Watch your Emissions: Persuasive Strategies and Choice Architecture for Sustainable Decisions in Urban Mobility

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Introduction

Transportation in urban areas is an important factor of growth and employment but also a major source of carbon emissions. The problem of increasing emissions can be addressed on one hand by means of improved infrastructure (e.g., adequate and environmentally friendly public transportation options) and urban design, and on the other hand by increasing travelers' awareness of the environmental impact of travel mode choices. Persuasive technologies, tailored for and integrated in route planning applications, can affect urban travelers' decisions and guide them towards selecting routes that are environmentally friendly.
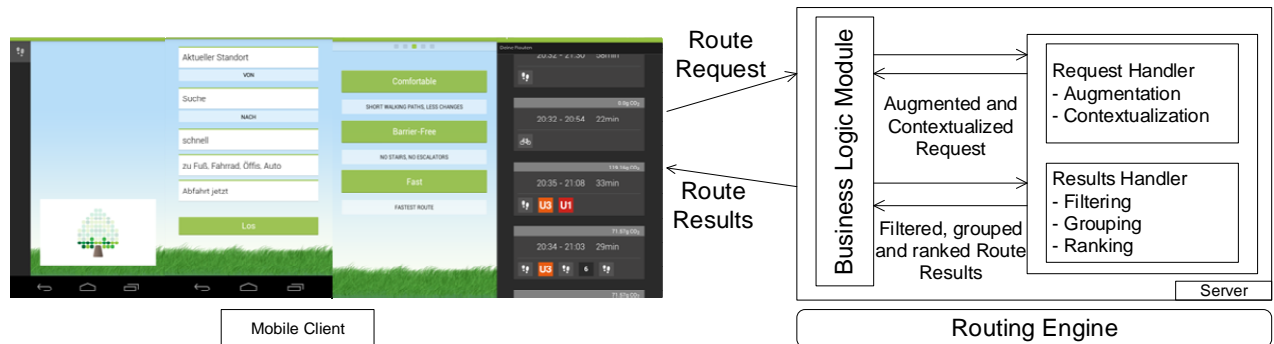
Objective

We propose a set of persuasive strategies for route planning applications. These strategies, namely Reduction, Tailoring, Tunneling, Cause-and-Effect Simulation and Suggestion, are deployed both visually in the user interface and in the design of an underlying choice architecture system. The system filters and ranks the available trip choices by considering user preferences and contextual elements while trying to balance user-perceived route utility (e.g., trip duration, comfort) and CO_2 emissions.

Our Approach

Persuasive Strategies	Key Choice Architecture and Interface Implementation Elements
Reduction	Condensed complex route options into three simple alternatives. Filtered trips in order to present a few meaningful alternatives.
Tailoring	Balanced trip results based on user preferences and CO_2 emissions thereby avoiding choice overload.
Tunnelling	Users are guided through the route search with a bias towards eco-friendly routes based on the power of defaults: - users are not required to decide on specific modes of transportation in the search process - environmentally friendly options are included by default.
Cause-and-Effect Simulation	Display of estimated CO_2 emissions per alternative trip
Suggestion	Grouped trips per mode of transportation thereby structuring the choice set. The environmentally friendly options are displayed in a more prominent position in the interface.

Architecture

Mobile Client

Route Request

Route Results

Business Logic Module

Augmented and Contextualized Request

Filtered, grouped and ranked Route Results

Request Handler
- Augmentation
- Contextualization

Results Handler
- Filtering
- Grouping
- Ranking

Server

Routing Engine

Evaluation

➢ We ran a trial in Vienna during summer of 2013 where 24 participants used the system on their own smart phones for 8

Question	Results
Usage Frequency & Patterns	Most users disregarded the trip settings and accepted the default values. Usage decreased during the course of the trial.
User Satisfaction and Usability	(M=3.1, p = .05) Users liked the aesthetics of the design of the application and highlighted its simple interface and non-cluttered functionality.
Perception of Route Suggestions	(M=3.2, p = .018) Users highlighted the positive aspect of being able to compare the different route options on one screen.
Perception of CO2 Information	Users reported increased awareness in case of unsustainable behavior, in particular the car drivers. Several of them stated they have a bad conscience when looking at the CO2 values the application provided for a car trip, which were compared to public transportation usually ten times higher
Self-reported Behavior Change	Users reported instances of switching from a bus to a tram, as emissions were lower, or following the car route that was more eco-friendly compared to their usual route

Future Work

➢ We plan to address the issue of non-rational factors that prevent behavior change, such as habits, by using the choice architecture to better support self-reflection on the effects of personal acts prior to doing them and by using extended feedback mechanisms including personalized messages.

➢ We plan to leverage social media in such way that we use social comparison and social learning to assist users in exploring sustainable travel alternatives.