External Awards

Best Paper (Outstanding User Modeling)
Winners: Takeshi Kurashima, NTT Human Informatics Laboratories; Tomoharu Iwata, NTT Communication Science Laboratories; Tomu Tominaga, NTT Human Informatics Laboratories; Shuhei Yamamoto, NTT Human Informatics Laboratories; Hiroyuki Toda, NTT Human Informatics Laboratories; Kazuhisa Takemura, Department of Psychology, Waseda University
Date: June 8, 2023
Organization: The International AAAI Conference on Web and Social Media

For "Personal History Affects Reference Points: A Case Study of Codeforces."
Published as: T. Kurashima, T. Iwata, T. Tominaga, S. Yamamoto, H. Toda, and K. Takemura, "Personal History Affects Reference Points: A Case Study of Codeforces," Proc. of the International AAAI Conference on Web and Social Media, Vol. 17, No. 1, pp. 507–518, Limassol, Cyprus, June 2023. https://doi.org/10.1609/icwsm.v17i1.22164

Papers Published in Technical Journals and Conference Proceedings

Simplest Fidelity-estimation Method for Graph States with Depolarizing Noise

T. Tanizawa, Y. Takeuchi, S. Yamashika, R. Yoshii, and S. Tsuchiya
arXiv:2304.10952, April 2023.

Graph states are entangled states useful for several quantum information processing tasks such as measurement-based quantum computation and quantum metrology. As the size of graph states realized in experiments increases, it becomes more essential to devise efficient methods estimating the fidelity between the ideal graph state and an experimentally-realized actual state. Any efficient fidelity-estimation method, in general, must use multiple experimental settings, i.e., needs to switch between at least two measurements. Recently, it has been shown that a single measurement is sufficient if the noise can be modeled as the phase-flip error. Since the bit-flip error should also occur in several experiments, it is desired to extend this simplest method to noise models that include phase and bit-flip errors. However, it seems to be nontrivial because their result strongly depends on properties of the phase-flip error. In this paper, by analyzing effects of the bit-flip error on stabilizer operators of graph states, we achieve the extension to the depolarizing noise, which is a major noise model including phase and bit-flip errors. We also numerically evaluate our simplest method for noise models interpolating between the phase-flip and depolarizing noises.

Anonymous Estimation of Intensity Distribution of Magnetic Fields with Quantum Sensing Network

H. Kasai, Y. Takeuchi, Y. Matsuzaki, and Y. Tokura
arXiv:2305.14119, May 2023.

A quantum sensing network is used to simultaneously detect and measure physical quantities, such as magnetic fields, at different locations. However, there is a risk that the measurement data is leaked to the third party during the communication. Many theoretical and experimental efforts have been made to realize a secure quantum sensing network where a high level of security is guaranteed. In this paper, we propose a protocol to estimate statistical quantities of the target fields at different places without knowing individual value of the target fields. We generate an enanglement between L quantum sensors, let the quantum sensor interact with local fields, and perform specific measurements on them. By calculating the quantum Fisher information to estimate the individual value of the magnetic fields, we show that we cannot obtain any information of the value of the individual fields in the limit of large L. On the other hand, in our protocol, we can estimate theoretically any moment of the field distribution by measuring a specific observable and evaluated relative uncertainty of k-th (k = 1, 2, 3, 4) order moment. Our results are a significant step towards using a quantum sensing network with security inbuilt.