Quantum machine learning in the cloud

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Quantum systems are likely to provide a computational advantage over classical systems for machine learning tasks. Currently, the most advanced hardware for quantum computing can only be operated in a few selected research centers around the world. The IBM quantum experience aims at providing remote access to a platform of superconducting qubits, where users can run their algorithms over the quantum hardware.

In this project, we will investigate how to operate the IBM quantum computing platform for the processing of sequential information in the context of the machine-learning paradigm of reservoir computing. Reservoir computing is ideally suited to process time series, for instance to forecast the power demand of the electric grid or the occurrence of an earthquake. While quantum reservoir computing has already proven valuable in numerical simulations, the proper way to operate the quantum hardware remains a challenge [1,2]. The candidate will be able to work in edge applications with a particular attention to the role of quantum information encoding and quantum measurement.

References

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[2] J. Chen, H. I. Nurdin, and N. Yamamoto. “Temporal information processing on noisy quantum computers.” *Physical Review Applied* 14, 024065, Aug 2020 (arXiv 2001.09498).