

Humanize Geospatial Science for Human Dynamics Understanding

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Over the years, we have developed GIS databases with expanding coverage of geographic features and phenomena at increasingly finer space-time resolutions. Advances in temporal GIS popularize change detection, tracking, and other space-time investigations with abundant supplies of spatiotemporal data and analytical tools. However, geospatial data remain predominantly about the environment (physical, biological, built, social, and economic, etc.). GIS database models represent diverse arrays of spatial objects and fields. Spatial patterns and spatial relationships of these spatial objects and fields are central to GIS analyses.

However, our modeling of the world remains incomplete without capturing what people do in geography. People carry out daily routines, social or political activities, and community fairs. Natural or anthropogenic processes drive environmental events. All these human and environmental events as well as their interactivities inscribe the hosting space and accumulate experiences and memories that make a space a place. While spatial databases for environmental events, such as hurricanes and wildfires, are generally available, spatial data on human activities are lacking or challenging to assemble. Tweets with geotags or place references are one major source of data to reveal what people do at locations. Events extracted based on keyword searches are limited to predefined terms that may or may not catch events that are unique or significant to specific locations. Hash-tagged events are most likely to notate political or environmental events with large-scale appeals. Community events or social activities that are local may be missed in tweets, but they play important roles to give shared life experiences and memories and strengthen community resilience.

The World Web Wide and cloud computing are now the primary platforms for event announcements. Community e-calendars, digital newspapers, and on-line event information and ticketing services, for example, are rich sources to harvest information about what people do and where and when activities and events take place. By constructing what has happened, is going on, and will be happening in a space, we humanize current GIS data of digital spaces to digital places with characters, rhythms, and stories of shared life experiences. Furthermore, we humanize spatial relationships of places by revealing spatio-social rhythms of what people do in one place (e.g. a city) relates to what others do in another place (e.g. its suburbs) over time (e.g. a year). The kinds of events and their annual cycles in a college town would be distinctive from those in a mining community. Likewise, what events and how often they take place in a music city will be quite different from a historical village. A metropolitan area would have convention seasons, and a touristic town could be rich in art fairs. Moreover, historical events make emotional connections at places. Restaurants with celebrity visits would enrich patrons dining experiences, for example. Hence, keyword searches might miss important types of events in places. Web crawling or harvesting with event ontologies and natural language processing would be necessary, and new research challenges and opportunities arise to humanize big geospatial analytics:

1. Harvest event data from open sources: web pages, e-calendars, API to event information web services, e-newspapers, and other web sources with heterogeneous contents and event descriptions which could challenge accurate recognitions of events, places, and schedules.

2. Develop efficient management for event data: robust and efficient indexing schemes for space and time, frameworks to integrate event ontologies, and processes for event data handling and integration.
3. Innovate new conceptual frameworks for geospatial analytics: spatial narrative building, horizontal and vertical integration of events, place emergence and development, temporal complements among places, and spatial complements among narratives (meaningful connections of events).
4. Visualize and communicate places, rhythms, collective experiences, and becoming.

Nevertheless, pilot studies with specific data sources can shed light on the possibilities and promises of the new research direction. Hence, I plan to share a pilot study for discussions at the workshop.