EmoMap – Considering Emotional Responses to Space for Enhancing LBS

Silvia Klettner, Haosheng Huang, Manuela Schmidt

Vienna University of Technology, Austria

Introduction

Every human perceives urban space differently. Research on environmental psychology shows that all stimuli, including environments, are perceived not only according to physical features but also in terms of emotional responses to them (Russell 2003). Some places are experienced as unsafe, others as especially interesting. This emotional perception is unequivocally subjective and shaped by people's interpretation of space.

Experiences from daily life show that many of our behaviors and decision-making are often influenced by this kind of personal perception and subjective evaluation of space. For example, in terms of wayfinding, which route we take and which one we avoid might not only depend on objective aspects, such as shortness in terms of time or distance, which can be objectively measured from existing geospatial data; but might be influenced by subjective aspects, such as feeling safe or stressed, which are reflected by experiences in space and personal perception of space. What we like or dislike, choose or avoid is highly influenced by our experiences (positive or negative) or subjective views. However, Location Based Services (LBS) are often designed to assist people's daily decision-making, especially spatial decision-making. In order to provide services with high usefulness (usability and utility), LBS should consider these kinds of subjective information about space. However, they are often missing in current geospatial databases.

The project EmoMap introduces the concept of the subjective or emotional element of space, and aims to add a *subjective layer* to the physical environment. This layer, aggregating and storing different people's experiences and personal perception towards environments, can be combined with existing geospatial data that describe the objective aspects of environments to provide smart services in LBS. In the EmoMap project, this subjective layer

will be integrated into mobile pedestrian navigation systems to illustrate its usefulness.

Methodology

In the project EmoMap, we will use the option of user-generated content (UGC) or volunteered geographic information (VGI, Goodchild 2007) to collect subjective experiences of the city by allowing users of a Web 2.0 community to contribute and share their emotions. The data collection will be done in-situ with mobile phones. A mobile application will be provided to the community users. This makes subjective experience in space reportable by "any user" and any time.

The collected data will be aggregated to provide averaged/collective emotional experiences of the city, which represents a subjective layer to the physical environment. The data will be stored in an open online database (OpenEmotionMap.org), and will be open for other projects and can be used, filled and developed by the community continually.

In this project, Vienna will be chosen as the study area. In order to illustrate the usefulness of the subjective layer, the data collected in the current project will be used for enhancing navigation systems for pedestrians by taking into account not only objective data, but subjective, emotional responses to space. We expect that the inclusion of emotional data into navigation systems will enhance users' satisfaction.

Currently, we are working on developing an emotion- and location- model, which links a person's emotional experience with the physical environment. This model is an essential input for developing the mobile application, which can help to collect users' affective experiences in the city. In the following section, we will report the proposed model.

Modeling emotional responses to space

In order to collect people's affective experiences in spaces, we need to develop an emotion- and location- model. This model specifies which dimensions of emotion are relevant and how they are linked to space. In other words, this model defines the information we need to collect from users for building the subjective layer.

For developing this model, we first need to understand how people feel in and about space. When we refer to subjective or emotional responses in the current project, we focus on two slightly different subjective experiences in space: emotions, which we define as feelings in space (e.g., "I feel

stressed”); and environmental qualities, which are properties of environments, which have the ability to cause changes in one’s affect (e.g., “it is noisy”).

For obtaining the most prominent affective experiences related to space, we compiled a set of emotions and a set of environmental qualities. A focus group (N=9) selected all relevant terms from the sets, as well as amended missing or inaccurate ones. To reduce the sets to the most elicited affective experiences, online questionnaires on emotions (completed by N=99) and environmental qualities (N=102) were carried out.

Consequently, those emotions and environmental qualities selected most often were taken as elements in a hierarchical emotion model. We developed a hierarchical structure due to individual differences in the degree to which people are able to characterize their emotional experiences in discrete emotional versus broad affective terms (Feldman Barrett et al. 2007). On three levels, the model will be the basis for the geo-referenced collection of emotion in space. (1) On the most general level, people will be asked to rate how pleasant or unpleasant the environment is perceived (level of broad affect). (2) On the second level information regarding the dimensions stress-relaxation and excitement-boredom will be asked (level of discrete emotions). (3) The last level will provide details about environmental aspects, with the categories of traffic, noise, smell, people, safety, attractiveness and diversity (level of environmental qualities).

For providing a suitable location model, we analyzed different check-in applications, such as Foursquare and Facebook Places. They link users' check-ins to "place labels", each of which basically has a lat/lon point and a name. However, results of the focus group show that people might annotate their emotional experiences to points, street segments, and polygons (e.g. parks and green areas). In addition, some places are hard to be named (labeled). Therefore, we will allow users to link their emotions to points, lines (along street network), and polygons. For each object, only the geometry is stored. In default, their reported subjective experiences are linked to a location which is automatically obtained from GPS devices. If users want to give more details, they will be provided the possibility to define a line in a street network, or even define a polygon.

Work in progress and conclusion

We will use the option of UGC or VGI to collect affective responses to the city by allowing users of a Web 2.0 community to contribute and share their emotions. The above emotion- and location- model will be implemented in

a mobile application, which will be provided to these users to help them report their emotional views anytime and anywhere.

In order to illustrate the importance of affective experiences of the city, the data collected in the current project will be aggregated to a collective emotional/subjective layer, and used for enhancing navigation systems for pedestrians.

Applications will not be restricted to navigation services though. The data will be stored in an open online database (OpenEmotionMap.org), which will be open for other projects. We expect the inclusion of a subjective layer will bring benefits to different disciplines, not only ICT (Information and Communication Technology), but also urban planning, architecture, and policy making.

Acknowledgement

This work has been supported by the EmoMap project, which is funded by the Austrian FFG's ways2go program. Collaborative partners are Vienna University of Technology, Salzburg Research Forschungsgesellschaft m.b.H. and Rittberger + Knapp OG.

References

Feldman Barrett L, Mesquita B, Ochsner KN, Gross JJ (2007) The Experience of Emotions. Annual Reviewed Psychology, 58: 373-403

Goodchild, MF (2007) Citizens as sensors: the world of volunteered geography. GeoJournal, 69 (4): 211–221.

Russell JA (2003) Core Affect and the Psychological Construction of Emotion. Psychological Review, 110(1): 145-172