

Quantum Decision Making with Small Sample for Network Monitoring and Control

Authors : Tatsuya Otoshi, Masayuki Murata

Abstract : With the development and diversification of applications on the Internet, applications that require high responsiveness, such as video streaming, are becoming mainstream. Application responsiveness is not only a matter of communication delay but also a matter of time required to grasp changes in network conditions. The tradeoff between accuracy and measurement time is a challenge in network control. We people make countless decisions all the time, and our decisions seem to resolve tradeoffs between time and accuracy. When making decisions, people are known to make appropriate choices based on relatively small samples. Although there have been various studies on models of human decision-making, a model that integrates various cognitive biases, called "quantum decision-making," has recently attracted much attention. However, the modeling of small samples has not been examined much so far. In this paper, we extend the model of quantum decision-making to model decision-making with a small sample. In the proposed model, the state is updated by value-based probability amplitude amplification. By analytically obtaining a lower bound on the number of samples required for decision-making, we show that decision-making with a small number of samples is feasible.

Keywords : quantum decision making, small sample, MPEG-DASH, Grover's algorithm

Conference Title : ICQCDM 2022 : International Conference on Quantum Cognition and Decision Making

Conference Location : London, United Kingdom

Conference Dates : August 16-17, 2022