




Monday, 16 November 2020

Format: Online via Webex, at 16:15

A hybrid quantum classical learning agent

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Two important trends have emerged in information science in the last decades: artificial intelligence and quantum information. Amazing results have been achieved with artificial intelligence. For example, the algorithm AlphaGo learned to beat human players in the game Go by using reinforcement learning and playing against itself. As the field of artificial intelligence advances, the demand for fast and efficient algorithms increases.

Quantum information, on the other side, promises up to exponential speedups for certain computational tasks and enables speedups also in artificial intelligence. In addition, first quantum computer which can outperform classical ones despite their current restrictions are in reach.

In this talk, I will first give a short introduction to reinforcement learning, a branch of artificial intelligence. Then, I will introduce a hybrid learning agent which combines classical reinforcement learning with quantum search. Such a hybrid agent learns faster as a comparable classical agent as I will demonstrate.

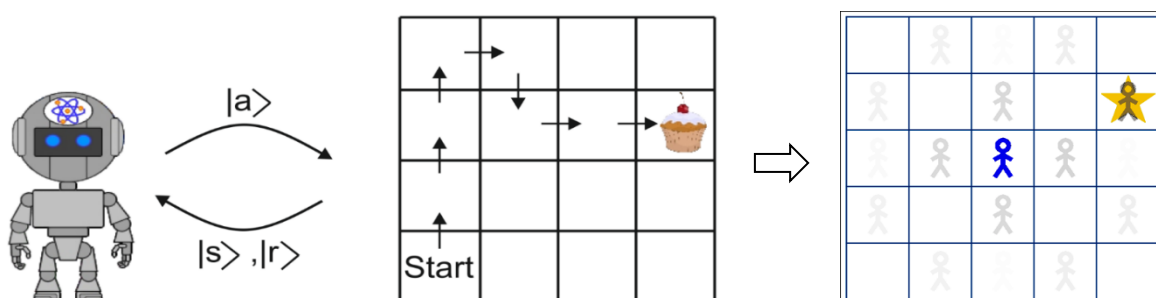


Fig. 1: A learning agent using quantum features such as superposition can learn faster to find its way through a maze than a corresponding classical agent