

Navigating the Quantum-Classical Confluence: Machine Learning in the Quantum Domain

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The fusion of Quantum Computing and Machine Learning is emerging as a new paradigm for analysing highly complex data and exploring fundamental physics. After a short review of the current state of affairs in quantum computing, we will delve into the core algorithms that fuel Quantum Machine Learning (QML), shedding light on how quantum principles lead to complementary data-analysis approaches and, thus, can significantly improve classical machine learning tasks. Discussions will also encompass the challenges faced, such as quantum hardware limitations and data limitations, and the ongoing research endeavours aimed at overcoming these hurdles. Through this colloquium, we aim to foster a dialogue on the potential of QML in propelling our comprehension of fundamental physics and the symbiotic evolution of quantum computing and machine learning.