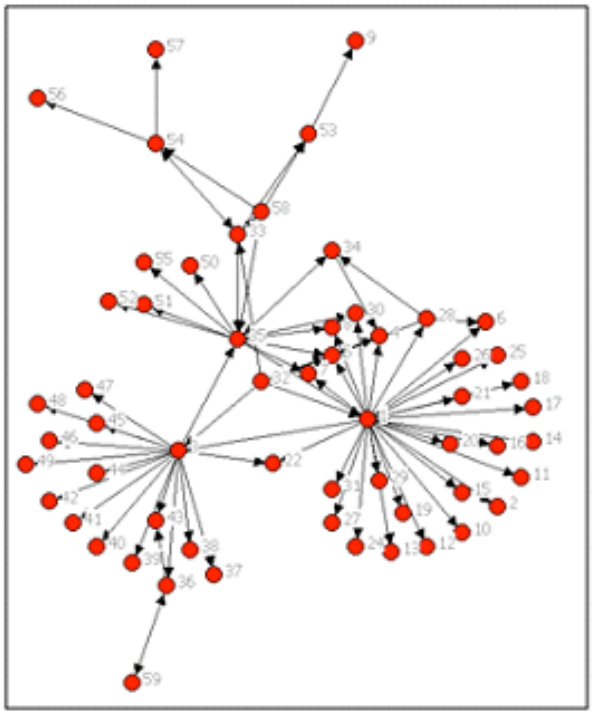
P-016

THE USE OF SPATIAL INFORMATION IN SOCIAL NETWORKS ANALYSIS

DELAZARI L., BRANDALIZE M.C.B., SLUTER C.R.
Parana Federal University, CURITIBA, BRAZIL

This paper presents some results of mapping different aspects of social networks according to social scientists needs. A social network is defined as a social structure comprised of individuals and/or organizations usually represented as nodes of a graph that are tied together according to their type of interdependency. This paper also focuses on social networks that are established through the World Wide Web, which are considered to be complex structures. These networks are extremely dynamic and, therefore, conflicts can arise because the geographic location of the actors and their spatial relationships changes constantly. Differently from geographic space, cyberspace is not defined by geographic physical elements. This is a great problem to cartographers when their intention is to represent and visualize social networks established in virtual spaces. Therefore, despite the importance of depicting the spatial locations of social network actors, such structures are usually analyzed by means of tables and 2D graphs, as presented in Figure 1.



Id	Nome
1	COEPPR – Comitê de Entidades no Combate a fome e PelaVida
2	Secretaria Municipal do Abastecimento de Curitiba
3	Pastoral da Criança
4	SEAB- Secretaria da Agricultura e do Abastecimento
5	CONAB - Companhia Nacional de Abastecimento
9	Conselho Municipal de Segurança Alimentar e Nutricional de Curitiba
14	SESA - Secretaria de Saúde
15	UTP - Universidade Tuiuti do Paraná
16	SANEPAR - Companhia de Saneamento do Paraná
19	Itaipu Binacional
21	IBGE - Instituto Brasileiro de Geografia e Estatística
22	UFPR - Universidade Federal do Paraná
23	Fundepar
26	Correios
29	UTFPR - Universidade Tecnológica do Paraná
27	Emater
32	Conselho Estadual de Segurança Alimentar e Nutricional do Paraná
30	Copel
33	Forum Estadual de Segurança Alimentar e Nutricional do Paraná
34	CEASA - Centrais de Abastecimento do Paraná
41	Kraft Foods do Brasil
48	Federação das APAES
52	Casa da Moeda do Brasil

Figure 1 – Graph and table related to Food Security Network

The representation of the spatial location of the network actors is needed for the analysis of social agents' proximity and neighborhood relationships. Moreover, the attributes (characteristics) of the graphs elements must be depicted due to the need of analysis of clusters, dispersions, tendencies and areas of influence. Users are sociologists, experts in social networks, that need to know the sort of social agents by regions in order to analyze which regions are aided by governmental agencies or non-governmental organizations; the users also need to know the characteristics of connections, the number of social agents in different States of Brazil, considering their organizational characteristics (governmental, non-governmental, third sector) and their connections (if ideological, by project, and so on). In order to get a solution to the problem of social network visualization and analysis, this research presents a methodology for mapping the different aspects of this type of network. The referred methodology was applied to represent and analyze a series of social networks regarding individual's social rights in Brazil. According the Brazilian Constitution of 1988, the individual's social rights comprise Housing, Health, Education, Labor, Food Security and Social Assistance. The data necessary to establish these networks were collected through

interviews, questionnaires and the Internet. Curitiba, capital of Parana State, Brazil, was used as the geographic main location for the establishment of the networks analyzed in this study. Concerning the referred networks, the main social agents of each network, their partnerships and links were identified, characterized and mapped, first using conventional social network software, like UCINET. Afterwards, the results from these applications were exported to ARCGIS software to proceed with the geographic analyses. The cartographic language was applied to the representation of networks (social agents and their connections) based on the organizational characteristics of the social agents (governmental, non-governmental, third sector) and their connections (if ideological, by project, and so on). The classification of social agents and their connections are presented in Figure 2a and 2b.

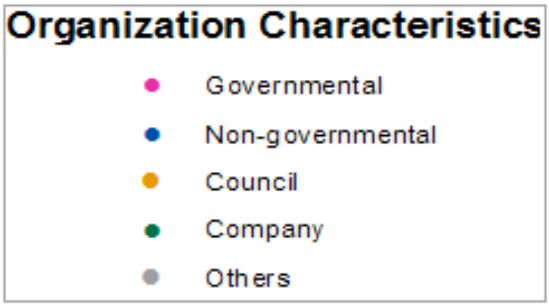


Figure 2a – Social agents classification *Figure 2b – Connections classification*

The methodology also comprised the representation of the referred networks in the cyberspace, using Google Maps platform (API: Applications Programming Interfaces, and GML: Geographic Mark-up Language) and its geographic database as background. At this stage, it was possible to examine how to represent the network connections and nodes, through vector and attribute data representation tools that were available in the same platform. The online representation of actors and organizations of a network and their relationships (as seen in Figures 3 and 4) through the Google platform employed the results from the TouchGraph application, an online java applet that investigates the relationship between hyperlinks by analyzing keywords in the contents of the websites.

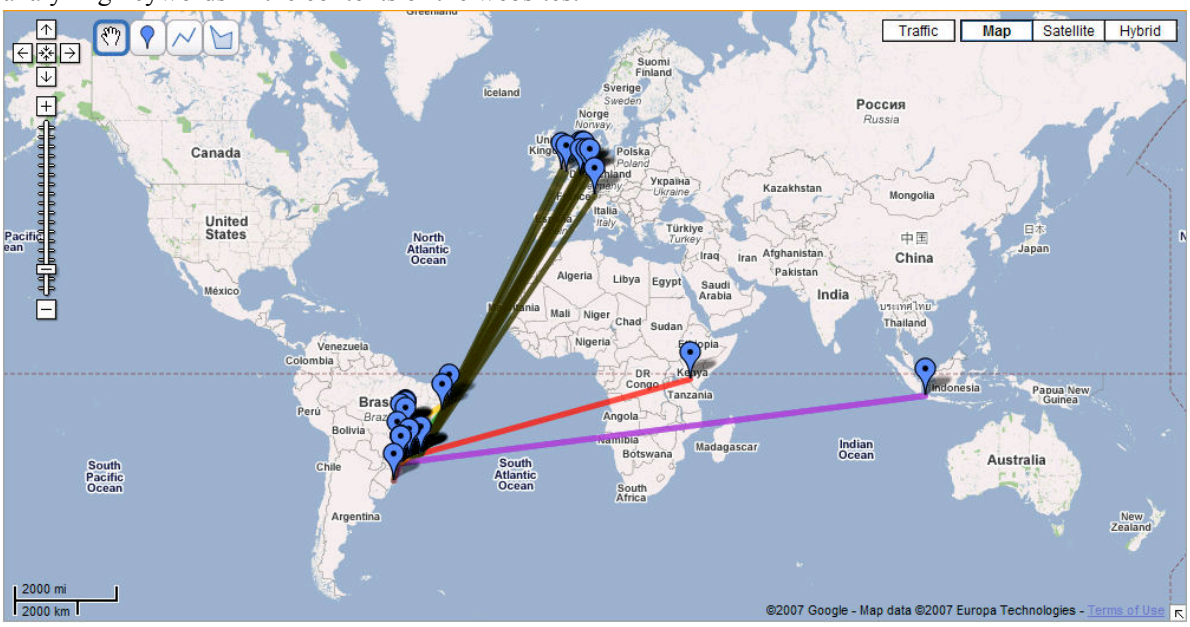


Figure 3 – Example of an online representation of the Housing Network, in a worldwide scale.

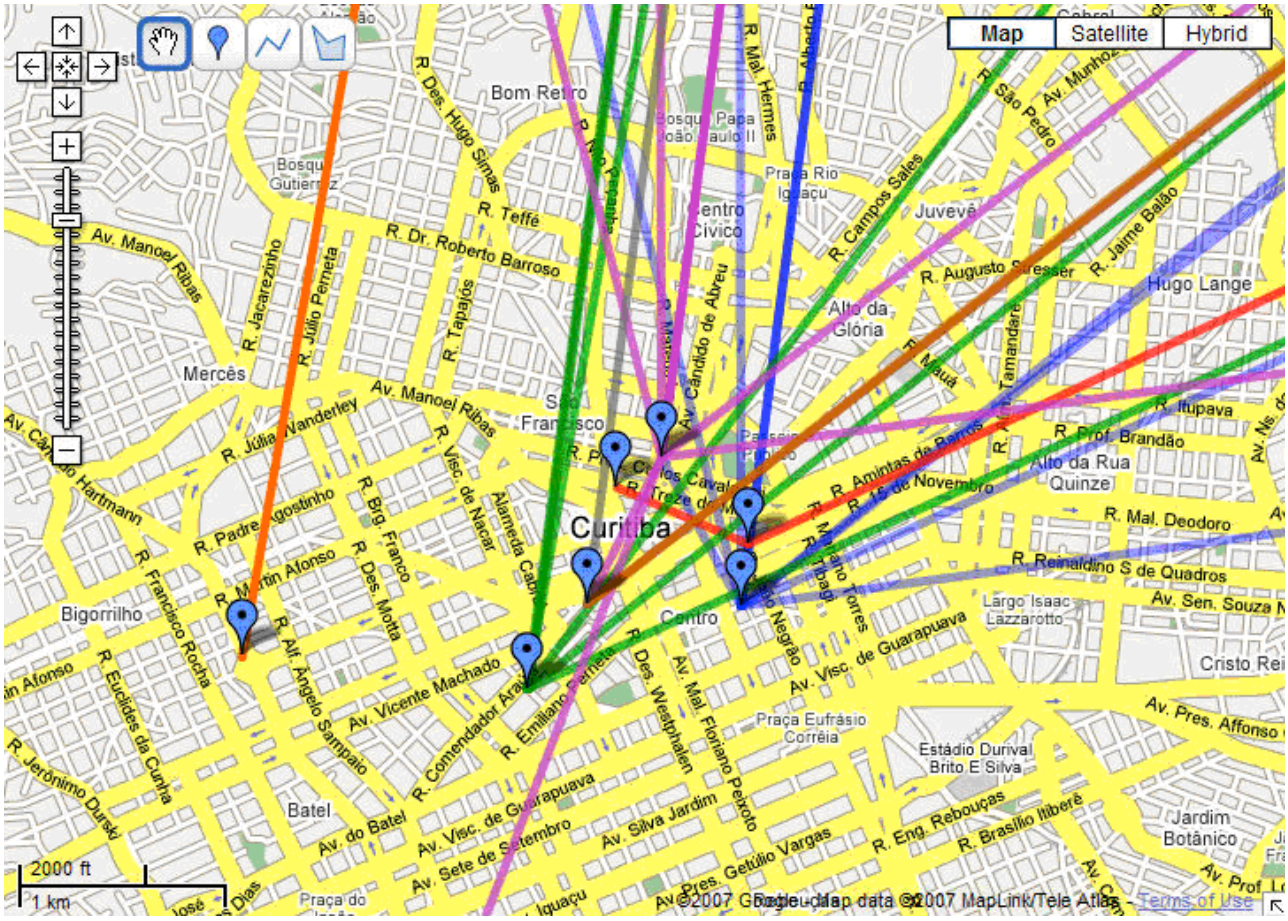


Figure 4 – Example of an online representation of the same Housing Network, in a local scale.

The resulting thematic maps (Figure 5) were presented to the sociologists in order to evaluate their understanding about social networks. The visualization of those maps allowed the sociologists to infer about the dissemination and effectiveness of public policies concerning to social rights protection in all levels of the public administration (municipal, state, and federal). The map users concluded that spatial information can be a methodological strategy to social network analysis, specifically in the case of social rights protection in Brazil. A challenge that still remains concerns the cartographic representation of the attributes of each network component. So far, the results showed that cartographic representation of social network improved the quality of the analyses. As an important consequence we learned that new possibilities of spatially thinking social networks can improve the decision making process related to public policies. The geographic mapping of such networks in the cyberspace is still being explored and the next step is to extend the current planimetric online representation to a 3D environment, like the one made available by the Google Earth platform.

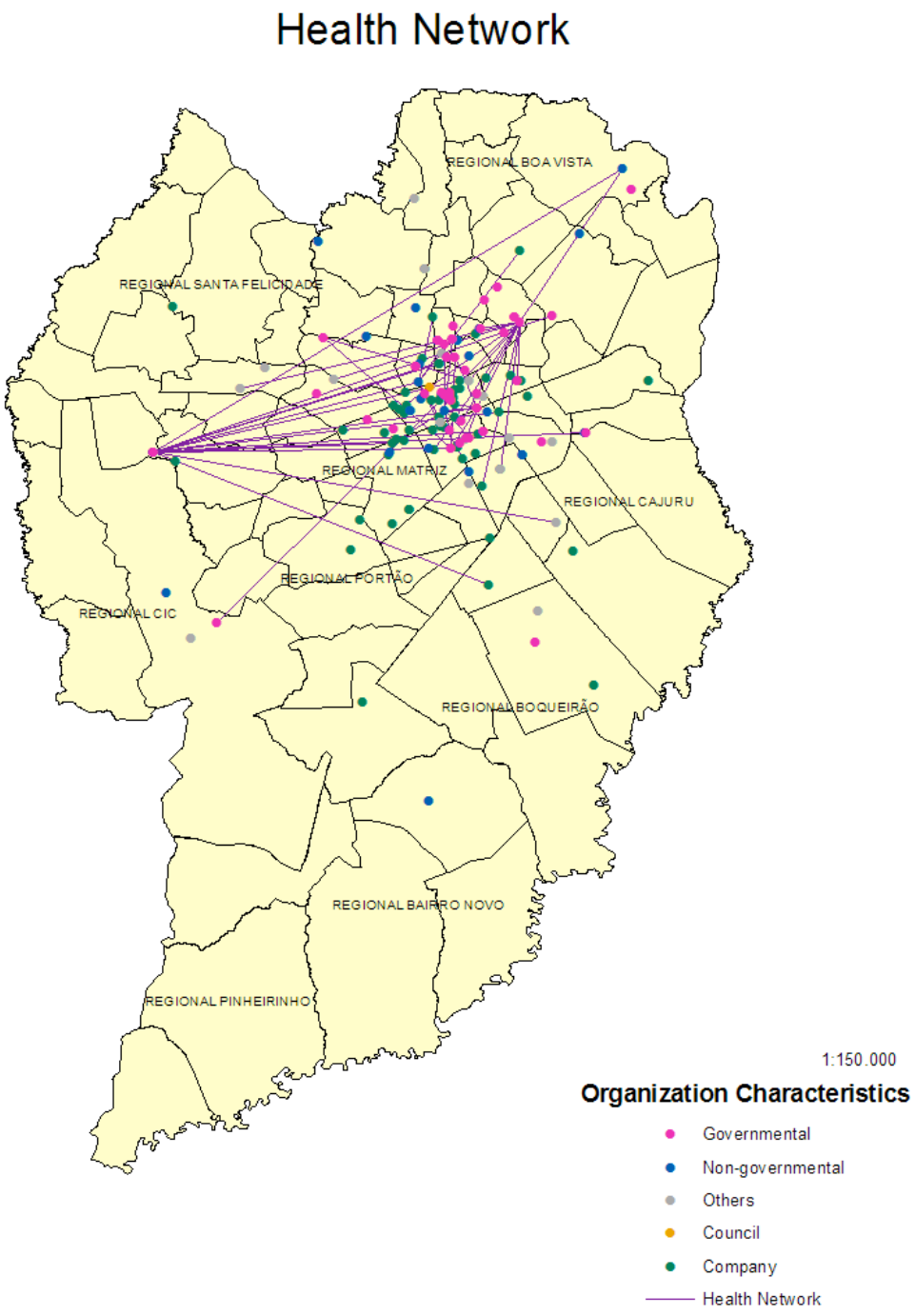


Figure 5 – Health Network Map

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