

Position paper for workshop on “Spatio-Temporal Constraints on Social Networks”

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Life in our mobile information society depends strongly on the interaction between networks, such as data and communication networks, transportation networks, and social networks. Space and time function as the major constraints for individual networks as well as for various network combinations. Examples are local area networks, which are bound to a spatio-temporal region; public transportation networks, which are spatio-temporally constrained and may connect to other nearby public transportation networks; and social and real-time information networks, such as Facebook¹ and Twitter², which are subject to potential access restrictions for a particular space and time (e.g., “China Blocks Access To Twitter, Facebook After Riots”³).

Spatio-temporal constraints impact social networks in different ways:

- They serve as *accessibility constraints* to a social network, e.g., scientist networks for citizens of a particular country that work abroad.
- They impact the *social capital* of the members of a social network, e.g., Couchsurfing, a worldwide network for making connections between travelers and the local communities they visit⁴ (Pultar *et al.* 2010).
- They serve as *dynamic participation constraints* in services such as shared-ride trip planning (Raubal *et al.* 2007), whose members may form a social network by rating each other.

It is interesting to note that the constraints work both ways. The examples clearly demonstrate that spatio-temporal constraints impact social networks but social constraints also impact spatiotemporal networks.

Investigating spatio-temporal constraints on social networks (and vice versa!) involves different research questions, such as:

- How can we formally represent social and other networks in Geographic Information Services in order to allow for an impact analysis of spatio-temporal constraints? How should the results of such analysis be presented to the users of these systems?

¹ <http://www.facebook.com/>

² <http://twitter.com/>

³ <http://techcrunch.com/2009/07/07/china-blocks-access-to-twitter-facebook-after-riots/>

⁴ <http://www.couchsurfing.org/>

- Is there a need for novel analysis frameworks that closely tie the spatial, temporal, and social components together or is a spatio-temporal extension to social network analysis sufficient?
- How can we quantify the impact of one network change on other networks? There seems to be a feedback loop, for example, spatio-temporal constraints impact social networks and in turn social constraints from such networks impact spatio-temporal networks.
- How can we best visualize different network levels and the impact of spatio-temporal constraints to offer users visual decision support?
- What are the critical applications where spatio-temporal constraints have a large impact on social networks? Which data sets are publicly available so that they can be used for benchmark testing?

Answers to these questions will help in the design of geospatial and social services that allow users to understand the impact of spatio-temporal constraints and network changes on social (and other) networks and offer optimal decision support in areas such as electronic tourism, agent-based collaboration (Raubal and Winter 2010), or transportation infrastructures.

References

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