General Session | General Session | [GS] J-1 Fundamental AI, theory

[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)

9:00 AM - 9:20 AM

[2E1-J-1-01]Development of convolution filter embedded quantum autoencoder by quantum simulator

○Shiba Kodai[1], Hiroto Hakamata[2], Katsuhisa Sakamoto[1,2], Kouichi Yamaguchi[1,2], Tomah Sogabe[1,2] (1. The University of Electro-Communications , 2. i-PERC, The University of Electro-Communications)

Keywords:quantum simulator, quantum autoencoder , Convolution filter

The quantum gate type quantum computer has high versatility and can be expected to be put into practical use in short future. However, the quantum bits of the quantum gate type quantum computer are very weak against external interference, and it is difficult to maintain the quantum state for a long time. Therefore, in the currently developed quantum computer, the number of quantum bits is limited, so it is difficult to calculate large scale and high dimensional data. In this paper, as a solution to this problem, we proposed a computation method that applies convolution filter, which is one of the methods used in machine learning, to quantum computation. Furthermore, as a result of applying this method to the quantum auto encoder, we found the effectiveness by applying convolution filter constituted several qubits to the data made of several hundred qubits or more under the autoencoding accuracy of 98%.