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Information diffusion backbones in temporal networks

Information diffusion on a temporal (time evolving) network can be modelled by an epidemic spreading process. Information is assumed to diffuse along the fastest path/trajectory. Not all the links contribute to the information diffusion, namely, appear in a diffusion trajectory. We address the question which kind of temporal links are more likely to appear in a diffusion trajectory. We construct the information diffusion backbone to record the probability for each temporal link to appear in an information diffusion trajectory. We discover that a local temporal connection feature among many other features we proposed, could well identify the links that contribute the most to the actual information diffusion. Our findings are crucial to tackle optimization problems such as which node pairs should be stimulated to link and at what time in order to maximize the prevalence of information propagation.