先端科学技術研究科　修士論文要旨

所属研究室 (主指導教員)	数理情報学 (池田　和司　(教授))		
学籍番号	2111015	提出日	令和 5年 1月 17日
学生氏名	生駒　洋樹		
論文題目	Learning Boltzmann Machines using Quantum-assisted Monte Carlo		

要旨

A Boltzmann machine (BM) has interesting properties compared to current machine learning-based methods, such as the possibility of significantly reducing the training data when performing the same task. Due to the huge amount of computation needed in the sampling in learning a BM, however, only approximate learning methods such as Markov chain Monte Carlo (MCMC) are currently used in limited applications, and practical use of a BM with classical computers is considerably difficult. To avoid that difficulty, learning methods using quantum annealing instead of classical computers have been proposed, but the inherent problems of quantum annealers prevent learning in general tasks. In this thesis, we propose a method to use quantum annealing for learning BMs while at the same time mitigating the problems that arise when using quantum annealing. The key idea of the proposed method is to use the samples with different timings of turning off the transverse magnetic field to reduce the effect of freezing which disturbs the sampling. We conducted experiments, and although further observations are needed, we confirmed an example that reduced the learning time by about a third while reducing the learning error at the same pace as when using MCMC.