration departure and points of disembarkation, roads, and other routes and also helped to eliminate conflicts between all parameters. Methods of planning based on AI allow working out within a few hours such kinds of plans, which would take people some weeks to make up the same plans by the old, traditional methods [3].

In agriculture, artificial intelligence helps to detect the illnesses of plants, as well as pests and bad farm feeding. Sensors with AI can identify the kinds of weeds and then decide which herbicide should be used in the region. This will help to reduce the usage of herbicides and to save money.

The Ukrainian scientists Lubko D. V. and Sharov S. V. have structured the methods and systems of using artificial intelligence [4]. Thus, artificial intelligence can be used in:

1. *Knowledge representation and knowledge-based systems development*. This is the main direction in the sphere of AI study, which is connected with the development of a knowledge-representation model, and the creation of a knowledge base, which makes up the core of expert systems. Moreover, this direction includes models and methods of getting and structuring knowledge, combined with knowledge engineering. AI in knowledge representation

and knowledge-based systems development plays a crucial role in capturing, organizing, and utilizing information in a way that mimics human cognitive processes, it is essential for creating intelligent systems capable of reasoning, decision-making, and problem-solving in diverse domains. Knowledge representation is a fundamental aspect of artificial intelligence, as it involves encoding information in a form that a computer system can understand and manipulate. Knowledge-based systems, on the other hand, are artificial intelligence systems that use knowledge representation to reason and make decisions.

2. *Software engineering for AI*. Software engineering for AI involves the application of principles and practices from the field of software engineering to design, develop, deploy, and maintain artificial intelligence systems. This encompasses various stages of the software development life cycle (SDLC) and addresses the unique challenges posed by AI technologies. Within this direction, special languages are being developed for solving intellectual tasks, where traditionally the attention is paid to logical and symbolic data processing over computational procedures. Such programming languages as LISP, PROLOG, SMALLTALK, and others, are focused on the symbolic processing of information. Besides, the packets of applied programs are being created, focused on the industrial processing of intellectual systems, or artificial intelligence software tools (for instance, KEE, APTS, G2). The creation of so-called Shells of Expert Systems – EXSYS, Hugin, etc. is also very popular. Their knowledge bases can be filled with particular knowledge, creating different applied systems. By applying sound software engineering principles throughout the AI development process, teams can create robust, scalable, and ethically responsible AI systems that effectively address real-world problems.

3. *Understanding of natural language and solving the tasks*. Artificial intelligence in understanding natural language and solving tasks involves the development and deployment of systems that can comprehend, interpret, and generate human language. This field, known as Natural Language Processing (NLP), utilizes various AI techniques to enable machines to interact with and understand human language effectively. Here are key aspects of artificial intelligence in NLP and task-solving:

– Tokenization and Parsing. Tokenization is breaking down a text into individual words or tokens; and Parsing is analysing the grammatical structure of sentences to understand relationships between words.

– Part-of-Speech Tagging. Identifying the grammatical category (noun, verb, adjective, etc.) of each word in a sentence.

– Named Entity Recognition (NER). Identifying and classifying entities (such as names of people, organizations, locations) in text.

– Semantic Analysis. Understanding the meaning of words and sentences.

– Machine Translation. Translating text from one language to another using AI algorithms.

– Chatbots and Virtual Assistants. Building conversational agents that can understand and respond to user queries or engage in natural language conversations.

– Text Summarization. Generating concise summaries of longer texts while retaining key information.

– Speech Recognition. Converting spoken language into written text enabling machines to understand and process spoken input.

– Artificial Intelligence is continually evolving, and breakthroughs in deep learning, neural networks, and transformer architectures have significantly improved the capabilities of language models. These advancements have led to more accurate and context-aware language understanding, making AI systems increasingly effective in natural language tasks and interactions.

4. *Pattern recognition*. Pattern recognition by AI is a versatile and evolving field with applications across various domains, contributing to advancements in automation, decision-making, and problem-solving. This is one of the AI directions, that started to be developed at its very beginning, but nowadays it has become a separate branch of science. The field is fundamental to various applications, ranging from image and speech recognition to fraud detection and medical diagnosis. This AI direction includes methods of development and presentation of information about visual images. The main approach consists of the description of classes of objects by determining the values of significant features. Each object is matched with a matrix of features, according to which it is recognized. The recognition procedure most often uses special mathematical procedures and functions that divide objects into classes. This approach is close to machine learning and closely connected with neurocybernetics.

5. *Machine learning and self-learning*. This sphere of artificial intelligence is being actively developed, encompassing models, methods, and algorithms, that are oriented on the automatic accumulation and formation of knowledge based on the analyses and data generalization. The types of studying can be based on examples (i.e. inductive), also there are traditional approaches from the pattern recognition theory. Recently, data analysis systems (data mining), and systems for finding regularities in databases (knowledge discovery) are closely regulated in this direction. Artificial intelligence in machine learning and self-learning involves the use of artificial intelligence techniques to enable machines to learn from data, improve performance over time, and make decisions without explicit programming. The key

aspects of artificial intelligence in machine learning and self-learning are the following: Supervised Learning, when an AI model is trained on a labelled dataset where the input data is paired with corresponding output labels; Unsupervised Learning, which involves training models on unlabelled data, allowing them to discover patterns and structures within the data; Reinforcement Learning, that involves an agent learning to make decisions by interacting with an environment; Self-Supervised Learning which often involves solving pretext tasks, such as predicting missing parts of an input or generating context from data; Transfer Learning allowing models trained on one task or domain to be adapted to another related task or domain; Deep Learning, utilizing neural networks with multiple layers (deep neural networks) to automatically learn hierarchical representations from data; Meta-Learning, focusing on training models to learn how to learn.

6. *Autonomous management.* In artificial intelligence, it refers to the ability of AI systems to independently and intelligently manage various aspects of their operations, such as optimization, adaptation, and decision-making. This capability allows AI systems to operate efficiently, adapt to changing conditions, and optimize their performance without constant human intervention. Autonomous management in artificial intelligence aims to create systems that are not only capable of performing complex tasks but also possess the ability to adapt, optimize, and secure themselves in dynamic and evolving environments. Striking a balance between autonomy and human oversight is crucial to ensure ethical, responsible, and transparent artificial intelligence operations. Regarding autonomous management, the researchers Lubko D.V. and Sharov S.V. [4] point out that once, a system of computer vision Alvinn [5] was taught to drive a car, keeping to the particular traffic lane. In the University CMU, this system was placed in the minibus, controlled by the computer Navigation Lab, and was used for travelling across the USA. For 98% of the total experimental time this system ensured steering control. A person only took control during the other 2% mainly on the away ramps. Computer Navigation Lab was equipped with video cams, which transmitted the pictures of roads into the Alvinn system, and then this system, based on the previous educational runs, calculated the best road direction.

As to the approach of autonomous planning and scheduling, there exists a program "Remote Agent" of NASA agency [6], that works at a distance of hundreds of millions of kilometres from the Earth, it has become the first on-board autonomous planning program, aimed at managing the processes of drawing up the schedule of operations for the spacecraft. The "Remote Agent" program worked out plans, based on high-level goals set on the Earth, but also monitored the spacecraft's-work in the process of plans' implementation this program identified, diagnosed, and eliminated problems as they occurred.

The research carried out with robotics, has an essential influence on the development of many ideas of artificial intelligence. Thus, they have brought the creation of descriptive methods and modelling of the outer world state; they helped to understand better how to make plans for the robot's sequential actions and how to administer these plans' realization. Methods of planning of robot's actions are created as multi-level systems with a high level of abstraction on the upper level and more and more details on the next levels.

Artificial intelligence is widely used for creating intellectual tasks for draughts, chess, and other games of this kind, as well as for the creation of computer music, poems, tales, aphorisms, and so on. A well-known program "Deep Blue" by IBM company was the first computer program, that won the World Champion Harry Kasparov. The magazine "Newsweek" described that match under the title "The Brain's Last Line of Defense" [4, p. 26].

Every year and day by day, new ways of appliances are being invented for our lives, neural networks and intelligent systems in particular. Artificial intelligence has already entered not only into scientific institutions and production but also into our everyday lives as smart houses, household appliances, and so on. For educational purposes, it is recommended to use such international services as Grammarly, Bard Google, Mid Journey, Notion AI, Stable Diffusion, and many others. A service "SendPulse", for instance, offers a visual bot designer that can be connected to the network. The designer is quite simple as to its structure and consists of four main blocks: a message, a chain, an action, and a pause. In the bot's behaviour algorithm, it is possible to add a mailing list schedule and the content of the mailing list. The content can be not only a text with a theory but also a link for a video lecture, webinar, educational resource, or a text, created in Google Forms. In addition, "Google Forms" can be used not only for doing thematical tests but also for saving statistics for providing feedback [7, p. 159].

But, regardless of all the positive sides of artificial intelligence, it also has a lot of disadvantages, and one of the most dangerous ones is fake creation, which can be applied to news, images, and videos because AI can easily generate any image under the given parameters. It threatens misinformation, manipulation of public opinion, provocations, and deliberate launching of fake informational and negative psychological operations. The World Health Organization has also issued a warning about overindulgence in artificial intelligence [8]. They emphasized, that data, which are used for studying, can be biased and create misleading or inaccurate information. At the same time, there is fear that quick and smart artificial intelligence can push out people of some professions. Now,

we already have self-service cash registers, robots at plants and factories, chatbots, and autopilots. And it is worth remembering, that artificial intelligence can easily violate human rights to the inviolability of private life.

At present, it is possible to single out the following models of AI regulations:

1. European. It implies not only the regulation of state behaviour in the context of artificial intelligence but also the behaviour of private participants.

2. Chinese. It means the monopolization of AI by the state with its full control. For example: users have to confirm their names before using applications with artificial intelligence, and it is also forbidden to generate and spread fake news, created by AI.

3. The USA, Japan, and South Korea. In this model, there is no strict state regulation, but the state, nevertheless, adopts point legislative changes.

Because of the European integration processes, Ukraine is interested in the European model, as the basis for regulating artificial intelligence. Concerning this question, the main document in the European Union is considered to be the bill "AI Act" [9]. It was offered in 2021 but has not been approved yet. It is still being discussed, but if it is adopted, it cannot be taken into consideration earlier than 2026. Now it implies the banning of biometric systems usage, that works in "real-time" mode, and the banning of remote biometric systems, such as scanning with face recognition. Moreover, high-risk technologies will require mandatory registration in the EU database. This includes systems in education, public order, critical infrastructure, and migration management. The law will impose special requirements on generative systems, capable of creating texts, images, audio, and media files. They will have to inform users that the content was generated by a machine, but not by a human being.

Recently, the Ministry of Digital Transformation of Ukraine has given into consideration a "Road Map" [10] to regulate artificial intelligence in our country because AI is considered to become an unavoidable course, and it is necessary to have strict laws for improving business relations as well as defending rights of people in intercommunication via Artificial Intelligence. The full realization of "The Road Map" plan may last until 2027. Being founded on the "button-up" approach, which implies particular movements, starting from the simplest actions to more complicated ones, it consists of several steps. The first step will last for 2–3 years and implies a non-legislative track. Within its borders businesses will be given different opportunities and instruments to prepare for future regulations. At the same time, a state will get some time for a better understanding of the market trends and potential risks while getting the possibility to implement rules and create a regulator. Meanwhile, people will obtain more

information to become knowledgeable concerning the topic. During this stage, they plan to work out discretionary rules of behaviour and publish different thematical guides. Taking part in the pilot European project HUDERIA (Human Rights, Democracy, and the Rule of Law Impact Assessment) [11] has also been assumed as well as the preparation of "the White Book" draft concerning the AI and the usage of AI Labelling. Besides, the regulatory "sandbox" for AI developers will start functioning. This is a kind of environment where within its frames, the companies will be able to develop their products in such a way that they would meet the requirements of the future European AI Act. Later, they would be launched into the European market without any obstacles. In the second step of the offered Road Map, on the legislative track, the implementation of the European AI Act has been planned, which would be founded on the experience, obtained within the first step. However, the Ministry of Digital Transformation of Ukraine is going to attentively analyse the upcoming rules of the European Union and could refuse its controversial standards when it turns out to be necessary [1].

In recent years, Ukraine has witnessed a significant surge in the adoption of AI-driven technologies within its educational institutions. From AI-powered learning platforms to intelligent tutoring systems, these innovations are reshaping traditional teaching methods. Artificial intelligence offers personalized learning experiences, adapts to individual student needs, and provides real-time feedback, thereby revolutionizing the way education is delivered.

While the integration of artificial intelligence in education brings forth numerous benefits, it also poses challenges that require careful consideration. One of the primary concerns is the need to establish clear guidelines for the ethical use of AI in educational settings [12]. Ensuring data privacy, preventing algorithmic bias, and maintaining transparency in decision-making processes are critical aspects that any regulatory framework must address.

Recognizing the transformative potential of artificial intelligence in education, the Ministry of Education and Science of Ukraine has taken proactive steps to develop a comprehensive regulatory framework. This framework aims to strike a balance between fostering innovation and safeguarding the rights and well-being of students and educators. The key components of the regulatory approach include:

1. *Ethical Guidelines.* Establishing clear ethical guidelines for the development and deployment of artificial intelligence technologies in educational settings. This includes considerations for fairness, accountability, and transparency in AI algorithms.

2. *Data Protection.* Implementing stringent data protection measures to ensure the privacy and security of students' personal information. Guidelines for

the collection, storage, and sharing of educational data are crucial in building trust among stakeholders.

3. *Teacher Training.* Providing extensive training programs for educators to familiarize them with artificial intelligence technologies and equip them with the skills needed to integrate these tools effectively into their teaching methods.

4. *Curriculum Development.* Integrating AI-related topics into the national curriculum to ensure that students are not only consumers but also creators of artificial intelligence technology. This fosters a deeper understanding of the technology and its societal implications.

5. *Public Awareness.* Creating awareness campaigns to inform students, parents, and educators about the benefits and risks associated with artificial intelligence in education. Transparency and open communication are vital to building trust in the new technological paradigm.

In regulating artificial intelligence in education, Ukraine is actively engaging in international collaboration to stay aligned with global best practices. Learning from the experiences of other countries, participating in collaborative research initiatives, and contributing to international discussions on artificial intelligence in education leading to improved learning experiences and outcomes for students are essential steps in ensuring that Ukrainian regulations are both effective and adaptable to the evolving landscape.

Thus, artificial intelligence has become a powerful tool for educators, students, and administrators, enhancing various aspects of the educational experience, and enabling personalized learning by giving the possibility to analyse individual students' data to understand their learning styles, preferences, and strengths. Besides, adaptive learning platforms use artificial intelligence algorithms to tailor educational content and pacing, ensuring that students receive customized support, challenges, and feedback. At the same time Intelligent Tutoring Systems powered by artificial intelligence offer interactive and adaptive support to students. These systems provide real-time assistance, identify areas of difficulty, and offer targeted explanations, helping students grasp complex concepts at their own pace. AI's predictive analytics capabilities help identify students at risk of academic challenges or dropouts which gives the possibility to implement early intervention strategies based on AI-generated insights, enhancing student success and retention rates. Artificial intelligence tools analyse vast amounts of data to generate valuable insights, so educators can leverage this data to identify trends, assess student performance, and make informed decisions about curriculum adjustments, teaching strategies, and resource allocation. At the same time, artificial intelligence streamlines administrative tasks, reducing the burden on educators and administrators. Automation of grading, scheduling, and other routine tasks allows educators to focus more on instructional activities, fostering a more efficient educational environment. Besides, AI applications contribute to greater accessibility and inclusion in education. Text-to-speech, speech-to-text, and other AI-driven tools assist students with diverse learning needs, ensuring that educational content is accessible to everyone. At the same time, AI-powered gamification elements and interactive simulations make learning more engaging and enjoyable. Educational games leverage artificial intelligence algorithms to adapt challenges based on individual progress, maintaining a balance between fun and educational objectives. AI facilitates the creation of educational content by automating aspects of content generation, curation, and adaptation that allow educators to access a wealth of resources, create dynamic content, and stay current with the latest educational trends. In such a way artificial intelligence also supports lifelong learning by tailoring educational experiences to the evolving needs of individuals throughout their careers. Continuous skill development, personalized training, and AI-driven professional development opportunities are becoming integral components of modern education.

Conclusion. While artificial intelligence presents vast potential for enhancing educational systems in Ukraine, its integration must be managed with care to ensure ethical application, data privacy, and the mitigation of biases. The proactive steps taken by the Ukrainian Ministry of Education and Science to create a strong regulatory framework show a commendable commitment to fostering responsible AI growth in the educational sector. Through ethical guidelines, comprehensive data protection, and collaboration on international best practices, Ukraine is positioning itself to benefit from artificial intelligence advancements in education while safeguarding the rights and interests of students and educators. Such a balanced approach promises to advance education sustainably in the artificial intelligence era. Ukraine's regulatory framework serves as a proactive step toward fostering innovation responsibly and could serve as a model for other nations navigating the complex AI landscape.

Approaches to artificial intelligence regulation vary globally, with Ukraine poised to align with the European model through the proposed "AI Act". The proactive "Road Map" crafted by the Ukrainian Ministry of Digital Transformation adopts a methodical, two-phase regulatory approach that balances market understanding with policy development, ensuring businesses are ready for compliance and innovation is not stifled. As AI's influence deepens, crafting informed, equitable regulations will be paramount in harnessing AI's advantages while protecting the public interest and maintaining trust in this revolutionary technology.

Thus, taking into account all the advantages and disadvantages of Information Technologies and Artificial Intelligence in particular, the offered Road Map implies actions that would give our national corporations of the Informational Technologies and educational spheres any possible capabilities to be a contestant to the European companies, to entice investing occurrence and work experience, and create a Digital World safe, mindful and helpful for people.

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