Annals of Social Sciences & Management Studies
ISSN: 2641-838X

Juniper Publishers
key to the Researchers

Opinion
Volume 7 Issue 3 - April 2022
DOI: 10.19080/ASM.2022.07.555710

Ann Soc Sci Manage Stud

Should Students of All Majors Study Artificial Intelligence?

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Submission: April 04, 2022; **Published:** May 16, 2022

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Abstract

The article describes high standards of education in IT and AI areas. We show what disciplines do we teach in IT and mathematical faculties and also in humanitarian faculties. Interdisciplinary approach to study AI is very important and we give basics of artificial intelligence in various faculties. We define main trends that determine the need to update the training of undergraduates in the field of artificial intelligence, as well as methodological approaches and directions of transformation of the training of undergraduates in natural-mathematical and legal specialties. We describe the features of the content of these disciplines and provide a list of thematic sections in which students perform project tasks. Topics of master degree thesis are also shown.

Keywords: Preparation of undergraduates; Artificial intelligence; Interdisciplinary connections; Mathematics; law disciplines

Introduction

The introduction of information and communication technologies has led to changes in all spheres of life. Not so much time has passed since the appearance of the first computer before the robotization of production and digitalization in the economy and social sphere. And now the question is not only how to replace the routine work of a person with a computer program or robot, laying down algorithms for certain actions, but also to develop systems that include elements of intellectual activity and act as analogues of human mental activity. All this has led to the emergence and rapid development of the concept of artificial intelligence (AI), the purpose of which is the reliable and continuous execution of numerous large-scale computerized tasks. The advantages of artificial intelligence are that:

a) it integrates into existing software products, allowing you to improve them;

b) has adaptability due to the use of progressive learning algorithms;

c) performs in-depth analysis of large amounts of data through neural networks with many hidden levels, since the purpose of the neural network is to simulate analytical mechanisms for classification, prediction and recognition of data.

Artificial intelligence includes technologies such as machine learning, natural language processing, computer vision, machine reasoning and much more, which are increasingly being introduced into our daily lives. That is why deep learning has become one of the most popular areas of AI research [1].

In this regard, the problem of improving theoretical and practical approaches to the preparation of undergraduates, adjusting and dynamically updating the content and organizational forms of its inclusion in the educational process does not lose relevance. This has been especially relevant in recent decades - as the higher education system has become aware of the disparity between the increasing volume of scientific knowledge, the requirements for the professional competencies of young specialists and the organization of their training in universities. This is evidenced by the fact that in the Russian Federation, in 2021, the Government allocated 600 million rubles for grants to universities for training in the "artificial intelligence" profile. It is planned that in three years, at least 10 bachelor's degree programs and at least 40 master's degree programs will be developed in Russian universities [2]. Since September 2021, Moscow State University students of all specialties have been required to take a course in artificial intelligence [3].

This paper describes the trends that determine the need to update the training of undergraduates in the field of artificial intelligence, as well as methodological approaches and directions of transformation of the training of undergraduates in natural-

mathematical and legal specialties, based on the practice of their studies at the Belarusian State University.

Teaching disciplines in the field of artificial intelligence

Belarusian universities have long-standing traditions of providing high-quality higher education. In the field of mathematics, computer science and natural sciences and a number of humanities, those strong features of fundamentality are preserved, which are easily lost in attempts to keep up with constantly changing practical applications and shortening the terms of study.

The goals and content of master's degree training should meet such requirements as: compatibility with socio-economic and educational needs, creation of conditions for students to master the basics of scientific research, compliance with the field of science and the modern level of computer technology development [4]. This is consistent with the trend in the development of pedagogical technologies and techniques related to the concepts of "computer thinking", "computational thinking", "computer thinking skills", etc. in relation to different categories of trainees and different levels of training [5].

The term "computer thinking" was introduced in 1980 by Dr. Seymour Pipert from the Massachusetts Institute of Technology, a specialist in the development of artificial intelligence. Computer or computational thinking is the thought processes involved in the formulation of problems and the presentation of their solutions in a form that can be effectively implemented with the help of a person or computer. Following Bocconi et al. (2016), six basic computer thinking skills can be distinguished: abstraction, decomposition, algorithmic thinking, debugging, automation and generalization [6]. Computer is one of the types of thinking, being a component of research, scientific thinking, since its basis is the ability to think logically, algorithmically, as well as the ability to find effective ways to solve problems. This requires the skills of creative thinking – at the stage of searching and composing methods of solving the problem and critical thinking - at the stage of evaluating the effectiveness of the solution.

Natural and mathematical specialties

The most important and high-level thinking process in computer thinking is the process of abstraction, which is characteristic of mathematics. In addition, to one degree or another, these skills (except, perhaps, automation) are also characteristic of solving a mathematical problem or problem [7]. It is no coincidence that R. Courant wrote: "The relative and mutually opposite elements of mathematics are logic and intuition, analysis and construction, generality and concreteness. Mathematics is an example of a universally applicable scientific method" [8].

At mathematical and IT-faculties training at the first stage includes the study of the main provisions of mathematical disciplines, which are characterized, on the one hand, by high information saturation of the conceptual apparatus, on the other hand, relative autonomy of the content. This often leads to the fact that students do not grasp the interrelationships and in their perception different mathematical disciplines and objects are not interconnected. Teachers call some mathematical concepts in different disciplines with different terms, or use them in a new context, believing that students are confident enough in the appropriate methods "by default".

As a result of the transition of mathematical faculties in classical universities to 3-and 4-year education, both the time of adaptation of yesterday's students to the conditions of the university and the time required for understanding the meanings and strategic assessment of the importance of fundamental mathematical training in the second and third years has been reduced. At the same time, educational practice shows that the connections of mathematics and computer science in the process of mastering mathematical content at universities often do not find explicit confirmation. Students studying mathematical disciplines do not see them as part of their professional training [9].

Since the competence of effective use of existing mathematical and computer knowledge and skills and the development of new software applications and mathematical packages are mandatory results of undergraduates' training, the role of disciplines whose methodology and content provide for a combination of fundamental knowledge with the ability to optimally use the capabilities of computer technology to solve research and applied problems is increasing.

The following subjects can be noted, which are taught in universities in IT-specialties and which are related to artificial intelligence:

a) Expert systems

b) Knowledge and its organization

c) Databases and knowledge

d) Machine learning

e) Semantic networks

f) Pattern recognition and image processing

g) Neural networks

h) Data mining

i) Data analysis using Python

j) Computer vision

k) Computer graphics and others.

Cognitive processing of information for the productive achievement of goals and solving tasks in these areas includes:

a) analysis of the strengths and weaknesses of existing approaches and methods for solving similar problems,

How to cite this article: M.S.Ablameyko, N.V. Brovka. Should Students of All Majors Study Artificial Intelligence?. Ann Soc Sci Manage Stud. 2022; 7(3): 555711. DOI: 10.19080/ASM.2022.07.555711

b) selection or construction of your own method or algorithm for solving the problem,

c) approbation and correction of the method,

d) evaluation of the obtained result (correlation of labor intensity, complexity and error of the proposed method, time and speed of algorithm implementation, etc.).

e) verification of the proposed method.

Artificial intelligence systems operate with data and knowledge. Data are individual facts that characterize objects, processes and phenomena of the subject area, as well as their properties. Knowledge is the laws of the subject area (principles, connections, laws) obtained as a result of practical activities and professional experience, allowing specialists to set and solve problems in this area. It can also be said that knowledge is a set of information, concepts, ideas about something received, acquired, accumulated as a result of teaching, experience, in the course of life, etc. and usually implemented in the activity.

Knowledge Engineering works with knowledge, which studies methods and means of extracting, presenting, structuring and using knowledge. More formally, Knowledge Engineering is a set of models, methods and techniques aimed at creating systems that are designed to solve problems using knowledge. In fact, knowledge engineering is a theory, methodology and technology that covers the methods of extraction, analysis, presentation and processing of expert knowledge. One of the first and main questions is how to get knowledge. There are several strategies for gaining knowledge. The most common are: acquisition; extraction; formation.

In our opinion, students of all subjects must know the main rules to acquire, extract and form knowledge.

Humanitarian Specialties

The development and implementation of information technologies is impossible without appropriate legal regulation. Recently, much attention has been paid to this in the framework of training specialists in legal specialties. Thus, special attention is paid to the development of the legal foundations for the creation and use of artificial intelligence systems [10]. At the first stage of education, this is done within the framework of the specialty "Information Law", which has been intensively developing in recent years. In the Master's degree, the main discipline included in the state component is "Legal support for the development of the electronic state", the development of its content includes the study and analysis:

a) conceptual approaches to assessing the effectiveness of e-government as a mechanism for the development of a national technology transfer system;

b) ways of cooperation between countries in the field of cybersecurity, as well as problems of ensuring information security in the information society;

c) legal aspects of the introduction of ICT in the real sector of the economy;

d) legal support for the development of e-commerce, e-health, e-education, e-employment and social protection of the population and others.

The following disciplines are also taught at the Law Faculty:

a) Organizational and legal provision of information security;

b) Legal support of information technologies in the activities of state bodies;

c) Protection of personal data;

d) Information technology support of legal activity (LegalTech);

e) Digital technologies in the banking sector;

f) Legal support of startups, etc.

The following subjects are taught in universities at the humanitarian faculties and which are related to artificial intelligence:

a) Legal support of information and analytical work

b) Information technology in the economy

c) Corporate information systems

d) Data mining

e) Information systems management

f) Evaluation of the effectiveness of information systems

g) Artificial intelligence systems

h) Intelligent information systems and others.

At the humanities faculties, when writing master's theses, the issues of making specific proposals for improving legislation in the implementation of artificial intelligence systems, as well as ethical and moral standards of use, are relevant. Students write master's theses on the following topics:

a) ethical standards for the creation and development of artificial intelligence systems;

b) ethical standards for the use of artificial intelligence systems;

c) philosophical aspects of the development of artificial intelligence systems;

d) legal norms for the use of artificial intelligence systems;

e) development of legislation in the field of artificial intelligence;

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f) legal issues of information security;

g) protection of personal data in artificial intelligence systems;

h) from private to general artificial intelligence: philosophy of development.

The main problem of training ICT specialists remains the problem of preservation and reproduction of teaching staff. There is an obvious need in the next few years, through the joint efforts of the state and private HTP resident enterprises, to create a stable system of moral and material incentives for teachers involved in training personnel for the ICT industry [11].

Conclusion

The development of artificial intelligence as a reflection of the global trend of digitalization generates the need to restructure education taking into account external and internal factors. External factors include such features of higher education as socio-economic conditionality, interdisciplinarity, mass character and continuity. The internal factors that act as imperatives of the organization of the educational process include the provision of feedback, the adaptability of learning and the possibility of implementing the active position of the trainees. Providing feedback involves designing not only the content, but also the educational environment through which the students receive the necessary educational experience and achieve desired results.

Adaptability implies, firstly, taking into account the specifics of the field of activity in which the young specialist will work, and secondly, a personalized educational trajectory in the form of an individual course program, taking into account the level of training of the student and the opportunity to study at a convenient time in various forms (mixed learning, micro-learning, webinars, podcasts, trainings, etc.).

The active-activity position of the trainees concerns the ways of interaction of the subjects of the educational process and is implemented in the process of developing projects and cases, organizing discussions, creating mastermind groups.

The training of master degree students is designed to promote the development of critical, logical, in particular, computer thinking, the formation of research methodology and the development of professional competencies in the process of solving practice-oriented tasks based on interdisciplinarity. The methodological potential of such training is determined by the ability to vary and deepen the content, update teaching methods and tools based on a purposeful correlation of fundamental mathematical and computer components of vocational training.

The psychological and pedagogical potential consists in the development of cognitive activity, motivational and value attitude to self-learning, in bridging the gap between abstract formal and logical constructions of the subject area, the possibilities of computer technology and the tasks of real practice.

The fulfillment of such educational and research tasks, and then research tasks, is the answer of higher education to the scientific and technical challenges of our time, since it provides a stable continuity of fundamental and applied components of training. The activity, which is independently carried out by a master's student, involves the development of analytical skills, convergent and divergent thinking and intuition as components of human natural intelligence. This not only develops professional competencies in the field of artificial intelligence, but also forms professional competencies, the foundations of research culture and self-development skills.

References

1. Yapici M, Tekerek A, Topaloglu N (2019) Literature Review of Deep Learning Research Areas. Gazi Journal of Engineering Sciences (GMBD) 5(3): 188-215.
2. Russian universities will receive 600 million rubles for training specialists in artificial intelligence.
3. MSU students were required to take a course on artificial intelligence (2021).
4. Shkerina LV, Brovka NV (2020) Design features of master's degree programs for teacher training in stem-teaching mathematics, in: Proceedings of the VII All-Russian Scientific method. Conf. Actual problems of the quality of mathematical training of schoolchildren and students: methodological, theoretical and technological aspects, Krasnoyarsk State Pedagogical University named after Astafyev VP, pp. 87-91.
5. Mohaghegh M, McCauley M (2016) Computational Thinking: The Skill Set of the 21st Century. International Journal of Computer Science and Information Technologies 7(3): 1524-1530.
6. Bocconi S, Chioccariello A, Dettori G, Anusca F, Katja E (2016) Developing computational thinking in compulsory education. European Commission, JRC Science for Policy Report.
7. Maria Kallia, Sylvia Patricia van Borkulo, Paul Drijvers, Erik Barendsen, Jos Tolboom (2021) Characterising Computational Thinking in Mathematics Education: A literature-informed Delphi study. Research in Mathematics Education 23(2): 159-187.
8. Courant R, Robbins H (1996) What is mathematics? An elementary approach to ideas and methods. In: (2nd edn.), Oxford University Press, USA.
9. Noskov MV, Dyachuk PP, Dobronets BS, et al. (2019) The evolution of education in the conditions of informatization: monograph. ed. by Lapchik MP, Noskov MV, Sib feder un-t, Krasnoyarsk.
10. Ablameyko MS, Ablameyko SV (2020) Legal regulation of interaction between artificial intelligence and human systems. Science and Innovation № 1(203): 40-44.
11. Brovka N, Medvedev D (2020) Factors and Didactic Characteristics that Determine the Information and Educational Environment of the University, In: Proceedings of the 4th International Conference on Informatization of Education and E-learning Methodology: Digital Technologies in Education (IEELM-DTE 2020) Krasnoyarsk, Russia, pp. 103-110.

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How to cite this article: M.S.Ablameyko, N.V. Brovka. Should Students of All Majors Study Artificial Intelligence?. Ann Soc Sci Manage Stud. 2022; 7(3): 555711. DOI: 10.19080/ASM.2022.07.555711