

Quantum games on networks

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Abstract

Systems consisting of a large number of agents which interact with each other in various ways are very common. Often they are modelled as games where players are connected via some network structure [1, 2]. If the interactions are of local character such approach can be used to simulate various aspects real systems with sometimes astonishing accuracy. There are suggestions that quantum game theory [3] approach extends such analyses in various interesting ways [4, 5, 6, 7, 8]. We will give a short introduction to games on networks and quantum game theory. There are many types of activities in various networks that can be discussed in terms of agents who can use both quantum and classical strategies. How will the players behaviour in a population evolve on networks? The answer depends on the specification of the system. We will discuss some interesting examples of quantum games on simple networks including the famous quantum Prisoner's Dilemma. In such "quantized" systems the classical strategy space is only a subset of the "quantum" one and the diversity of agents behavior in a population can be observed and the performance of quantum strategies can be measured and compared with the "classical behaviour". Quantum strategies can defeat the classical ones but this far from being a rule. The general conclusion is that quantum network games form an interesting field of research. This should be perceived in the context of emerging before our eyes smart society [9] or the IBM Quantum Experience, the worlds first quantum computing platform delivered via the IBM Cloud at IBM's T [10].

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