

Inserting Quantum Computing into AI chains: experiences in Hybrid Quantum Machine Learning for EO

Wednesday 19 November 2025 09:30 (1 hour)

Quantum Computing for Earth Observation (QC4EO) is a rapidly emerging, cutting-edge research field. Within this innovative context. In our research we introduced Quanv4EO, a novel quanvolutional approach to pre-process EO data, by extracting detailed feature maps from EO imagery. The resulting features are fed into a classical neural network (NN) to perform specific tasks. This proposed framework has been extensively validated on multiple EO benchmarks. On the EuroSAT dataset, it maintains an accuracy of 96% while drastically reducing the complexity of the subsequent NN, from tens of millions to just a few thousand trainable parameters. When integrated with an Attention U-Net for building segmentation, it results in a 93% parameters reduction with the same accuracy. For turbidity prediction with Φ Sat-2 data, the parameters reduction is 98% with improved metrics. This framework aims at effectively replacing NN structures with millions of parameters with more agile QC layers, facilitating efficient, high-performance analytics for EO.

Presenter: GAMBA, Paolo Ettore

Session Classification: Morning session