

Tracing Percolation Centrality of Epidemics in Australia

Mahendra Piraveenan (University of Sydney)

Abstract. A number of centrality measures are available to determine the relative importance of a node in a complex network, and betweenness is prominent among them. However, the existing centrality measures are not adequate in network percolation scenarios (such as during infection transmission in a social network of individuals, spreading of computer viruses on computer networks, or transmission of disease over a network of towns) because they do not account for the changing percolation states of individual nodes. We discuss a new measure, percolation centrality, that quantifies relative impact of nodes based on their topological connectivity, as well as their percolation states [1]. We demonstrate the usage of percolation centrality by applying it to simulated and real world scale-free and random networks.

The main case study traces percolation centrality using a national-level discrete-time epidemiological model of the entire population of Australia in generating dynamics of influenza viral infection and transmission, based on the 2006 Australian Census data on population demographics and mobility [2].

References

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- [2] P. Wang, D. Newth, M. Piraveenan, M. Prokopenko, Tracing Percolation Centrality of an Influenza Epidemic in Australia, *under review*, 2015.