Dynamic & Geo-Spatial Network Visualization and Analysis

L. Richard Carley (LRC@CMU.EDU)
Carnegie Mellon University & Netanomics

Description: A lecture and hands-on workshop in which attendees learn how to analyze and visualize multi-dimensional dynamic network data (multiple time periods) and geo-network network data (where nodes have latitudes and longitudes). Using *ORA the attendees will learn how to import, export, visualize, and assess example dynamic network data and geo-network data. Attention will be focused on the use of spectral analysis of over-time networks, temporal network visualization techniques, identifying and highlighting changes in metrics and network structure over time, trend analysis, geo-spatial visualization of networks, spatial heat maps, and geo-spatial network measures. Participants will be presented with a thorough demonstration of software features used to analyze and visualize dynamic and geo-network data. Participants will be provided with a USB Flash Drive containing a windows executable of the software, sample data, and a user's guide. This workshop will be fast-paced and involve advanced material.

*ORA is a powerful network analysis and visualization tool. *ORA supports the assessment of standard social network data, organizational network data, high-dimensional network data, meta-network data, geo-spatial network data, and dynamic network data. Relatively unique features include trail and network visualization, fuzzy grouping algorithms, multi-mode network assessment, built in network simulators, JSON and CSV importers, specialized twitter analytics, two mode metrics, and a powerful visualizer with data entry and mark-up capabilities. The professional version is capable of handling large networks (10^6 nodes), and can run under the PC, Mac or Linux operating system.

Who Should Attend? Those who are interested in analyzing and visualizing dynamic and/or geo-spatial network data, including spatially tagged twitter data. The material and its delivery is suitable for researchers and practitioners, alike. This is designed to be a non-technical workshop; however, by its very nature, the material will involve some mathematics, although this will be minimized as the delivery is driven towards how to use the software to assess and visualize data.

Topics Include:

- Analysis & Visualization of Dynamic Network Data
- Comparing and contrasting networks
- Network Trend Analysis
- Placing Networks on Maps.
- Network Heat Maps.
- Geo-Spheres of Influence
- Fourier Analysis for over-time network measures
- Use of Fourier Analysis to prepare over-time network data for anomaly detection
- *ORA software

Computer Equipment:

For this tutorial the windows version of ORA will be used. Users may wish to pre-load and test the *ORA software from the CASOS website – http://www.casos.cs.cmu.edu/projects/ora/. However, the software will also brought to the meeting. Participants should bring their own laptops to workshop. For those wishing to use the full professional version there will be a special tutorial discount available.

Maximum Number of Attendees: Unlimited

Keywords: Dynamic Network Analysis, Geo-Spatial Network Analysis, ORA, Big Data, Network Visualization