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Entanglement classification via Neuronal Networks

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In this talk, we investigate the application of machine learning to
an NP-hard problem in quantum information theory, the separability
problem of classifying a quantum state as entangled or
separable. This problem arises for entangled
quantum systems of dimension three or higher, where no exact solution
is currently known. We demonstrate that neural networks can accurately classify mixtures
of Bell states. This classification can be achieved by
considering the properties of the mixtures themselves and
by entropy-related quantities.We further highlight convolutional neural networks in this
process. Our findings indicate that these networks can reflect
entanglement structures crucial for accurate
classification. The study underscores the synergistic potential of machine learning
and quantum information science. It suggests a promising direction for
their combined application in solving complex quantum problems.

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