



SEMINARI ANNO ACCADEMICO 2023/2024

26 Marzo 2024, ore 11:00, Aula G8 (Corpo G)

Prof. Nicola Strisciuglio,

Data Management & Biometrics, University of Twente

Towards Robust Computer Vision: identifying, mitigating and inducing bias

Computer vision has witnessed notable progress in the past years as it coupled with advancements in deep learning and convolutional networks, and most recently transformers. The performance of vision models are however sensitive to unexpected changes in the inputs, which can occur in the form of adversarial attacks, common image corruptions, and more generally distribution shifts. Larger attention is thus dedicated to improve the robustness of such models to unforeseen input changes. In this talk, I will address the problems of robustness and generalization of computer vision models, and link them to characteristics of and bias in the training data. I show that analyzing image classification models from a Fourier perspective can shed light on aspects that hinder out-of-distribution generalization, such as (frequency) shortcut learning. Furthermore, we will discuss how carefully-designed forms of inductive bias (e.g. neuro-physiology findings about the human visual system, or geometry-related priors about camera pose) can have a positive effect for robust representation learning, and lead to more robust, generalizable and data-efficient models.

7 Maggio 2024, ore 11:00, Aula G8 (Corpo G)

Prof. Antonio Chella

Director of the RoboticsLab, University of Palermo (Italy)

Towards Robot Consciousness

Developing a conscious robot is a significant scientific and technological challenge. The debates about the possibility of creating conscious robots and the potential benefits and risks for humans are no longer limited to philosophical circles. Robot consciousness is a field of research that aims to achieve two objectives. Firstly, scientists in this field draw inspiration from biological consciousness to create robots that can demonstrate experiential and functional consciousness. Secondly, scientists use robots as tools to understand biological consciousness better. The ultimate goal of robot consciousness is to replicate various aspects of biological consciousness in robots by combining different approaches from AI and robotics, cognitive robotics, epigenetic and affective robotics, situated and embodied robotics, developmental robotics, anticipatory systems, and biomimetic robotics. The other objective of robot consciousness is to employ robots to make progress in studying consciousness in humans and animals. It is worth noting that neuroscientists involved in the study of consciousness do not rule out the possibility that robots may be conscious. The talk will discuss recent theoretical studies, models, and case studies of machine consciousness that use robots as a reference frame.

6 Giugno 2024, ore 14:00, Aula G4 (Corpo G)

Prof. Donato Malerba,

Former Director of the Big Data CINI National Laboratory, Department of Computer Science; University of Bari "Aldo Moro"

Towards a Symbiotic AI

Symbiotic AI (SAI) delves into the multifaceted challenges arising from the deepening integration between humans and AI across scientific, social, economic, legal, and ethical domains. As AI systems increasingly permeate our daily lives, addressing the deficiencies and limitations in human-machine collaboration becomes imperative. Unlike standalone AI, which prioritizes achieving goals autonomously, SAI emphasizes synergistic interactions between humans and AI towards shared objectives. This necessitates AI systems to comprehend human actions and mental models while augmenting human cognitive capabilities, fostering a symbiotic relationship that values human involvement. Key challenges in SAI include endowing AI with human understanding, improving performance through user input, enhancing system understandability, integrating HCI principles, ensuring AI acceptability, and balancing accuracy with sustainability. These challenges span diverse disciplines, from advanced machine learning to legal and ethical considerations, underscoring the interdisciplinary nature of SAI research. The rationale for SAI's importance lies in its potential to revolutionize various sectors, notably healthcare and wellbeing. This talk explores the burgeoning field of SAI within the context of the project FAIR - Future AI Research.

27 Giugno 2024, ore 14:00, Aula G4 (Corpo G)

Prof. Roberto Tagliaferri,

Director of the NeuroneLab, Department of Business Sciences - Management & Innovation Systems, University of Salerno

Applications of Deep Neural Networks to label-free Imaging at single-cell level and Fourier ptychographic microscopy

In recent years, Artificial Intelligence (AI) has seen widespread application in the field of medical image analysis. In this seminar, we present two applications within microscopy. The initial case study pertains to digital holography in microscopy, an emerging technology used for imaging biological specimens without the need for exogenous agents. We introduce AI methodologies aimed at classifying label-free cells, even in the presence of bias. Fourier ptychographic microscopy, on the other hand, samples label-free specimens from various angles, achieving super-resolution phase contrast imaging through a synthetic aperture principle. This method is well-suited for high-resolution imaging of tissue slides across a broad field of view. In our second case study, we utilize a generative adversarial network to mimic the complex amplitude estimation process. Once trained, this network can accurately reconstruct Fourier ptychographic images in real-time, even when acquired from a severely misaligned setup.