ARTUR SILVA
University of Aveiro

MESSAGE FROM THE VICE-RECTOR

Artificial Intelligence in Research

The combination of fast-paced developments in the Artificial Intelligence (AI) field with increased digitalization, enhanced connectivity, and, especially, advanced natural language models, is making a wide variety of powerful tools available at your fingertips. This is not only profoundly impacting our world as it is paving the way for unprecedent change across all domains and daily tasks, in breadth, scale, and speed.

Few areas, if any, will remain unaffected, and research will not be one of them. In fact, research is at the very core of this process, driven by the massive investment of large corporations, incentivized by governments, and pursued by public higher education and research institutions. The University of Aveiro, as a comprehensive research university, takes an active stance in this process, and must not shy away from taking a cross-cutting and in-depth look at the ongoing developments and their implications, both complex and multifaceted.

To begin with, there is research 'in AI' specific fields, such as machine learning, neural networks, natural language processing, and expert systems, among others at the core of the AI capabilities and human-algorithm interactions.

Much vaster is the research that we could designate as 'for AI', that lays the scientific and technological grounds supporting AI developments and its increasing ubiquity. This includes fields that do not share the same spotlight, such as the earth sciences, crucial to determine the availability of the rare materials used in the semiconductor industry. The same goes for the fundamentals of condensed matter physics, at the very heart of the same industry. Or energy production, distribution, and storage systems required to feed the increasing energy demand; the AI use for materials science engineering, where it has catalysed the discovery of new materials, enhanced design simulations, influenced process control, and facilitated the operational analysis and prediction of material properties and behaviour; or improvements in the target selection and identification in drug discovery.

Taking a step away from the mere technological aspects of AI, we enter yet another dimension of AI-related research, that of research 'about AI', delving into its implications and impacts on all of us, as individuals, and the society. In here, virtually all areas of research at the University of Aveiro come into play, for a better understanding of the present, to challenge assumptions, and project futures. You can name almost any field, be it behavioural studies, improved medical care, employment and unemployment, decision making processes and citizen participation, social media and communication, arts and the boundaries of creation, global trade and geopolitics, local and global sustainability, among others.

These three facets – research in AI, for AI, and about AI – concern every area of research, and cover the specific contribution to AI development, its use, and its implications. In addition, there are other layers of special relevance for higher education institutions: the very use of AI in research and in higher education, and the impacts of this changing world in the training of researchers and teachers.

We have come a long way, in a not that long time, from when access to information in physical form was a critical factor hindering research, to widely accessible digital publications, where the adequate filtering of information became the main challenge. This has now evolved into access to information selected, curated, and hierarchized by third-party automated processes, with its advantages and perils.

Likewise, we have moved from data scarcity into big data, beyond sense and comprehension of the human brain, requiring machine-made intermediation and a new array of tools. This has been leading to significant progress in so many areas, not least in the biological and medical domains. Nonetheless, it also brings interrogations and considerations about their use, requires a new set of skills, and even a new way of questioning and building up on previous knowledge and data.

These developments are paralleled in the education domain. Soon, a generation that grew-up in an ambiance of widespread AI will be entering higher education, and, not long after that, the labour market, a new labour market. A generation that will most likely use AI tools as a second skin, without second thoughts. All this should make us question the role of the higher education for a future that is rapidly becoming present. How to better contribute to the individual development? What knowledge, abilities and competencies will be required? What new skills should teachers have? In all, what shape, or shapes, should higher education assume.

One thing remains certain in these rushed times, where, once more, the fascination of technological progress co-exists with caution, and even fear of its consequences, and a power struggle for control: Increased critical thinking and responsible AI practices are ever more important.