

Reservoir Computing with Quantum Kicked Top

Nisarg Vyas

Indian Institute of Science Education and Research, Pune, India.

Reservoir computing (RC) is a machine learning technique which utilizes a collection of dynamical systems to achieve supervised learning tasks. Quantum chaotic models display intricate and counter-intuitive quantum dynamical features making them a suitable candidate to be used as reservoir computer nodes. For example, the chaotic nature of dynamics guarantees the echo state property, quintessential in the functioning of a reservoir computer, and presence of non-trivial quantum correlations help at memory and processing tasks. In this work, we explore the quantum kicked top model as a reservoir computer and demonstrate its performance on several learning tasks like polynomial regression, time-series prediction and entanglement classification. In order to systematically understand the links between dynamical properties and machine learning capabilities of a reservoir, we investigate metrics like the memory capacity to quantify and characterize the reservoir performance across various dynamical regimes of the model.
