Artificial Intelligence

When it comes to technological development all eyes are on Artificial Intelligence. The endless possibilities of AI come with an extra dose of responsibility to follow the highest standards of quality and ethics.

On the sixth edition of our newsletter, we will navigate the work Fraunhofer is doing with, and for the success of AI.

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SmartHealth4All Mobilizer Project

The SmartHealth4All is a Mobilizer Project in which FhP-AICOS, Health Cluster Portugal (HCP), Siemens, FEUP, INESCTEC, CITEVE, among many other partners participate.

It aims to boost, in Portugal, an ecosystem dedicated to research and development, production, commercialization and dissemination of medical Smart Health technologies, based on information, communication, electronics and on future and emerging technologies.

Keep an eye out for our official channels and follow the evolution of the project!
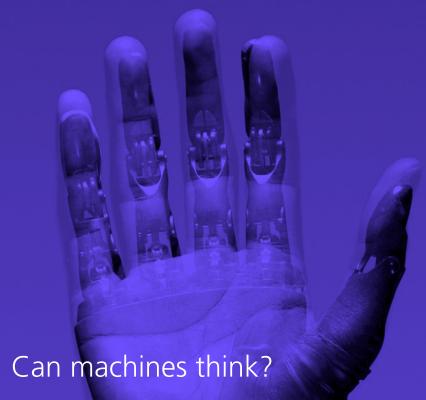
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The Derm.AI project wins the HINTT Awards in the category of clinical outcomes

We are happy to announce that the Derm.AI project developed by Fraunhofer Portugal AICOS in partnership with SPMS just won the HINTT awards in the category of clinical outcomes. On the sixth edition of the event, the projects that have shown the best practices in adopting Information Technology to improve health care were awarded, giving the Derm.AI team the well-deserved recognition for the work developed.

Congratulations to all the finalists.

Contrary to popular belief, Artificial Intelligence is not that "intelligent." Despite the unimaginable amount of data we can process today, it's still not enough to make the algorithm's applicability fit for different nuances.
Plus, if we consider that some of this data is person made and therefore prone to error, we understand that the big challenge of implementing AI is the human factor.

Can machines think?

This is the question that in 1950 shaped the following years of technological and scientific development. Alan Turing - considered the father of Computational Science and Artificial Intelligence (AI) – theorized and explored the mathematical possibility of a future where machines would be able to replicate or simulate human intelligence.

Fast forward 70 years, and technological development opened the door for an exponential growth of AI techniques as computers became faster and able to store larger amounts of data, and Machine Learning algorithms improved, along with the experts' know-how.

This might appear like a distant scenario to the average person but virtual assistants, social media algorithms and driverless cars prove that the once imagined future is happening now.

With no universal definition, the Stanford's One Hundred Year Study on Artificial Intelligence defined AI as the "activity devoted to making machines intelligent, and intelligence is the quality that enables an entity to function appropriately and with foresight in its environment."

In the age of "Big Data", Artificial Intelligence is proving to be a valuable tool in different industries, making business more efficient and giving insights for strategic decisions.

Considering the remarkable developments in AI, what are the main concerns surrounding this technology?

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How to make it trustworthy or accountable? How to widen its application? How to be accepted?

Integrating AI into a system begins with knowing the domain. Let's take Fraunhofer Portugal AICOS' project VAICeramics as an example. In VAICeramics, Fraunhofer Portugal AICOS partnered with Matcerâmica, Centro Tecnológico da Cerâmica e do Vidro and AGIX with the ambition of developing the technology to automate the inspection process in a ceramics' production line, a task that is usually very repetitive, time-consuming and requires a lot of human resources.

Knowledge is key

Before starting to design the system that will inspect the tableware, it is important to know the workflow: what are the possible errors, and what do they look like? Are they inspected visually, or is any tool used to help in the process? Answering all these questions requires many hours learning about the domain, in this case, ceramic tableware production, and knowing the ins and outs of specific tasks.

Only after answering all these questions, we may "feed" the support system with examples, so that the algorithm recognizes – in this specific case through computer vision and audio signal processing – what a defected tableware is and what is not.

It seems quite simple, but when the input data is not clean, clear and representative of the problem, the algorithm will not function for its initial purpose.

Healthy data for a fairer world

In the Derm.AI project, Fraunhofer Portugal AICOS proposes a decision support system that will improve the existing teledermatology processes between Primary Care Units and the Dermatology Services in the Portuguese's National Health System.

To achieve this, an application was created to help both the local practitioner acquire an accurate image of the skin lesion, and the dermatology expert in the decision-making process by implementing an algorithm that will learn from its feedback on previous examples.

To teach an algorithm to analyse the risk level of a skin lesion, it needs to have different examples of what the lesion might look like – varied sizes, colours, or textures, standard or out of the ordinary values - and have input from the dermatology expert. It is of the utmost importance that the input data is clear and diversified to avoid perpetuating biased information.

Acceptance

Although AI is and will revolutionize how we live, it also comes with a handful of questions and challenges. Like every big shift, this one will take time as the community is still venturing into the possibilities of Artificial Intelligence's application and dealing with data access, biased algorithms, legal liability, AI ethics, and transparency. These are hot topics under the AI umbrella that still need time to mature as well as the idea that AI and human intelligence will co-exist and cooperate to achieve better results.

AI at service of people: literacy and responsibility

Artificial Intelligence (AI), the ability to build machines that reason, learn and act intelligently, holds the promise to revolutionize life as we know it. Driverless cars, virtual assistants or targeted online advertisements are well-known examples of how artificial has already entered our life.

João Costa, Researcher

João Costa is a researcher at Fraunhofer Portugal AICOS since 2019 and is part of the Intelligent Systems group. João has a master in Bio Engineering from the University of Porto and throughout his career at AICOS he has been working with natural language processing applied to the context of health.

Inês Sousa
Head of Intelligent Systems at Fraunhofer Portugal AICOS

▶ Meet João Costa and the work she develops at AICOS.

Artificial Intelligence (AI), the ability to build machines that reason, learn and act intelligently, holds the promise to revolutionize life as we know it. Driverless cars, virtual assistants or targeted online advertisements are well-known examples of how artificial has already entered our life. We feel amazed by the potential of digesting gigantic amounts of data to find patterns and relations that have formerly eluded human capacity. The first examples are being shown, AI models that surpass the accuracy of human medical doctors in specific problems or suggest molecule combinations for creating new antibiotics. In industrial production, notable examples of AI applications are predictive maintenance of equipment or automated visual inspection of production outputs. AI introduction has been gaining traction with the vision of the intelligent factory of the future, the key to unlocking a new level of productivity, profitability, safety, and sustainability.

Diverse society and business sectors are nowadays fully digitalized, producing great amounts of data continuously, which hold enormous potential value. However, the conversion of data into value can only be attained if actionable insights can be extracted from the massive data volumes generated. This requires implementing sophisticated AI solutions and the integration of domain knowledge, which is a challenging endeavour. The best use cases and application scenarios of AI are devised by those who master the specificities of each domain and are able to understand how this technology works. Thus, the lack of skilled personnel in AI across business sectors is limiting its widespread application and value creation. At AICOS, we identified the mission to close this gap and prepared a set of training sessions and practical workshops adapted to different sectors and backgrounds of the trainees. Trainees from technical backgrounds can complement the theoretical contents with hands-on sessions based on their own use cases and data. For business audiences, we created the AI Project

Canvas, which guides strategic thinking for AI solutions. We intend to provide the knowledge and tools to conceptualize, plan and implement successful AI solutions that live up to their potential.

Like any new technology evolving fast, the consequences of AI on people and society may be unpredictable since an extended reflection on ethics is frequently left behind. Both bright and dark sides of technology use and implementation exist and must be addressed. We shall be committed to placing AI at the service of people, with the development of responsible, trustworthy, and reliable AI solutions that create a positive impact on society.

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Fraunhofer delivered a condensed view of the latest deep learning methods applied in real-world computer vision challenges. Ranging from basic concepts to specific tips resulting from practical experience allowed a quick and focused acquisition of practical know-how that will have an immediate application to BOSCH Car Multimedia division challenges."

André Ferreira, Eng. Manager at BOSCH Car Multimedia

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The Machine Learning Workshop organized by Fraunhofer Portugal was a very interesting training session, led by a group of excellent trainers, merging theoretical knowledge with practice in software laboratory and client's own data. To be repeated!"

Prof. Dr. Pedro Vieira, Head of R&D at CELFINET