

The Map is the Net. Towards a Geography of Social Relationships

Augusto Celentano¹, Piero Mussio², and Fabio Pittarello¹

¹ Dipartimento di Informatica, Università Ca' Foscari di Venezia, Italy
{auce,pitt}@dsi.unive.it

² Dipartimento di Informatica e Comunicazione, Università degli Studi di Milano, Italy
mussio@dico.unimi.it

Abstract. In social networking maps can improve the users perception of the social environment, supporting them with a visual representation of other people's social properties and of the relations among the community people. This position paper addresses the fundamental issues related to the use of maps for representing the social environment and for interacting with it.

1 Introduction

Traditional maps permit the communication and sharing of knowledge and are used as boundary objects for cooperative activities. Maps arose as media for representing, communicating and reasoning on territorial phenomena, such as the cadastral or the geographical ones. However, the geographical metaphor was soon adopted to represent systems developing in space—such as the human body maps—but also abstract systems, schematizing intangible phenomena which can be described through a geographical metaphor.

The metaphorical Map of Tenderness [1] is the first of a rich family of maps in which different domain of knowledge are represented as metaphorical territories —such as the “mental maps” to describe a person's personal point-of-view perception of a domain, or the “concept maps” to schematize learning and teaching processes, map depicting common interests among participants to a conference, or co-authoring of papers [2]. Maps can also be the expression of a general social ‘mood’ of a part of the environment, derived for example from an interpolation of events related to the locations of the humans participating to the social network (such as a map of the risks associated to different areas of the city), bridging geographical metaphors with information visualization.

Hence, the class of *geographical* maps can be refined into two main broad categories: *reference* maps (also called base or geographical maps in literature), representing the territory, and *thematic* maps, representing physical to social phenomena diffused in the territory. Social networks enhance the role of thematic maps by marking locations with data relevant for a community (e.g., a map of emoticons about restaurant quality synthesized from a set of user reports). A third type of maps, the *metaphorical* maps take a phenomenon which is *not* related to the territory, but represent it with a geographic metaphor. Metaphoric maps are useful for identifying social parameters such as friendship relations, or commonalities of interests, while geo-located maps represent the social environment in relation to the location in the real or in a virtual world (such as Second Life, <http://www.secondlife.com>). However the boundaries among the three classes of maps are fuzzy and the nature of a map depends on the creative metaphoric ability of the maps authors.

In the Web 2.0 age, maps become new media for knowledge creation, accumulation, distribution and sharing. They evolve to digital interactive and pro-active tools, whose content develops in time and whose physical appearance can be determined on the fly at use time. Users themselves may become coauthors of the map, directly contributing to its evolution.

Cooperative computing traditionally has been focused on collaboration for solving specific tasks; social systems extend the use of computer supported communication and collaboration for promoting friendship, for communicating thoughts and feelings to people that share common interests, and for enhancing the exploration of the social environment.

In social networking maps can greatly improve the users perception of the social environment through the visual representation of other people's social properties and of the relations inside a community. Maps improve also interaction among users, who are able to visually identify and relate each other through the perception of location, distance and grouping. Maps are useful as a real-time representation of the social environment dynamics, and for localizing events such as meeting, entertainment, public places, that can affect the virtual community evolution.

A large literature has addressed social networks and virtual communities. At our knowledge their representation with map metaphors has only be addressed for display purposes, leaving interaction control and interaction related issues a field still to be analyzed.

2 From geographic to metaphoric maps

In the human history mapmaking has evolved from craft to science and has set rules to help people to interpret maps in a unique way. Based on geometrical properties and transformations from a 3D world to a 2D surface, maps have become more and more accurate, as the technology for the measurement of the Earth surface has evolved.

It is however easy to argue that a representation, even made under fixed rules, may be biased by the goals and thoughts of the author. Born to be objectives, maps are the concrete projection of the point of view of people and organizations drawing and delivering them. The wide criticism to Google's decision to remove the imagery of New Orleans after the Katrina hurricane has made evident that also the photographic evidence can be masked under social or commercial pressure (note: we do not comment or evaluate the reasons behind the decision or Google, simply note that their maps of the New Orleans area didn't represent objectively, from September 2006 to March 2007, the current appearance of that part of the land). More evident is the subjective role of maps drawn to represent partial views over a geographical area, such as the thematic maps illustrating the development of human activities.

Thematic maps show a shift from physical evidence to political relevance (using the word "political" in a very general meaning): thematic maps are the representation of a feature of a land which is not measured with geometrical units but with units bound to the impact of that feature on the economic, political or industrial society.

Maps evolve to be the background on which different types of information can be placed, becoming an important corner of information visualization techniques and metaphors.

Thematic maps are a visual representation of a qualitative evaluation or a quantitative measure of a phenomenon. The gap for abstracting from phenomena bound to the land to general information is not large. Metaphoric maps take the geography as a metaphor and draw relationship in data organization as relationships among locations in a abstract world.

While also metaphoric maps display an imaginary territory, their main purpose, rather than being tools for reasoning on land, is offering a visual representation of some knowledge. That is a significant difference with geographical and thematic maps, that are conceived (also) as tools for supporting and helping a user that moves in a real or virtual world. We can say that metaphoric maps, rather than being geolocated representations of an external real world, are representations derived from the direct mapping of a world created by the author. Also the navigation paths represented inside of them are metaphoric, as demonstrated by a well know map with historical value: the Map of Tenderness (*Carte du Tendre*). This map, by Madeleine de Scudéry [1], was first published in 1654 in her romantic novel *Clelie*. Quoting [3] "The map details the distractions and pitfalls—depicted as town and landmarks—

that lovers encounter along their journey from New Friendship (the town at the bottom center of the map) to intimacy.”

After abstracting from the idea of quantity, a further step has been to abstract from the structure relating data to be mapped, in a process leading to concept organization, as done by mental maps.

3 The map is the net

Maps, both geographical and metaphoric, are able to visualize with great evidence spatial relationships such as distance, adjacency, clustering, distribution, etc. We could well say that the geometrical and topological properties of the world are so easy to understand that they become a metaphor also for describing concepts which do not have a physical counterpart, but benefit from relationships mirrored from the world geometry. Therefore maps can join physical and conceptual representation in a unique visualization where geometric distance and conceptual distance concepts can be represented together.

This is the basis on which geography and maps are evolving with products like Google Maps, which through a simple yet powerful mechanism of marking and annotation allow users to related the space with social activities and relationships. Geographic maps are used as a background layer over which layers of human activities cause relations to become visible.

This is not, however, too far from conventional mapmaking tracing the human modifications of the environment induced, e.g., by roads. Roads are both a part of the territory and a map of human relations. As virtual roads are traced between human activities, the maps describe a geography of human relations more than a geography of the underline real world.

If we focus on the relations induced by information technology, the map is a vehicle to understand the structure and the evolution of the net. Can we go further and claim that the map is the net? In other words, can we claim that the map is not a mere transcription of a reality which exists by itself, rather that the net, while existing by itself, can be known and used, only if it is represented through some visual, graphical scheme, i.e., a map? Can a map be an objective and faithful representation of the existing social relations, or does any map interpret them according to some methods, thus filtering the original information?

4 Seven issues for a geography of social relationships

We borrow the title of this section from the famous paper by Frank Halasz on Hypermedia [4], which has set a reference framework for the research in the area. We aim at responding in a creative way to the question posed at the end of section 3, stimulating the research in the area of HCI for social networks with some reflections on the role of maps in guiding, documenting, mirroring and anticipating the human relationships. Besides being a magic number, seven is also a comfortable size to condense a large number of issues in a few fundamental areas of discussion.

We shall introduce the issues in the shape of questions; without expecting to be able to formulate complete answers, we provide hints for stimulating the discussion and the research in the field.

4.1 Which are the most useful social parameters that a map representation can efficiently communicate to the users?

Social networks as organized today, i.e., as they appear through the Web 2.0 applications, do not exhibit formalized ideas about their organization and structure. Free tagging and spontaneous convergence of keywords seem to characterize several communities able to self-organize their vocabulary without stated rules. It is not easy to perceive social parameters in that. However, it is evident that

users are able to coordinate themselves to gain a complete and generalized understanding of their interests. If we assume that a tag cloud (a data representation often used to access information in community portals) is really a relevance map of the keywords, hence of the concepts, which glue a community, the map makes evident at least three properties:

1. There is some mechanism in the users, a kind of “relevance feedback”, which boosts the differences in concept importance. It is rare to face communities where tags are uniformly used, and the most used tags are different in different communities.
2. The tag distribution in different communities classifies users in equivalence classes, which might correspond to a classification of the social status.
3. The use of jargons and of group languages might well be a signal of the cultural background of the users.

4.2 How can individual parameters be integrated and interpolated to visualize a (possibly evolving) social ‘mood’ of the network?

If the parameters are measured in a nominal or ordinal scale, often the social or affective mood evaluation can be reached through a cooperative evaluation process, for example based on a bargain exploiting some map annotation technique, through which users (of the system: the experts in charge of the evaluation) express and compare their views, comment and ranks. The final evaluation mark can be resumed by some symbolic representation, such as an emoticons. The emoticon, like a synthetic title, resumes the result of the bargain, and can act as a link to the annotations of the experts. In this way not only the final ranking is expressed, but also the whole evaluation process becomes accessible.

4.3 Can the map facilitate the human use of the net?

Semantic web is aimed at obtaining machine inter-operability of web resources. Human inter-operability of such resources is however questionable.

Machine inter-changeable data must be translated to a human manageable form. However human manageable form are not unique, because a signal is interpreted by humans according to their different cultures, skills and current situations. A set of data in machine operable form should be translated into localized forms which are properly operable by different humans in different situations. Are map based representations a more intercultural way to represent content, to be communicated?

4.4 Which is the role of geographical versus metaphorical maps in dealing with people physical and emotional neighborhood?

Social geographical maps may have a more direct emotional impact on users, because they may precisely relate the presence of humans, associated to information such as their profile, to the territory. The impact is augmented whenever such maps are consulted on the field, e.g., with a mobile device, in a situation where the physical limits of the user are directly related to the environment. For example, knowing that a criminal lives in the neighborhood of a street the user is walking in may have a strong emotional impact, leading her/him to change direction to avoid a potential danger; on the other side, knowing that people sharing the user interests are in the physical neighborhood may have an attractive role. In both cases the user emotions and interaction are directly influenced by the information visualized by the map.

Social metaphorical maps may offer a deeper view of the relations between people, but they need to be further elaborated by the user for applying to the specific situation and location. Therefore their

emotional impact on users is not direct.. The potential of metaphorical maps however lays in their abstraction, that may enable the user to take advantage of their information in a variety of situations and locations.

4.5 How can novel visualization and interaction techniques improve the user perception of the social environment?

A must is that the visualization and interaction techniques be familiar to users, i.e. the system visualizes its data in visual, graphical notations which are understood by users and can be accessed through actions familiar to users. This calls for a system localized to user culture. Several techniques are foreseen for localization: the first is to have an archive of abstract definitions of the concepts to be managed by the system, and several archives which define the user culture profile. identifying the user visual, graphic and colour languages , as well as his/her written and spoken language. At login time, the system links the concepts in the archives to their representations and generates a localized version of the system. A second techniques is to produce several different copies of the system, each one devoted to a cultural community, but the problem arises of maintaining the different versions aligned.

4.6 How is the development of context-aware and ubiquitous systems contributing to improve the map based interaction to discover and access social services?

Ubiquitous systems and context aware systems are tightly related since the dawn of this area. In context aware systems, location has been considered for long time a privileged context descriptor. The privilege in part derives from the ease to acquire, measure and compute spatial coordinates and discrete locations. The human ability to relate oneself to the surrounding space and the space-based nature of most human activities has boosted location awareness to its full exploitation. RFID, Bluetooth and GPS, to cite three popular technologies for location processing and data exchange with the neighborhood, are technologically mature, have a wide diffusion and are increasingly used as data and context providers to personal and social applications.

Identifying a location is, however, only a first step to identifying the services available in that location. The inverse problem, to identify a location where a given service is supplied, requires a proactive role of services which is not yet an acquired result with current technologies.

Service discovery, a growing research theme, collects services available in an environment and links them in plans. This is a prerequisite for visualizing them on a map with proper spatial coordinates, attributes and plan routes. Conversely, maps can provide the visualization front-end for service discovery, creating a synergy between the two areas.

4.7 Which are the privacy concerns related to the representation of the social environment?

Privacy concerns are one of the most serious drawbacks of the explosion of net-based social activities. Leaving apart the issues related to the abuse of personal data (such as credit card number steal), exposing to the net own's preferences, habits and social choices can overcome the goals set by the service providers.

One of the most critical issues is the management of world-wide applications in presence of substantial differences in the regulations of different countries. A very simple example comes from Wikipedia, whose policies about copyright about the article content are differentiated across the countries to mirror local regulations, leading to different localized content. More complex examples, less visible by the general public, are the services provided by telephone carriers about the logging and delivering of traffic data.

Such a scenario makes the service providers aware of local restrictions, which conflict with the idea of giving world-wide services, and of extending the services delivered to catch a larger part of users.

Social networking has one more problem, due to the lack of a superior authority able to control the delivery of information. While every user is authorized to deliver information about him/herself, how can we check that such information does not touch other users' privacy, still retaining the free and self-regulating nature of such networks?

5. Examples from the personal safety domain

Crime is one of the most explored domains in social maps exploitation. Chicago Crimes (<http://www.chicagocrime.org>) is one of the most famous sites of this type. It is an independent web site that displays on the top of the Chicago map the locations of criminal events happened in the town, starting from 2005. The site is constantly updated with data coming from a public database maintained by the Chicago Police Department and offers a number of possibilities for accessing information. Data can be accessed by crime type, street and other variables. One of the most interesting features is the possibility to visualize crimes along a path defined by the user; additional filters such as the day hour or the crime type can be applied.

The Chicago Crimes site is primarily targeted at showing the location, the time and the type of crimes happening in Chicago, rather than focusing on the criminals' identity (although blotter, an additional service of the site, started in 2006, links a selected set of crimes to the related news appeared in the Chicago Journal newspaper). In this sense we may say that privacy issues for this site are more related to the reputation of a specific ward or street of Chicago, rather than to individuals.

A different approach is taken by the California Department of Justice's Internet web site (<http://www.meganslaw.ca.gov>), which lists designated registered sex offenders in California. The site allows users to search the database by a sex offender's specific name, address, ZIP code and city/county listings.

The site is targeted at crime prevention, therefore allows the user to obtain detailed personal profile information about the sex offenders, in cases where the law allows the display of a home address. An additional service allows the user to select a park or a school and visualize, as a result, the location of dangerous subjects located within a specific distance (e.g., one mile).

While the examples cited above leave to the user imagination the task of deriving the specific 'mood' (if any) of the environment, a more scientific approach is proposed by researchers that take advantage of statistical techniques such as spatial analysis to derive information about the life quality of a certain place [5].

One of the most interesting efforts is being performed by the researchers of the National Institute of Justice (<http://www.ojp.usdoj.gov/nij/>) that have introduced a number of concepts for the crime analysis, such as that one of hot spot [6] for delineating areas with high concentrations of crime. The National Institute of Justice also distributes for free CrimeStat, a spatial statistics program for the analysis of crime incident locations (<http://www.ojp.usdoj.gov/nij/maps/software.html>). The program interfaces with most desktop GIS programs and provides statistical tools to aid law enforcement agencies and criminal justice researchers in their crime mapping efforts. The program covers spatial description and distance analysis, hot spot analysis, interpolation, space-time analysis and journey-to-crime estimation (for estimating the likely residence location of a serial offender).

6 Conclusion

The introduction of IT technologies induce an evolution in the nature of maps, which evolve from static representation of knowledge related to Earth or that can be organized following the geographical metaphor, to dynamic, proactive new media for creation, accumulation, distribution, management and sharing of such knowledge. This evolution creates new opportunities for knowledge creation and sharing but also creates new hurdles and fences for knowledge user. The aim of the workshop MapISNet - Map Based Interaction in Social Networks is to try to focalize the problems that we have characterized with seven topic issues.

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