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Quantum Machine Learning 2022

Guest Editor:

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Message from the Guest Editor

The book Quantum Machine Learning: What Quantum Computing Means to Data Mining, by Peter Wittek, made quantum machine learning popular to a wider audience.

Linear-algebra-based quantum machine learning is based on quantum gates that describe quantum basic linear algebra subroutines. These subroutines exhibit theoretical exponential speedups compared to classical counterparts, and are essential for machine learning. The quantum algorithm for linear systems of equations is one of the main fundamental algorithms expected to provide a speedup compared to classical counterparts. The algorithm is also called the HHL algorithm, and is based on Kitaev's phase algorithm. We describe quantum principal component analysis (qPCA) and quantum random access memory (qRAM). We introduce quantum kernels and indicate quantum advantage kernels. Still, there are many open problems, such as the efficient preparation of data or the estimation of the expected values that describe the results.

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Message from the Editor-in-Chief

The concept of entropy is traditionally a quantity in physics that has to do with temperature. However, it is now clear that entropy is deeply related to information theory and the process of inference. As such, entropic techniques have found broad application in the sciences.

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