
[2E1-J-1]Fundamental AI, theory: quantum computing and search

Chair:Takahisa Toda Reviewer:Yoichi Sasaki

Wed. Jun 5, 2019 9:00 AM - 10:20 AM Room E (301A Medium meeting room)

9:20 AM - 9:40 AM

[2E1-J-1-02]Total Quantum Search of Optimal Solution in Quantum Computing

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Variational Quantum Eigensolver (VQE) has been devised which solves large-scale eigenvalue problems by calculating quantum computers and classical computers alternately. Nelder-Mead method is mainly used as a method of optimizing eigenvalues. However, there is a disadvantage that a global optimum solution cannot always be searched. In this paper, we used two kinds of optimization methods, Particle Swarm Optimization (PSO) and Quantum Behaved Particle Swarm Optimization (QPSO) as an alternative method. As a result, we found that the performance of PSO and QPSO is better than that of Nelder-Mead method for the eigenvalue optimization method in VQE algorithm. Furthermore, we found that the relative error when using QPSO is the smallest among the three optimization methods. Meanwhile, we are also incorporating quantum-bit particle swarm optimization (QBPSO) into the eigenvalue optimization method of the VQE algorithm, aiming to realize an eigenvalue search algorithm solely using quantum circuits.