Quantum Machine Learning: overview and perspectives

Filippo Caruso
Physics Dept., Florence University, Florence, Italy

We will give an overview on novel very promising interplays between machine learning and quantum physics, giving rise to the extremely exciting and rapidly growing field of Quantum Machine Learning. In particular, there are several ways in which machine learning could benefit from new quantum technologies and algorithms to find new ways to speed up their computations by breakthroughs in physical hardware, as well as to improve existing models or devise new learning schemes in the quantum domain. Big data analysis and image processing are just a few examples where these new hybrid classical-quantum algorithms can be applied, in domains ranging from material science to medicine, from finance to cybersecurity. This new field is indeed expected to provide remarkably huge advantages over its classical counterpart and deeper investigations are timely needed since they can be already tested on the already commercially available noisy intermediate-scale quantum (NISQ) machines, towards future scientific and industrial practical use-cases and real-world applications.