SocioScape

A Tool for Interactive Exploration of Spatio-Temporal Group Dynamics in Social Networks

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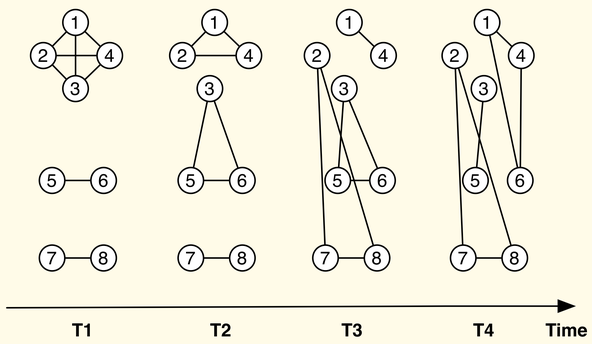
Khairi Reda* Chayant Tantipathananandh Tanya Berger-Wolf Jason Leigh Andrew Johnson

Department of Computer Science
University of Illinois at Chicago
*mreda2@uic.edu

The problem with graphs

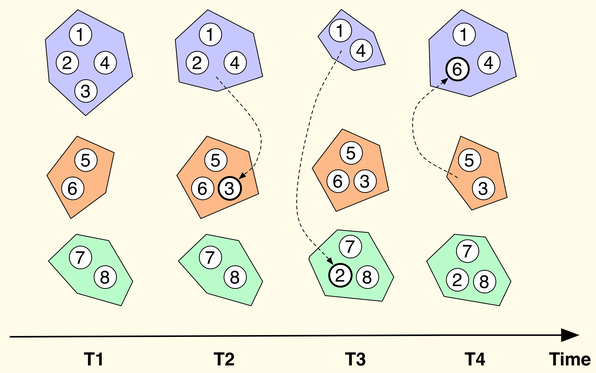
Graphs continue to be the predominant method for visualizing social networks. However, using graphs to visualize the transient interactions between individuals does not work well in dynamic social networks in which the interaction changes over time. When the structure of the graph changes, the social groups become less evident as the relative positioning of nodes no longer reflects the topology of the graph.



Community identification

Revealing the social structure

A dynamic group identification algorithm is used to detect persistent groups in the transient interactions. We refer to these groups as *communities*. A community is a grouping of individuals that persists over time, while allowing new members to join and exiting members to leave. The detected communities are given stable "colors" across all timesteps.



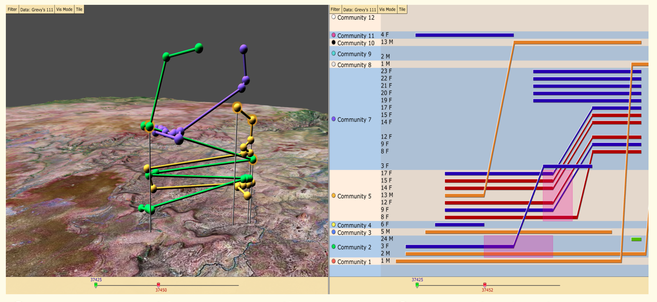
Real-world case study

Grevy's zebra form tight communities for relatively short periods of time, only to split ways forming new sets of communities. This behavior is influenced by the reproductive state of individuals as well as their resource need. Individuals make association choices that maximize access to resources such as water and grass.

Wild Grevy's zebra were observed in Kenya for a period of two months in 2002, recording the associates of each individuals and their movement at different points in time.

SocioScape is used to visualize the movement of Grevy's zebra and the their community structure, side-by-side. Semantic cross-highlighting allows an analyst to select elements in one visualization and automatically highlight related elements in the other visualization.

This allows ecologists to see how the physical decision making of individuals embodied by their movement in the landscape give rise to the underlying social structure. The Affiliation Timeline also provides a more intuitive visual representation of the social structure than graphs.



Group movement in space and time **Community structure**

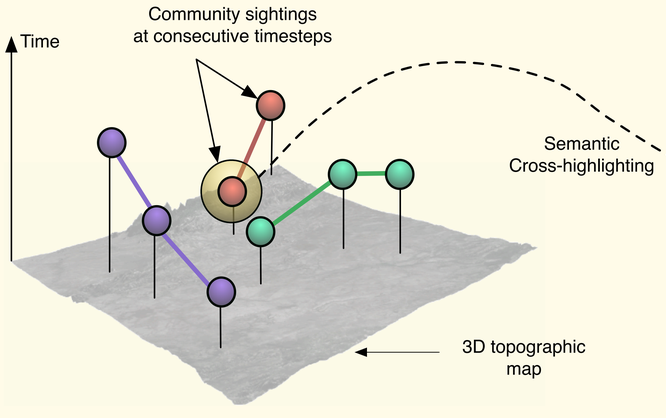
We conducted a user study with the participation of expert ecologists who are researching the social behavior of Grevy's zebra. The reviews were very positive. SocioScape allowed the participants to gain new insights into the movement patterns of zebra groups, and the influence of these patterns on the social structure of the population.

Users using SocioScape collaboratively

Combining space and time

80% of data collected today is spatially referenced one way or another. Many types of social behavior is directly influenced by the spatial position of individuals and their movement in the environment.

Visualizing the movement of groups or individuals in the environment side-by-side with the social structure of the population allows greater insights into the role of the environment in shaping the social structure of the population.



Rethinking social network visualization

To represent the evolving nature of the social structure, the *Affiliation Timeline* unrolls the social network in time, showing the different communities and their development over time.

Communities are represented by non-overlapping rectangles, and individuals are depicted with contiguous lines. At any point in time, individuals that fall within the same rectangle are said to be affiliated with that community. When an individual switches its community affiliation, its line is skewed towards the new community at the timestep at which the switch occured.