

## SPECIAL POINTS OF INTEREST

**6th Annual  
Network Science  
Workshop  
22-24 April**  
See website for more  
information

<http://www.netscience.usma.edu/>

**1st Annual  
Minerva at West Point  
Workshop  
16-17 April**  
For information see  
the Minerva webpage:  
<http://ow.ly/8Lu6i>

### Social Networks:



[Facebook](#)



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[Central Node](#)



# Network Science Center at West Point

## Advancing the Study of Network Science

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### Sunbelt XXXII

West Point had a large contingent of faculty and cadet researchers from Network Science Center present at Sunbelt XXXII, the International Network for Social Network Analysis's (INSNA) annual conference in Redondo Beach, CA 12-18 March 2012.

Two West Point researchers who presented their research share some of their insights from the conference.

Jocelyn Bell, PhD

The meeting began with workshops, featuring the software programs ORA, AutoMap, R, and UCINET among many others. Researchers from around the world and many disciplines gave presentations on more than 80 network topics. For me, the areas of network visualization, centrality, and dynamic networks were especially relevant.

Some of the talks I attended which were of particular interest included:

#### **Visualization of Multimodal Relationships in Dynamic Networks.**

This presentation featured a new way to visualize networks in which the relationships between nodes are multi-dimensional. The connections between nodes, instead of lines, were two dimensional arcs which provided color coded information about the type of relationship. The thickness of the individual arcs represented the strength of the tie, and the upper half symbolized one direction of the relationship, and the bottom half indicated the reverse direction. The network visualizations produced contained a great deal of information while still maintaining overall readability.

#### **Social Media Network Analysis and Visualization using NodeXL from the Social Media Research Foundation.**

This talk was especially useful, as it demonstrated uses for network visualization software, NodeXL. This particular program runs in Microsoft Excel and is highly customizable: various nodes and links can be colored, sized, and reshaped easily, rendering network visualizations which highlight specific qualities.

#### **Centrality Measurement- A Comprehensive Theory with Practical Implications.**

This talk was very well attended, and as its title suggests, several centrality measures were discussed. The general problem addressed here was

that different centrality measures do in fact measure nodes differently, and some of the pros and cons of various measures were discussed.

#### **A Probabilistic Interpretation of Beta Centrality.**

Beta centrality is a particularly difficult measure to visualize because so much is happening behind the scenes in the adjacency matrix. This talk featured a visual representation of beta centrality as the parameter beta changes, clarifying the relationship between the beta value and the largest eigenvalue of the adjacency matrix.

#### **Incremental Centrality Computations for Dynamic Social Networks.**

As networks change over time, it becomes necessary to recalculate centrality measures. As was pointed out in this talk, for large networks or networks with frequent changes, such as Twitter, repeating all these calculations takes considerable time and computing power. The algorithm presented here tweaked the previous calculations, rather than starting from scratch each time the network was updated. The result was, for closeness at least, a much faster method for updating the nodal centrality measures. Prior to this talk, I had little understanding of potential computational issues.

#### **My own research presentation, Centrality: Nodes and Subsets,**

focused on the problem of computing the centrality of subsets of nodes rather than individual nodes. I presented a split definition of nodal centrality, local and global, and used those measures to compute subset centralization. I was working in a purely theoretical setting, and some of the most valuable feedback I received was to apply my ideas to the work of others in structural holes and team organizations, where the networks are real world applications.

James Gatewood, PhD

The talks were distributed into different topic areas such as Online Social Networks, Epidemiology and Disease Transmission, Criminals, Gangs and Terrorist Networks, Dynamic Network Analysis, and many others. A few of the talks I attended were:

#### **If there's a crime in your network neighborhood, who you gonna call?**

This research was

interested in who people will turn to (their network) after a crime happens. The study focused on two southern California locations and used spatial and social analysis to do their research. The findings suggest that people reach out to others more nationally than locally in their immediate area.

#### **Duo Centered Personal Networks of Low Income Couples.**

This was a social network analysis of recently married couples and their support groups. This study interviewed black and white couples and asked them to write out their networks. The researchers then compared the networks of the spouses. The differences they found within the white and black married social groups were: in the white married couples social networks both spouses had the similar if not the same immediate friends while the black married couples had immediate family members but different networks of friends. How does this impact society at large?

#### **Modeling hospital patient transfers and infections as network event data.**

This work focused on patients who entered the hospital without an infection but left with an infection at hospitals within the UK. Can they create a model using a time stamped network model? Within hospitals, patients are transferred between wards and they applied a network analysis to detect when patients acquired the infections.

I also presented my research at the conference, **A Mathematical Model of Network Communication.** There I created a network to describe a communication flow model. Social networks are exciting for they can assist us in understanding our connections and lives.

Sunbelt XXXII was a valuable experience for faculty and cadets. Not only did they get a chance to present their research to the international network science community and get valuable feedback, they also had a chance to collaborate on future research. To learn more about the Sunbelt XXXII presentations/posters please see NSC's website: <http://www.netscience.usma.edu> Or read one of several posts written by the cadets on the Central Node blog: <http://wp.me/p1C01l-jt>

### Important Dates:

4 April—**Brown bag lunch**—Classified brief on TIGR  
16-17 April—**1st Annual Minerva at West Point Workshop**  
22-24 April—**6th Annual Network Science Workshop**  
3 May—**Project's Day**

### Current Publications/Presentations:

Current articles are on NSC website under Publications or linked below:

[ROS Enabled Communications Between Smartphones & Robot Swarms](#)  
[Flowing Valued Information and Cyber-Physical Situational Awareness](#)