Knowledge Acquisition about Places

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Place, a concept originating from human geography [1, 2], has recently become a hot topic in GIScience: place is important in human cognition and communication, and hence, is a high priority for human-computer interaction research. But place is also a challenging concept to model, reason with, and analyze in information systems, because of its fluency with context shifts, and its underspecification [3]. Thinking about knowledge acquisition methods—from geographic information retrieval from big data to dedicated user generated content—they seem to involve several disciplines such as computational linguistics, data mining, artificial intelligence, and geographic information science.

The participants of the *Workshop on Place-related Knowledge Acquisition Research* were coming from these disciplines, accordingly. The workshop was held on 31 August 2012 in conjunction with the *8th International Conference on Spatial Cognition*, Germany. The workshop was jointly organized by three research teams from around the world: the University of Melbourne (Talking about Place), the University of California at Santa Barbara, and University of Edinburgh (SpaceBook), and attracted about 25 participants.

In the keynote, Ross Purves (U Zurich) laid out the challenges, but also pathways to approach place as a concept to be captured for databases and used in reasoning and human interaction. He especially was searching for useful definitions of place that allow to progress in formal knowledge acquisition methods, and adopted for this purpose the Panovsky-Shatford facet matrix by merging it with John Agnew's conditions for placeness: (a) an identifiable location, in relation to everywhere else, (b) a locale, which is the actual shape of the space, and (c) a sense of place, which is formed by personal and emotional attachment of people to a place.

A number of (peer reviewed) position papers answered to the challenge set out by the workshop, which had been to "discuss methods to automatically estimate the location of things or events based on verbal or graphical descriptions, or photographs, or a combination of them". Themes covered *observations* such as collections of text corpora, or big data, or attention and emotion mapping, *analysis* such as classification and pattern analysis, or semantic analysis, and *applications* such as guides for navigation, locating things or events, or mapping. The workshop proceedings are openly accessible from http://ceur-ws.org/Vol-881.

Thus inspired the participants developed in groups three "research proposals", or approaches to further pursue place-related knowledge acquisition research, profiting from the interdisciplinary mix in the audience. The approaches were: (A) capturing signatures of places, (B) crowd-sourced place descriptions, and (C) context-dependent strategic navigation advice. A short description of the projects follows:

(A) SIM^{2}PLE: Signatures from Multi-Modal Place Extraction (using big data)

The aim of the project is to calculate signatures (e.g., feature vectors, even though that is not necessarily the best representation) for places. These signatures are best on multiple modalities, e.g., visual information about the place, (typical) sounds at that place, and potentially even olfactory information. These signatures would allow answering how much change to the characteristics of a place might happen for it to still be the same place (or even a place). This would enable the maintenance of place databases, and more generally allow for predictions of 'placeness' for a location.

(B) Analysing Crowdsourced Natural Language Place Descriptions

The project sets out to examine two interrelated questions: (i) How do people produce descriptions in vista space in real-world urban contexts for different target audiences? and (ii) What are the more and less effective ways in which they do it, relative to a target audience? A modified version of the geocashing game is used to collect data, in which people are asked to produce: (a) a description of the place where a geocash is found, and (b) of the route for someone else to find it. The results of the data analysis are useful for a number of applications, such as personalised image retrieval and image annotation, and are pushing the boundaries of current natural language (NL) automated generation technology. The analysis would also lend insights into how people perceive places (cognitive dimensions) and how they construct such descriptions from a linguistic aspect. Finally, the results have the potential of generating more semantics for data, in the current data rich but semantic poor era.

(C) User-specific Contextual Landmark Selection for Navigation

This approach started from the observation that landmarks frequently have a sweet side, from where they are easily recognizable even by strangers, but can be used in route instructions for locals also when they approach from directions where the landmark is not easily recognizable. Expanding on this thought we identify the need for context-dependent selection of landmarks in strategic navigation, focusing on two contexts: the one of the landmark, such as its appearance at the time of the day or the season, its efficacy from all directions, or its cultural significance, and the `

References

[1] Cresswell, T. *Place: A Short Introduction*. Blackwell Publishing Ltd., Oxford, UK, 2004.
[2] Tuan, Y.-F. *Space and Place: The Perspective of Experience*. University of Minnesota Press, Minneapolis, MN, 1977.
[3] Winter, S., Kuhn, W. and Krüger, A. Does Place have a Place in Geographic Information Science? *Spatial Cognition and Computation*, 9, 3 2009), 171-173.