Artificial Intelligence in Serbia – An Open Gate to the Future

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The researchers of social studies have for centuries searched for an answer that discovers the secret of power functioning: who holds it; how it works; where it is hidden, what its meaning is and why there is not sufficient power for all of us. The problem of information management has always been part of social challenges – the space of political and legal systems has hidden a labyrinth of "deep secrets" on which the state functions, while the imbalance of economic, military and security power has enabled the international order to establish itself. Detailed supervision of *others*, along with the collection and processing of large amounts of data, has become one of the most important forms of power, which has been dedicated the attention of scientists worldwide in the past eight decades. The struggle for technological supremacy has also overflowed into the field of national security in which artificial intelligence systems make significant infrastructure of future confrontations at the ideological or military scenes. Extreme future awaiting us will be full of changes, challenges and risks, which means that our ways of thinking must also be adjusted to the modified vision of the computing environment. The combination of nanotechnology, biotechnology, information technology and neurotechnology will shape knowledge and innovation in new markets which will be exposed to permanent pressures of megacorporate capital.

With the beginning of the 21st century, the rise of generative artificial intelligence placed new landmarks in the view of global society because digital technology changed strategically man's environment, from economy, energy and politics, via healthcare and ecology, music and art, to science, education and religion. In the academic field, possibilities have become inexhaustible because idea generation and data processing simplify most complex scientific ideas and operations. The nations that fail to notice the depth and direction of such changes in a timely manner will have huge troubles because their workforce will no longer

be competitive, while the existence of millions of people will be threatened. The map of the future is being drawn at the moment, in the context of the digital environment and geopolitical remodelling, virtual reality and ever-present networks which affect our lives, changing us without our noticing it whatsoever.

Hence the need for an academically precise and scientifically competent response to the importance, characteristics and role of the application of artificial intelligence in Serbian society. The states that decide against the use of the benefits of artificial intelligence will remain trapped in the past because they unconsciously renounce economic progress and numerous strategically relevant information, from climate change to medical operations and treatment. Strategic investments in the research and development of artificial intelligence are one of the priorities of the Serbian government and President Aleksandar Vučić, which is illustrated by the economic indicators: in 2012, we had ICT sector exports in the amount of US$375 million, while one decade later it was between US$3.6 and US$3.7 billion! Our country is the technological hub of the Western Balkans, the regional centre for American IT companies and the leader in the development of software, artificial intelligence and smart IT solutions, which are applied in all sectors of our environment.

When it comes to the question as to what happens behind the doors of large technological companies and who teaches artificial intelligence about ethics and aesthetic values, it is impossible to get a precise answer in this edition of our journal. The fact that private companies control the majority of development processes in Europe and the USA, which means that their focus is on further acquisition of capital. In China and Russia, such research is financed by the respective governments, with the strong coordination or private and public investments. At the beginning of 2024, the EU Parliament adopted the Artificial Intelligence Act (AI Act), which as of the beginning of the next year will impose substantial punishments for the failure to observe the regulations about the use of prohibited AI systems. Researchers observe that, in the absence of the global management of artificial intelligence development, the companies doing it nowadays have power that used to be characteristic of the developed national states. Serbia rapidly understood and began applying the potential of creative industries, becoming the member of the Global Partnership for Artificial Intelligence (GPAI), equally with France, the USA, the UK, India, Japan, Germany Canada and twenty other countries. As an acknowledgement of the proper strategic orientation and a specific international recognition, Serbia has been appointed to chair the work of this organization in the next three years, which strives to establish global standards and rules for the development of artificial intelligence.

Reading thematically different texts in the new edition of *Napredak* (*Progress*) by the authors who analyze this technological-social phenomenon, you will see how the practicality of new technologies on the international scene increases efficiency of the communities using them. To become the leader of the changes in Southeast Europe, the Government of Serbia has done many things, from adopting the National Strategy in 2019 and founding the Institute for Artificial Intelligence two years later, via implementing new technological knowledge

in the educational system, to the formation of the research infrastructure and active changes in the international environment. Generative artificial intelligence can fundamentally change the labour market, increase the global gross domestic product and improve the public and private sectors, which is proved by our authors who particularly point to the current trends and structural changes in the field of economy. We also offer a comprehensive overview of the references so that you can join us in the analysis of theoretical concepts, current AI research outcomes and possible applications of Memristor technology, with ethical considerations and the analysis of regulatory frameworks. Our authors indicate that the development of Memristor technology may place our country in the leading position in relation to innovation in AI hardware and attract international investors, thus encouraging technological progress of the entire economy. The main purpose of our thematic edition is to motivate all interested parties, the state leaders, scientific and expert public, lawyers, innovators, as well as the increasing number of users to consider the challenges deriving from the application of this new technology, while emphasizing a broad range of risks constitutes a step ahead in the identification and understanding of the problems we need to encounter readily, while duly avoiding and preventing other potential problems.

In the past two decades, Serbia has been intensively trying to improve the educational technology by using multimedia, hypermedia, virtual and expanded reality, as well as educational software, which contributes to the improved quality of learning, increased dynamics and obviousness of teaching, as well as encouraging students'

motivation. In the past few years, we have particularly explored the sphere of personalized learning, more dynamic teaching, as well as complex evaluation of students' work. The new paradigm of education we propose in one of the texts also stipulates more substantial use of robots in the teaching process with the aim of encouraging creativity and critical thought, as well as to develop problem-solving skills by developing algorithmic thought. In the past year, the application of ChatGPT has intensified, thus making it necessary to define rules and procedures with which this technology would contribute to teaching and learning. In any case, robot autonomy sounds like science fiction even today, although autonomous robots have already become a reality. Our authors show that robot autonomy is not an unreasonable idea, but quite a realistic one, which can be elaborated in detail and achieved by constructing information systems which can act autonomously, although due to potential abuse it is necessary to think seriously about their application. Through an interdisciplinary approach that combines art, technology and social sciences, in this edition we also give insight into the potential and challenges brought by the integration of artificial intelligence into art. Particularly in the context of creative Serbia.

Thanks to technology democratization and good-quality infrastructure which has been constructed in the meantime, artificial intelligence has recently become available to the broadest population. The main domains of AI technology application in healthcare can be seen on a daily basis in clinical practice and clinical research, but also in the production of new medications, personalized medicine, public health and medical administration.

More specifically, the researchers from the Institute for Artificial Intelligence of Serbia (IVI, 2024) are implementing a number of projects in the field of healthcare, including the diagnostics of cancer and rare diseases. The aim is to ensure faster and more simple carcinoma detection, to reduce the complexity of diagnosing rare diseases and shorten the time until giving an accurate diagnosis, to alleviate the pressure on the healthcare system and, consequently, redirect medical treatment costs towards an adequate innovative therapy, as well as accelerate the process of finding and developing new medications.

The fear of artificial intelligence initiated by religious feelings is one of the perspectives which we approach, aware that every new technology also raises the question of the morality of its application. Believers' opinions are divided, which is not surprising since we know that the omnipresence of the phenomenon of fear in Christianity has historically produced certain resistance and doubts. The most frequent reason for it is insufficient knowledge of what artificial intelligence is and what its place is in modern society. As for religious communities, huge responsibility in the attitude towards artificial intelligence is actually on the clergy and its willingness to speak about it to people who have been entrusted to them for religious guidance.

Ny choosing to dedicate our thematical edition to artificial intelligence, we have also presented the attitude of our editorial board. In the past fifty years, the world has seen more changes than in the previous fifty thousand years. This acceleration is difficult to understand, the changes are radical and extreme, and there is no room for all of us on the planet… In the next two years (until the end of 2026), Serbia will invest about a hundred million Euros in the development of artificial intelligence, out of which thirty million will be invested in the supercomputer that will be free of charge for researchers and startups, while the same amount of money will be allocated for the development of artificial intelligence and its broader application. The government's strategy and orientation are clear, the gates to the extreme future have been opened and it is up to us only to take a firm step forward!