A partition function form game over routing networks

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Abstract

The purpose of this work is to introduce a novel family of games related to congested networks. So far traffic routing has been analyzed mostly from a non-cooperative aspect. A common assumption is that each individual optimizes his route in the network selfishly. However looking at the same network from a different scope in some cases we can find some actors that are responsible for the majority part of the traffic. From the point of view of these actors cooperation is indeed an inherent possibility of the game. Sharing information with other agents may result in cost savings, and more efficient utilization of network capacities. Depending on the goal and employed strategy of the agents many possible cooperative games can arise. Our aim is to introduce and analyze these wide variety of transferable utility (TU) games. Since the formation of a coalition may affect other players costs via the implied flow and the resulting edge load changes in the network, externalities may arise, thus the underlying games are given in partition function form.