

Opinion Diversity and the Resilience of Cooperation in Dynamical Networks

Adam Miles

Department of Computing and Mathematics
Manchester Metropolitan University
Manchester, UK
a.miles@mmu.ac.uk

Matteo Cavaliere

Department of Computing and Mathematics
Manchester Metropolitan University
Manchester, UK m.cavaliere@mmu.ac.uk

Abstract—Across various scenarios, individuals cooperate with others to contribute towards a shared goal and ensure self-preservation. In game theory, the act of cooperation is considered as an individual producing some form of benefit to be utilised by others, under the expectation others will return the favour. In several scenarios, individuals make use of their own information to aid with their decision about who to connect and cooperate with. However, the choice of cooperation can be taken advantage of by opportunistic defectors, which can lead to significant disruption. This paper investigates how the diversity of opinion can contribute to the structure and mechanics of a dynamical network model and to the resilience of cooperation, by utilising a computational model where individuals make use of both public and private information to implement their decision. Our results show that increasing diversity leads to more stable, less connected and less prosperous networks coupled to more frequent, but shallower information cascades. Our work generally shows that the outcome of the conflict between cooperators and cheaters strongly depends on the interplay between population structure, individual decision making and individual opinions.

Keywords—graph theory; game theory; information cascades; agent-based model