

# The power of dynamic spatial and temporal characterization in social networks

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## **Abstract**

*Social networks tend to form topically around shared subjects, affiliations, events and causes. They assemble and disperse and their boundaries in space and time depend on their topical viability. Physical and temporal distance are of lesser or greater importance in different communities.*

*Social networks, like all networks, compete for resources. They require some form of presence, effort or participation. The investment that people make in social networks depends on the visibility and relative importance of the network topics to potential participants.*

*Time and space provide us with a convenient and shared backdrop for understanding dynamic social networks but traditional spatial and temporal boundaries are often replaced by domain specific references to regions, events and schedules. Community specific notions of space and time and their relative importance are needed to understand changing network topology.*

## **Introduction**

When understanding the dynamics of a social network, it is important to understand the bonds that unite a particular social community. In different communities, the notion of “half time,” polling day or religious service can replace traditional temporal patterns. Religious, trading and familial patterns break down traditional political boundaries in the spatial domain. The temporal and spatial patterns are often driven by the shared context, key events and semantics of the community members.

By using generalized models for space and time and focusing on capture of events that preserve time and place, context and semantics of the specific social networks can be incorporated and the traditional backdrop of more familiar space and time presentations can be used with community specific perspectives thus facilitating a better understanding of regionalization and cadence in different networks.

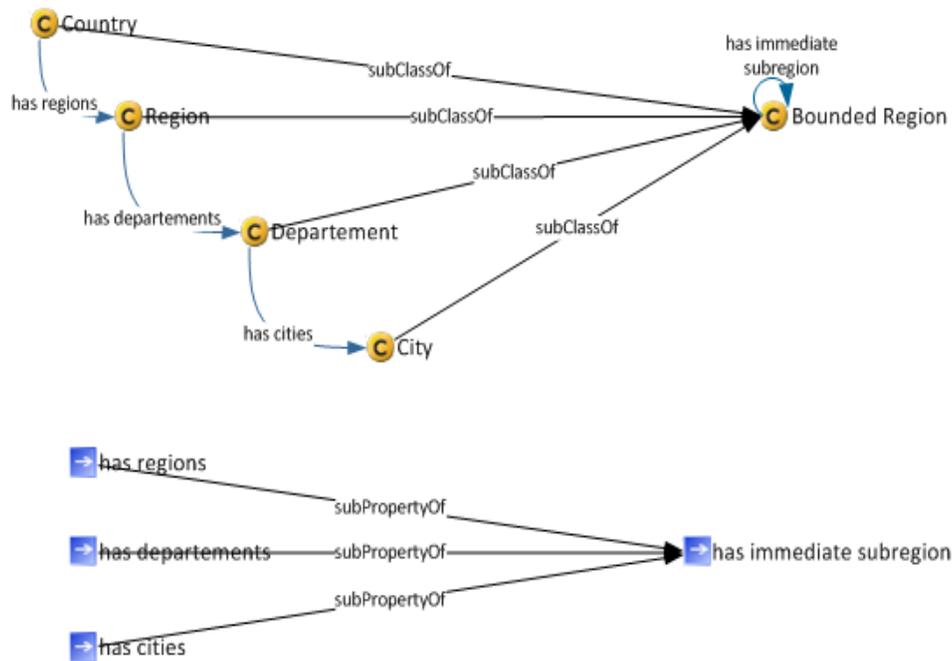
## **Space: A Generalized Bounded Region Ontology**

A very general bounded region ontology lets different communities view space in different ways. Regions can be of any size or shape and are often defined dynamically by their properties. Events can re-shape regions and containment can change over time.

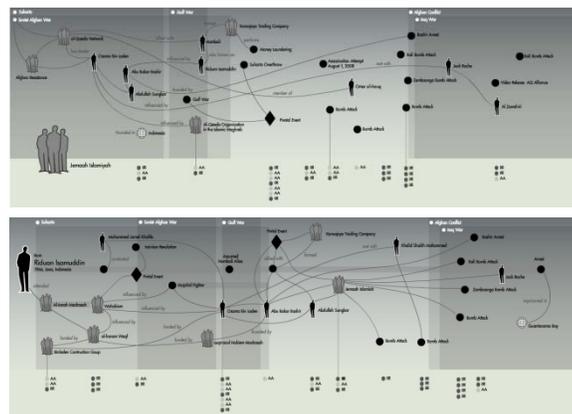
A bounded region is defined by its community and known physical locations are mapped into the more general region based models.

The ontology itself is very simple; a single class and a small number of interconnected relationships. It is sufficient to address the ideas of containment or nested regions and

relate regions to more traditional political boundaries. When used with an event driven schedule ontology, it paints a picture of spatial temporal change in a network.



A generalized schedule ontology complements the bounded region ontology. It allows different communities to define key temporal events in community or subject specific ways. The presentation below shows a traditional timeline with different subjects of interest (in this case, a group and a person) where the temporal events are adjusted for the community specific interests.



Using events in lieu of specific properties allows capture, contextualization and spatial/temporal reasoning that is otherwise difficult. Representations that are based in the present (is employed by, is member of, etc.) instead of event based (with start and end) limit

understanding of change in both time and place. Event based representations allow derivation of current state from different perspectives and can facilitate understanding of changes in the state of a social (and other) networks.

Social networks are, by their nature, constantly moving in time and space. Participants and roles change, people move, outside events drive participation changes. However, understanding of the network dynamics can be easily understood if general event driven spatial and temporal models are used to describe activity.