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Reconstructing a Large-Scale Attribute-Based Social Network

Weijia Luo
Department of Computer Science, University of Illinois at Urbana-Champaign
Mario Ventresca
Department of Industrial Engineering, University of Purdue

ABSTRACT

An epidemic occurs when a disease rapidly infects substantially more people than expected compared to past experience of similar diseases. If an epidemic is not contained, it could turn into a pandemic, which will cause a worldwide crisis. Therefore, it is critical to determine and implement epidemic policies that are promising and effective within a short period of time. In this paper, we will develop tools that will allow us to recreate large-scale real-world social networks. Using such networks will enable us to simulate disease spread and determine critical personal and social factors that will be the key to containing or even preventing an epidemic event. We begin by developing an attribute-based social network infrastructure with the objectives of: efficiency, modularity, and functionality in mind. Next, real-world data from public sources are analyzed and imported into the infrastructure to reconstruct a real-world social network. The resulting social network is predicted to be an accurate representation of the data used to create the network since properties in the network are matched with actual publicly available census data with a percent error less than 0.03. The tools and methods developed in this paper will allow simulation and analysis to be performed on real-world social network, which will provide crucial information on determining effective epidemic policies within an extremely short period of time.

KEYWORDS

Social Network, Disease Simulation, KD-Tree, Large-Scale Network, Reconstructing Real-World Population

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