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Artificial Intelligence and Machine Learning: Past, Present, and Future

Mário A. T. Figueiredo, Prof., Instituto de Telecomunicações and Instituto Superior Técnico, University of Lisbon, Portugal

Abstract

Machine learning (ML) and artificial intelligence (AI) have progressed from niche research topics to pivotal tools in science, technology, and business, profoundly influencing various societal aspects, including social media and decision-making processes. Their transformative role is evident in fields such as medicine, autonomous vehicles, and computational biology, with Alphafold's protein structure predictions being a notable example. ML and AI enhance traditional scientific methods, facilitating novel solutions to complex challenges. This advancement is epitomized by physics-informed machine learning, which combines data with mathematical models to solve problems that were intractable with conventional numerical methods. In my talk, I will review the history of AI and ML, underscore the economic and technological shifts that have fueled their rapid expansion, and discuss their significant impact on scientific research, as well as technological development and innovation.

Bio

Mário Figueiredo received his MSc (1990), PhD (1994), and Habilitation (*Agregação*, 2004) degrees in Electrical and Computer Engineering, all from Instituto Superior Técnico, University of Lisbon, where he is an IST Distinguished Professor and holder of the Feedzai endowed Chair on Machine Learning. He is also a senior researcher, group leader, and thematic line coordinator at Instituto de Telecomunicações. His research areas include machine learning, signal processing, and optimization. He has received several distinctions and awards, namely: Fellow of the Institute of Electrical and Electronics Engineers (IEEE), Fellow of the International Association for Pattern Recognition (IAPR), Fellow of the European Association for Signal Processing (EURASIP), Fellow of the European Laboratory for Learning and Intelligent Systems (ELLIS), W. R. G. Baker Award (IEEE), EURASIP Technical Achievement Award, member of the Portuguese Academy of Engineering, and member of the Lisbon Academy of Science.