## I•Plan - Intelligent Planning

I•Plan is a framework disgned for intelligent planning systems. It may be used for a diverse range of applications, e.g. navigation, tourism and health care, amongst others. In general, the set of sophisticated and efficient algorithms suits the needs of location-based services as well as ubiquitous computing applications. The framework's planning capabilities account for complex factual dependencies and user- or context-centered preferences, alike. I•Plan is responsive to the volatility of these preferences, automatically: Used for route planning purposes it will consider public transport time tables, weather conditions, business hours, special needs of users and other preferences. Basically, similar dependencies may be applied to a variety of other recommender system domains, e.g. health care.

## Landmark-based Pedestrian Navigation - A Challenge to Information Science

UR-Walking is an Android-based prototype application made for scientific purposes. Its aim is to demonstrate pedestrian navigation systems using landmarks useful for both, indoor and outdoor environments. The project's scientific focus is threefold:
From an Information Coverage perspective, data fusion methods must be found in order to combine a diverse range of existing data sources.
From an Information Retrieval perspective, the selection of user- and context-aware information concerning landmarks and their corresponding features is an important problem.
From a Methodological Perspective, suitable tools and methods to enable scalable, user-centered, real-world data acquisition need to be developed.

UR-Walking will be further enhanced within the scope of NADINE, a research project funded by the German Federal Ministry of Economics and Technology.



## People to talk to

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**Visit the Chair of Information Science online**
http://iw.ur.de

**Visit UR-Walking online**
http://iw.ur.de/urwalking

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## About

**Universität Regensburg**
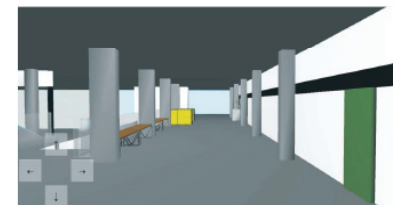FACULTY OF LANGUAGES, LITERATURE AND CULTURAL STUDIES

INFORMATION SCIENCE

# Indoor and Outdoor
# Intuitive Guidance

## Dynamic Orientation Support (DOS3D)

## Collaborative Landmark Mining

### Social Saliency Models





**UR walking**

## UR-Walking

Did you ask for directions last time you visited a city you did not know before? Do you remember the answer? Did the person tell you, to walk 250m before turning right? Most likely, the answer is "No". The preferred mode of human route communication is based on salient objects (landmarks). Therefore it makes sense that intuitive pedestrian navigation systems should mimic the mode of communication based on landmarks. As a suitably complex navigation scenario, we started at the campus of the University of Ratisbon. The prototype smartphone application, built by students and lecturers together, was presented at CeBIT 2012. In 2013 the software has changed in many ways: Our activities have focused on aspects regarding scalability, i.e. we thought about ways to enable landmark-based pedestrian navigation in arbitrary regions.

## Landmarks as Data

Despite its prevalence in human route communication, current data sources lack information on landmarks in general and features causing their salience, in particular. Land surveying data provided by the Government of Bavaria (*Bayerische Vermessungsverwaltung)* gave us very useful architectural information regarding the form of buildings. Additionally, we investigated OpenStreetMap data in order to gain knowledge about Points of Interest people find useful. However, even combining these sources did not suit our needs as the number of POIs is too small and the data lacks feature values to allow the salience of landmarks to be estimated. Consequently, we enhanced the UR-Walking prototype to be able to create our own data set.

## Data Acquisition Features

### Intuitive Indoor and Outdoor Guidance
UR-Walking is able to provide similar route directions for indoor and outdoor environments, i.e. users are not required to learn or adapt to different system outputs. Regardless of the curent environment, route instructions are always based on landmarks. This uniformity in terms of UI design is reflected in the method of implementation as well.

### 3-D Orientation Support
UR-Walking provides thee-dimensional orientation support
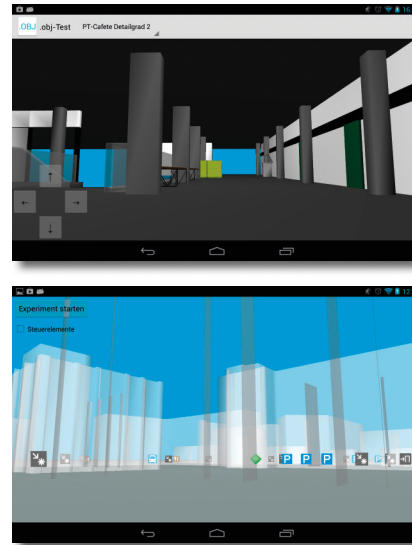


*UR-Walking shows indoor (above) and outdoor surroundings schematically. Any landmarks known to system are displayed as well.*

indoor as well as outdoor in order to prevent users from feeling lost. The surroundings of a person's position are displayed schematically as well as landmarks being shown. This mode of presentation facilitates the rating of both, existing and adding new landmarks.

### Collaborative Landmark Mining
In order to get sufficient data sources, UR-Walking enables
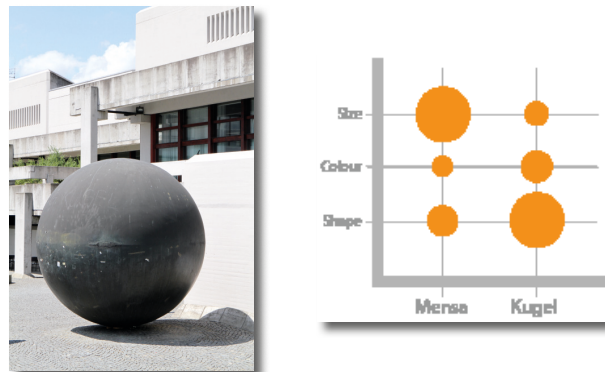


*An artwork regarded as salient by many people on campus (left). The diagram (right) shows the resulting social salience model: the artwork's shape accounts for most of its salience.*

Collaborative Landmark Mining. Users are engaged in rating and adding new landmarks during navigation. Most likely, users are willing to rate and add objects in order to fill that gap: Due to data sparseness, UR-Walking often still relies on distance-based route instructions.

### Social Salience Models
The basic idea of social salience models is to gain an insight into the features that are most salient to a large number of people. The picture on the left shows an artwork on campus called *Kugel*, often named as a salient object. On the right hand side the rating of 28 people regarding its most salient features is shown. Accordingly, shape accounts for most of its salience.

## UR-Walking on the Web

We have started to setup a portal for UR-Walking on the Web. Visit us on http://iw.ur.de/urwalking for an update on our activites. We would appreciate it, if you would participate in our experiments. Of course your data will be used only for scientific purposes and data analysis is done anonymous. Currently, we are working on trials regarding the user's sense of direction and visio-spatial abilities. Furthermore, we are keen to get to know user preferences. Therefore, we will add more tests and provide an English language version soon.



*The development of UR-Walking is an example of up-to-date university course work at the Chair of Information Science. Lecturers and students try to solve real-world problems together. It is as challenging as it is instructive for both, learners and educators.*