

Accepted Manuscript

Node-securing Connectivity-based Model to Reduce Infection Spread in Contaminated Networks

Gokhan Karakose, Ronald G. McGarvey

PII: S0360-8352(17)30574-0
DOI: <https://doi.org/10.1016/j.cie.2017.12.008>
Reference: CAIE 5012

To appear in: *Computers & Industrial Engineering*

Received Date: 7 August 2017
Revised Date: 20 October 2017
Accepted Date: 6 December 2017

Please cite this article as: Karakose, G., McGarvey, R.G., Node-securing Connectivity-based Model to Reduce Infection Spread in Contaminated Networks, *Computers & Industrial Engineering* (2017), doi: <https://doi.org/10.1016/j.cie.2017.12.008>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Node-securing Connectivity-based Model to Reduce Infection Spread in Contaminated Networks

1st author:

Gokhan Karakose¹, gkz7c@mail.missouri.edu

2nd and corresponding author:

Ronald G. McGarvey^{a,2}, mcgarveyr@missouri.edu

Abstract

Given a network with a set of contaminated and susceptible nodes, this article presents models for identifying a subset of susceptible nodes to secure (e.g., guard against infection, or remove from the network) such that the total number of nodes at risk of infection is minimized, subject to a limited budget for securing nodes. These models utilize a connectivity-based metric, in which a susceptible node is assumed to be at risk of infection if there exists a transmission path between it and any infected node, where no transmission path exists between two nodes if every path between them includes at least one secured node. The initial model presented, which is to the authors' knowledge the first node-securing connectivity-based model for mitigating the spread of infection in contaminated networks, is then reformulated by use of a novel search space reduction algorithm. Computational testing is presented demonstrating the significant reductions in solution time achieved by the reformulated model.

Keywords: networks; infection control; mathematical programming

¹ Department of Industrial and Manufacturing Systems Engineering, University of Missouri, Columbia, Missouri, 65211, United States

² Harry S Truman School of Public Affairs, University of Missouri, Columbia, Missouri, 65211, United States

Download English Version:

<https://daneshyari.com/en/article/7541665>

Download Persian Version:

<https://daneshyari.com/article/7541665>

[Daneshyari.com](https://daneshyari.com)