Chapter 19
Perceiving the Social:
A Multi-Agent System to Support Human Navigation in Foreign Communities

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ABSTRACT

This paper describes a system developed to help people explore local communities by providing navigation services in social spaces created by the community members via communication and knowledge sharing. The proposed system utilizes data of a community's social network to reconstruct the social space, which is otherwise not physically perceptible but imaginary, experiential, yet learnable. The social space is modeled with an agent network, where each agent stands for a member of the community and has knowledge about expertise and personal characteristics of some other members. An agent can gather information, using its social "connections," to find community members most suitable to communicate to in a specific situation defined by the system's user. The system then deploys its multimodal interface, which "maps" the social space onto a representation of the relevant physical space, to locate the potential interlocutors and advise the user on an efficient communication strategy for the given community.

MOTIVATION

Since the advent of computer age several decades ago, the role of various information systems in human knowledge sharing and proliferation has been increasing continuously. At the same time, however, the bulk of information learned by people in their lifetimes still never appears in a database or on the Internet but is readily available to members of various local communities, such as families, school students and alumni, indigenous people, company employee, and the like. This information is typically conveyed via word-of-mouth in conversations on an individual, person-to-person basis. While the modern information technologies traditionally focus on asynchronous mass-communication and deliver a vast array of tools (e.g. electronic libraries and search engines) supporting this form of information exchange, little has been done to assist the essentially personified and synchronous communication occurring daily, as we quire a teacher at a school, ask a local for directions, or seek advice from a friend or the "best" expert in a field (e.g. a doctor or lawyer). Even though existing computer systems do provide for person-to-person information exchange, their support does not go far beyond, say, a postal service that promotes communication among people who are already socially connected in one or another way. Whether we walk on a street or chat using an instant messenger, or else write to a forum of a social network system, our chances of obtaining information of interest are roughly the same. It is then our abilities to navigate social spaces (which are, at best, partly known) and to initiate and maintain communication at a level of synchronicity optimal for given time constraints that determine the success or otherwise of an information quest.

None of the present-day information systems and "e-services" known to the authors targets supporting this essentially "interhuman" navigation process. The very concepts of social space and communication synchronicity, although not totally alien in computer sciences, are presently discussed as quite theoretical and speculative rather than as something that would be practically used in and strongly affect information system design and development (Derene, 2008; Kalman & Rafaeli, 2007). While there is a growing interest to modeling social aspects of human communication and knowledge production processes in the relatively new fields of cognitive informatics and symbiotic computing, the community's present efforts are, however, mainly directed at the theory rather than at the development (see Wang & Kinsner, 2006).

Our study aims at the creation of an information service to facilitate human navigation in (unknown) social environments by enabling people to "perceive" and explore the corresponding social spaces. The envisaged service is also to help the users locate "carriers" of specific information (i.e. advisers) that would be approached in a particular situation. This paper describes a multi-agent information system "SoNa" (*So*cial *Na*vigator) developed to provide the social navigation service.

In line with the most common understanding of the social space concept (see Lefebvre, 1994; Monge & Contractor, 2003), the proposed system reproduces in a 3D virtual reality (a relevant fragment of) the physical space together with members of the local community present in the space at the moment. Unlike the physical proximity, social relationships (e.g. "trust" or "friendship") are usually not directly perceived in real life, but are inferred and "felt" from (collective and individual) communicative experiences. A haptic environment including a force display is then used to convey important parts of the community's communication practices – the "social knowledge" – to the user via the subconscious tactile communication channel. An agent network is created and used by the system to deal with the social knowledge. This network represents a real social network of the community, and the agents exchange information by communicating with their "socially connected" counterparts in the same way as people do it in the real world. Each

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