World Academy of Science, Engineering and Technology International Journal of Computer and Information Engineering Vol:17, No:09, 2023

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

Authors: Diego Tancara, Raul Coto, Ariel Norambuena, Hoseein T. Dinani, Felipe Fanchini

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

Conference Title: ICQTML 2023: International Conference on Quantum Techniques for Machine Learning

Conference Location: Toronto, Canada Conference Dates: September 18-19, 2023