Capturing dynamics with noisy quantum computers

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Stellingen

Behorende bij het proefschrift
"Capturing dynamics with noisy quantum computers"

1. With the proper input data scaling, parameterized quantum circuits can approximate functions in the Sobolev and infinity norms. [Chapter 2]

2. The inclusion of derivative data in the training of parameterized quantum circuits in the context of supervised learning enables generalization in the Sobolev and infinity norms. [Chapter 2]

3. Higher order Runge-Kutta methods can decrease the resource costs of implementing variational quantum algorithms for solving differential equations compared to the Euler method. [Chapter 3]

4. The effects of shot noise in quantum state tomography can be reduced by employing known physical properties organized as a semidefinite program. [Chapter 4]

5. Generative adversarial networks with a parameterized quantum circuit as a generator can model time series as well as their temporal correlations qualitatively well. [Chapter 5]

6. The role of shot noise, even though it is a source of error that can be estimated comparatively easily, is often ignored in theoretical analyses of quantum algorithms.

7. The Black-Scholes model serves as a benchmark for quantum algorithms, but it is often neglected that it can be solved analytically.

8. Given the present stage of quantum computing, research in quantum algorithms should focus on fundamental questions rather than industrial applications, which can be meaningfully examined only at later stages of technological development.

9. It remains to be determined whether quantum computers will be able to outperform classical computers in modeling classical dynamics.

10. Mathematical communication, much like natural languages, varies across communities and individuals in style and expression.

11. The dangers of social networks and information overload for health and society are currently heavily underestimated, and methods mitigating these effects are still in their infancy.

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