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Eleni Stai, Vasileios Karyotis, Antonia Chrysanthi Bitsaki, Symeon Papavassiliou

PII: S0140-3664(16)30697-1
DOI: 10.1016/j.comcom.2016.12.013
Reference: COMCOM 5428

To appear in: *Computer Communications*

Received date: 3 November 2015
Revised date: 2 September 2016
Accepted date: 18 December 2016

Please cite this article as: Eleni Stai, Vasileios Karyotis, Antonia Chrysanthi Bitsaki, Symeon Papavassiliou, Strategy Evolution of Information Diffusion under Time-Varying User Behavior in Generalized Networks, *Computer Communications* (2016), doi: 10.1016/j.comcom.2016.12.013

Strategy Evolution of Information Diffusion under Time-Varying User Behavior in Generalized Networks

Eleni Stai[a,*], Vasileios Karyotis[a], Antonia Chrysanthi Bitsaki[a], Symeon Papavassiliou[a]

[a] *School of Electrical and Computer Engineering, National Technical University of Athens (NTUA), Iroon Polytechniou 9, 15780, Athens, Greece*

Abstract

Modern generalized networks, where physical devices and social players are combined to support seamless and more flexible services, are strongly driven by user behavior and its evolution. A typical example of behavior-affected processes is the information diffusion by users in generalized networks. In this paper, we focus on user strategy selection with respect to information diffusion in generalized networks, and study its evolutionary dynamics and their benefits, as user behavior/interests change over the course of time. We model information diffusion in generalized networks through graphical evolutionary game theory (graphical EGT) and analyze the evolution of the system and its Evolutionary Stable States (ESS) for time-varying fitness values due to time-varying user interests. We perform extensive evaluations based on numerical and simulation results, and study the impact of several parameters on the derived ESS curves (i.e., ESS points over time). Such parameters involve user interests and their fitness values, and the degree distributions and network type of the layers of the generalized network. We thoroughly evaluate via numerical analysis and appropriate examples the existence of ESS loci for the system dynamics depending on the associated parameters. Also, we discuss the relation between (graphical) EGT-based information diffusion analysis and the epidemics-based

*Principal Corresponding author

Email addresses: estai@netmode.ntua.gr (Eleni Stai), vassilis@netmode.ntua.gr (Vasileios Karyotis), antonia.bitsaki@gmail.com (Antonia Chrysanthi Bitsaki), papavass@mail.ntua.gr (Symeon Papavassiliou)