Correlated bursts in temporal networks slow down spreading

Takayuki Hiraoka[1] and Hang-Hyun Jo[1,2,3]

[1]Asia Pacific Center for Theoretical Physics, Pohang 37673, Republic of Korea
[2]Department of Physics, Pohang University of Science and Technology, Pohang 37673, Republic of Korea
[3]Department of Computer Science, Aalto University, Espoo FI-00076, Finland

Bursty dynamics, widely observed in human activities and natural phenomena, is associated with two key characteristics: a heavy-tailed inter-event time (IET) distribution and correlations in the IET sequence, which is often characterized by the memory coefficient†. An important question regarding the non-Poissonian nature is how it changes the dynamics in temporal networks, such as spreading. By studying simple epidemic models, previous studies show how the the shape of IET distribution affects the speed, reach, and steady state of spreading‡, while the effect of the correlations has been overlooked. Here we study the impact of correlation between successive IETs on the speed of spreading for generalized epidemic models. We analytically show that the average transmission time increases linearly with the memory coefficient if transmission involves more than one contact between susceptible and infected nodes. We also demonstrate by means of numerical simulations that a positive correlation between IETs leads to slower spreading in tree networks and random graphs.

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