ROUTING BY LANDMARKS

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1. INTRODUCTION

Why is it easier to follow directions if they are explained through a series of landmarks instead of street names? Street names are fine when you know the area or if it is adequately signed, but how often do you tell someone to “turn left after the park” or “turn right at the 7 Eleven”? In fact, research has shown that people nearly always refer to landmarks (Tom and Denis 2003).

Sensis, the Telstra subsidiary that operates the Whereis.com maps and directions service, now incorporates landmarks in the driving directions it generates.

Landmarks are outstanding features in an environment. Landmarks play a central role in human spatial cognition. They are fundamental to the way humans learn an environment and construct mental representations of it. Landmark knowledge is the first level of spatial knowledge a person develops in a new environment: the tourist in Paris will quickly learn about the Eiffel Tower and Montmartre, but it will take her some time to learn a route from the first to the latter or to use this and other routes for combining a route not traveled before. She will remember the café “close to the Eiffel tower” rather than the exact route to the café. To find the café again, she might first try to reach the Eiffel tower, which now serves as a cognitive anchor point. And so on.
Because of their dominance in human mental representations of space, landmarks are widely used in human communication about routes. A reference “left of Montmartre, not far away” is far more likely than a reference “on Rue du Cardinal Dubois, head West for 231m”.

By contrast, today's web routing services and car navigation services rarely make reference to landmarks. Why is that? The main reason for this omission is the lack of understanding what a landmark is, and then, of course, a lack of available data about landmarks. We do not have data sets of the landmarks in an environment (which are different from Points of Interest, see the following discussion). Recent research on identifying landmarks in spatial data sets typically relies on information about the detailed visual or geometric characteristics of the environment, such as 3D city models, cadastral data sets, and/or imagery of building facades (Raubal and Winter 2002; Elias 2003; Nothegger et al. 2004). While data about these characteristics is becoming more commonplace (at least in urban areas), all too often such highly detailed information about the spatial environment does not exist, is proprietary, is infrequently updated, or is otherwise unavailable except in restricted spatial locations. Also, the proposed landmark identification procedures are not yet tested in practice, and hence, not readily available.

2. SOLUTION

So, how can we address this dilemma? First it is important to acknowledge the difference between landmarks and points of interest. The prior must be selected based on perceptive and cognitive principles. The latter is rather a list of a recommender service.

“Deciding which landmarks are most useful is really based on the uniqueness of the landmark, and this can be determined by three main things; the landmark's meaning, its visual salience and where the landmark is located, relative to the decision point on the route,” said Matt Duckham, senior lecturer in geographic information science at the University of Melbourne.

“While computers can work out how far it is to the next interaction, humans find it much easier to use instructions that refer to places with meaning and that we can easily identify.”

Matt Duckham and Stephan Winter from the Department of Geomatics at the University of Melbourne developed for Sensis a model for incorporating landmarks into routing instructions that does not depend on the visual or geometric characteristics of individual buildings and streetscapes. Instead the model relies solely on information about the types of landmarks present in the environment, in addition to the road network and route geometry. The motivation for this approach is primarily practical: these information sources are much more commonly available and easily accessible, for example in the form of a geocoded directory service.

This model was applied on Sensis’ Yellow Pages business directory and directories of points of interests from city maps. A set of cognitively motivated rules ranks categories for their typical landmarkness, and then helps to pick up the most salient landmarks along a particular route. The second step considers also the structure of the route, such that landmarks are chosen at locations where the traveler has to turn, or along long segments for confirmation. While more and more categories are added, and rules are tuned, routing by Whereis.com has already access to 170,000 landmarks nationwide.

Let us study an example. Figure 2 shows the ranked landmarks along one street segment that are currently available in Whereis.com to produce routing directions. Figure 3 shows route directions along this street segment. Only two landmark candidates were selected and included in the directions, and both at strategically important locations along the route.
3. **SUMMARY**

A novel landmark identification and selection process enables now to incorporate landmarks in driving directions. This process was implemented in Whereis.com, an Australian webmapping and routing service owned by Sensis. According to Whereis.com commercial
manager Fred Curtis, “current trends in technology all point to increased functionality alongside ease of use, so that's the direction we're heading.”

REFERENCES


