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Quantum Kernel Based Regressor for Prediction of Non-Markovianity of Open Quantum Systems

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Abstract : Quantum machine learning is a growing research field that aims to perform machine learning tasks assisted by a quantum computer. Kernel-based quantum machine learning models are paradigmatic examples where the kernel involves quantum states, and the Gram matrix is calculated from the overlapping between these states. With the kernel at hand, a regular machine learning model is used for the learning process. In this paper we investigate the quantum support vector machine and quantum kernel ridge models to predict the degree of non-Markovianity of a quantum system. We perform digital quantum simulation of amplitude damping and phase damping channels to create our quantum dataset. We elaborate on different kernel functions to map the data and kernel circuits to compute the overlapping between quantum states. We observe a good performance of the models.

Keywords : quantum, machine learning, kernel, non-markovianity
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