

Position Paper

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In less than a decade, online social networks have risen to become some of the most popular sites on the Internet (Cosenzo 2010). Leveraging user-generated relationship linkages, such sites facilitate casual communication among friends and those with similar interests. The massive popularity of social networks has driven their evolution to include more diverse relationship types, such as business-to-business, business-to-consumer, teacher-to-student, and others. The ancillary effect of the derived social graph is the ability to automate recommendations from linked individuals' attribute similarities; such recommendation systems often provide the sites' sustaining business model via targeted advertising (Mitra and Baid 2009).

While a great deal of research has been conducted on the nature of the social graph (Barabasi 2003; Watts 2003), less work has been undertaken on such graphs' spatiotemporal embedding. That is, how does the "real world" affect network capabilities and what are the nature and magnitude of those impacts? For example, users in transit likely engage differently with the network than those sitting at a desktop computer. Similarly, since users may not be connected at all times to retain linkages, most social network communication is asynchronous. A message sent from one user to their connections will not be received simultaneously because not all participate in real time. Even with increasingly prevalent mobile clients, asynchronous communication is likely to persist in Web-based social networks due to imperfect hardware infrastructure and varying user interest.

Many goals and tasks performed by social structures require specific spatiotemporal configurations. The positional arrangement of groups, such as sport teams, military units, and nuclear families, may allow prediction of underlying linkages and functions. The pursuit of a general approach for disentangling social network relationships and goals based on spatiotemporal configuration might be built upon Hägerstrand's (1970) notions of Time Geography.

The initial undertaking presumably would be to census and classify social tasks. These activities might include food gathering, defense building, shelter construction, child rearing, and so on. Each task would then be defined by their common, associated spatiotemporal signatures. Such an inventory may eventually lead to better characterization of networks that do not include a social structure's entire population, allowing position and role prediction of off-network and hidden

individuals. Given the mathematical properties of social graphs, such questions could be framed conceptually or solved as a set of operations research optimization problems.

References

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