Autonomous Approach for Quantum Entanglement Detection and Classification Using Multi-Layer Perceptrons

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In this talk, I will present a novel and autonomous technique for detecting and classifying quantum entanglement, a fundamental aspect of quantum mechanics. Our method leverages the power of multi-layer perceptron neural networks to effectively identify entangled states in both two- and three-qubit systems. The proposed approach demonstrates remarkable detection performance, attaining near-perfect accuracy in two-qubit systems and exceeding 90% accuracy in three-qubit systems. Furthermore, it effectively classifies three-qubit entangled states into distinct categories with a success rate of up to 77% [1]. These promising results suggest that our method holds great potential for application in larger quantum systems. Finally, we will discuss different quantum problems that can be addressed by this technology.

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[1] J. Ureña, A. Sojo, J.J. Bermejo-Vega, and D. Manzano. Entanglement detection with classical deep neural networks. ArXiv:2304.05946 (2023).

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