LFE Medieninformatik • Susanne Keck

Diploma Thesis – Final Presentation

Incremental Personalized Trip Planning

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Introduction

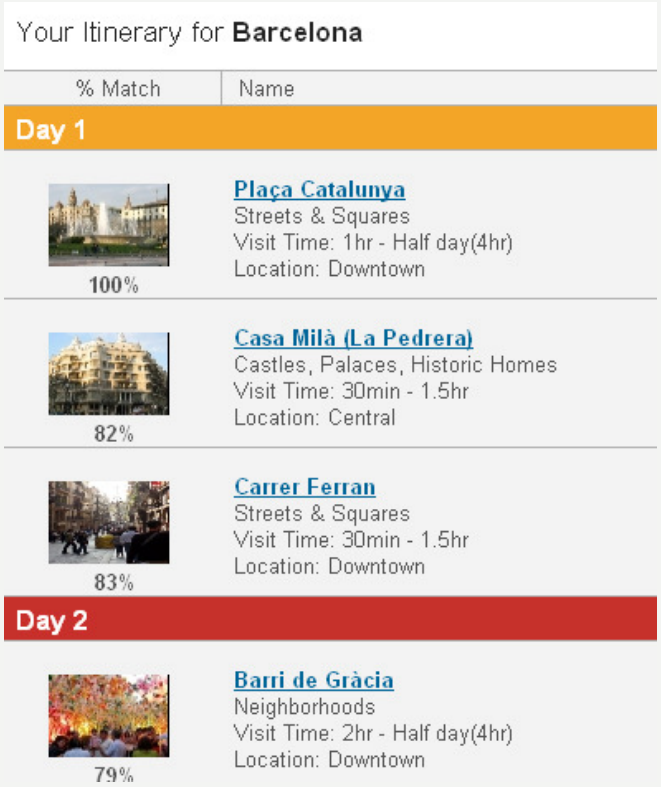
- Motivation
  - Increasing popularity of Recommender Systems
  - Complexity of trip planning process
  - Pre-defined travel packages do not meet the explorative experience of trip planning
  - Current systems do not support the tourist‘s dynamically changing preferences
- Topic of the Thesis
  - Design of an interactive trip planning system
  - Efficient combination of human interaction and system intelligence
  - Explore travelers‘ behavior in their trip planning

MYTravelGuide
YAHOO! TRAVEL
Google
lonely planet
tripadvisor

Overview

- Related Work
- Tourists‘ Requirements
- SARA: Stepwise Advanced Route Advisor
- System Implementation
- User Study
- Outlook

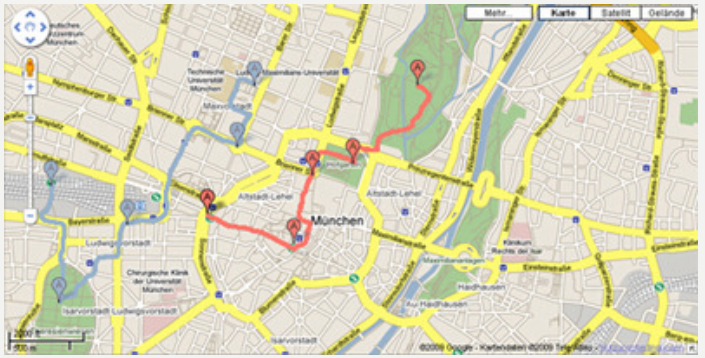
- On-Tour Guides with Mobile Devices
  - Information is provided based on the user's current location
  - Examples: *Cyberguide [Abowd, 1997], GUIDE [Cheverst, 2000], MyMap [Carolis, 2007]*
- Pre-Visit Trip Planning Systems
  - Generation of textual-based trip plans
  - A) Manual trip plan generation
    - Examples: *Yahoo! Travel [2009], LonelyPlanet [2009], Realtravel [2009]*
  - B) Automatic trip plan generation
    - Examples: *STAR [Goy, 2004], GraniteNights [Grimnes, 2003], e-Tourism [Sebastia, 2008], Home&Abroad [2009]*

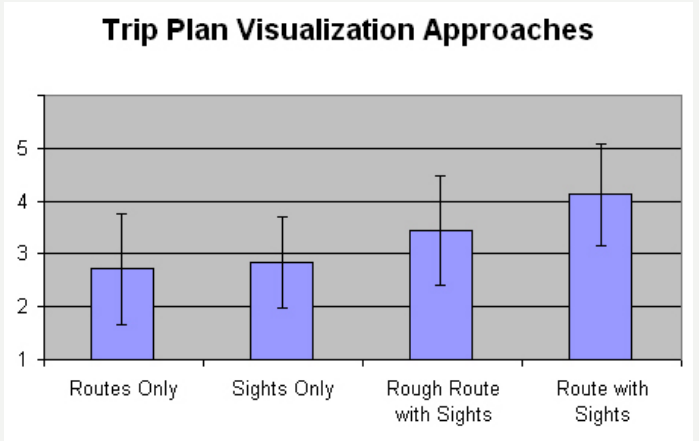


(Home&Abroad, 2009)

Elicitation of the Users' Requirements

- Primary Studies
  - Expert interview with a travel agent
  - Online survey with 100 participants
- Design Guidelines
  - Combination of human interaction and system intelligence
  - Considering multiple constraints
  - Dynamic behavior of tourists' preferences
  - Decomposition of the planning process
  - Importance of system transparency
  - Provide an enjoyable planning experience

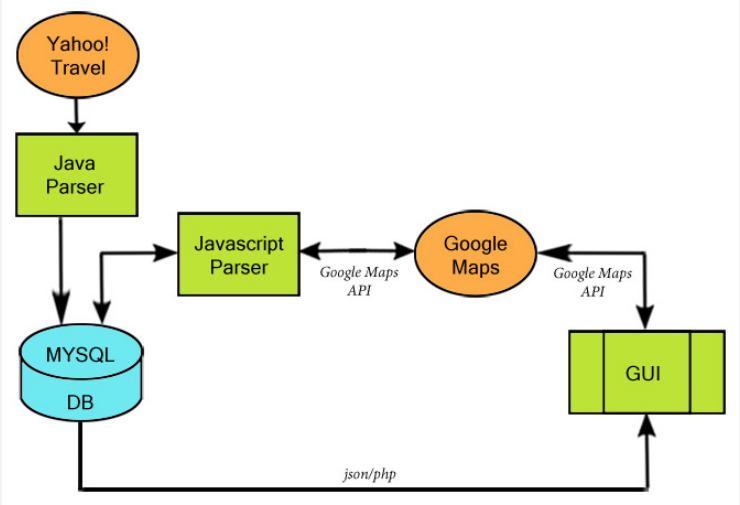




SARA

- SARA (Stepwise Advanced Route Advisor)
  - Construction of an executable tour plan for the city to visit
  - Concept of incremental trip planning
- Features of SARA
  - Dynamic user preferences
  - Considering multiple constraints (opening times, user preferences, distance and popularity)
  - Representation of trip plan via route and calendar
- Demo Video

- System Architecture
  - MySQL DB: stores data from different sources
  - Sources: Yahoo! Travel, Google Maps
  - Data: Opening Times, Popularity, Distances,...



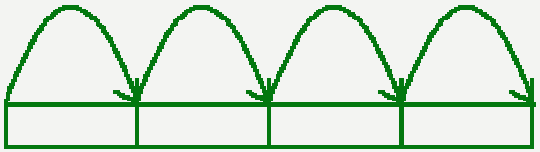
- Recommendation Algorithm
  - Computation of recommendation scores for all sights available

$$recommendationScore(sight_i) = popularityWeight \cdot \frac{sight_i.popularity}{maximumPopularity} + (100 - popularityWeight) \cdot \left(1 - \frac{sight_i.distance}{maximumDistance}\right)$$

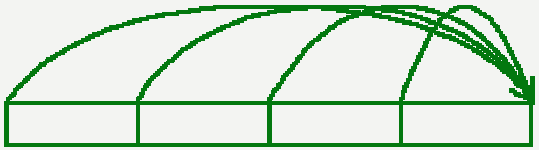
Three System Modes

- No recommendations mode
  - System makes no explicit recommendations for next sight
  - User constructs trip plan manually

- Local recommendations mode
  - System makes recommendations for next sight
  - User makes final decision of each sight to be included in the plan

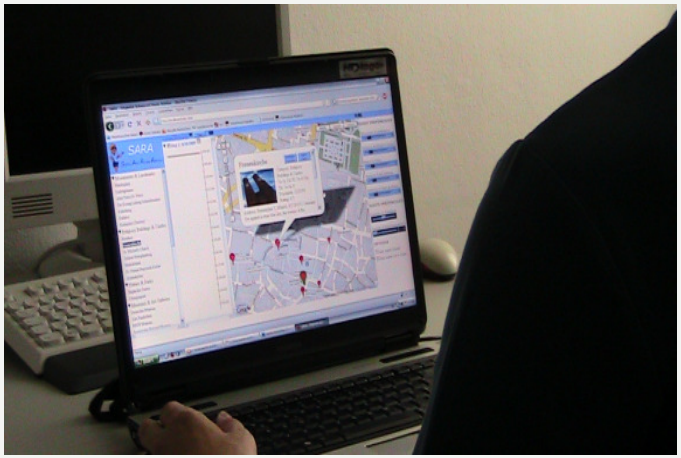


- Global recommendations mode
  - System generates the whole plan automatically (based on a greedy algorithm)
  - User can then make adjustments of this plan



User Study

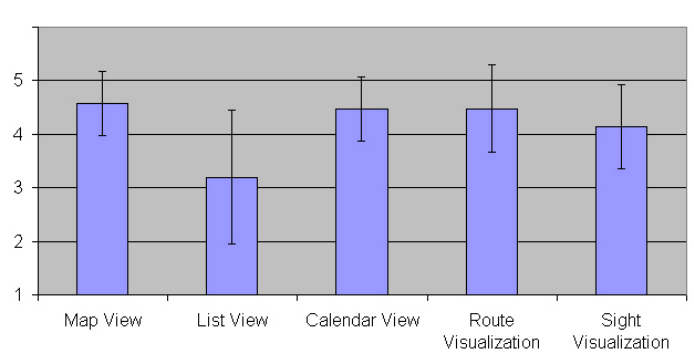
- Goals
  - Evaluate the overall impression of SARA
  - Investigate the appropriate degree of automation
- Design
  - Repeated measures within participants factorial design
  - Task: Generate a two-days trip plan in the city of Munich with each system mode



- Participants
  - 21 participants (10 male, 11 female), average age: 24 (mostly students)
  - Trip planning experience: 3.19, Munich experience: 3.67

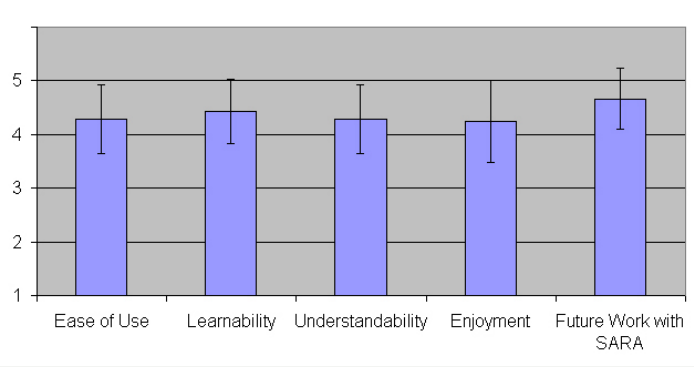
Overall Impression of SARA

- Visualization components
  - Advantage of single user interface
  - Usefulness of map view, calendar view, route and sight visualization



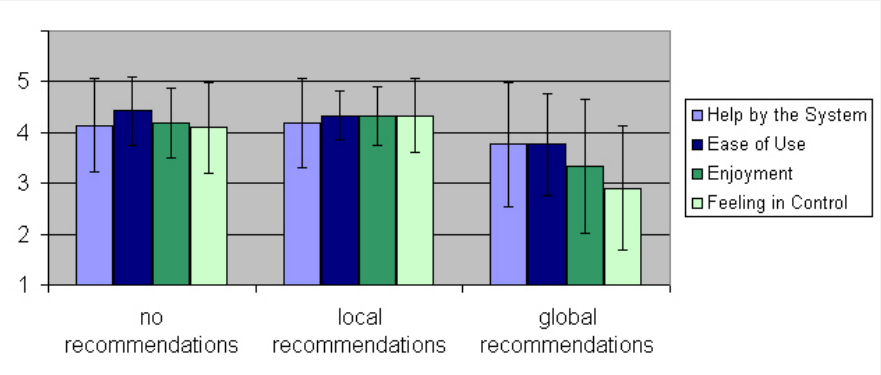
- Dynamic Preferences
  - Usefulness of sight preferences to control indirect recommendations
  - Usefulness of route preferences to control explicit recommendations

- Overall feedback
  - Enjoyment of explorative experience
  - Value of own decision-making
  - Transparency of recommendations



Comparison of System Modes

- Usage Experience
  - Especially less enjoyment and feeling in control in global mode



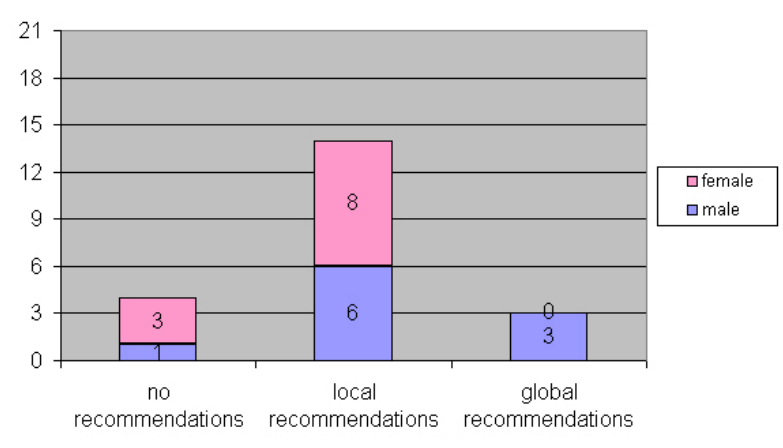
- Time Efficiency
  - Quantitative: no (8:08), global (8:35), local (8:47)
  - Qualitative: local (4.43), no (4.19), global (3.48)
- Trip Plan Quality
  - Quantitative: no (0.881), local (0.871), global (0.865)
  - Qualitative: no (3.95), local (3.90), global (3.86)

$$tripPlanQuality(tripPlan) = \frac{sightQuality(tripPlan) + routeQuality(tripPlan)}{2}$$

Differences in System Mode Preference

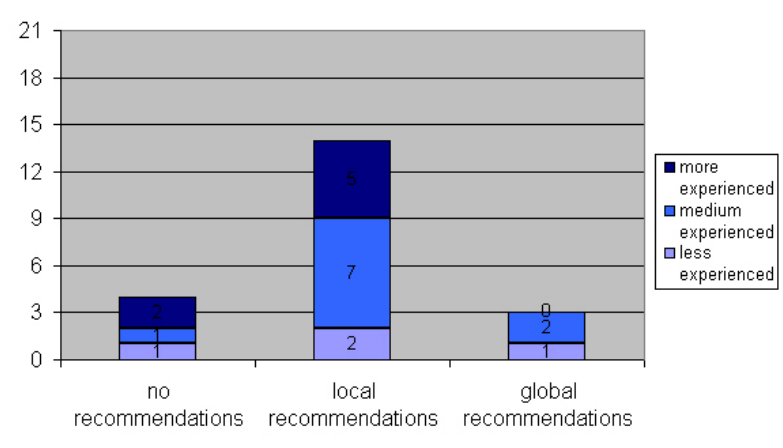
- Gender Difference
  - Global: preferred by male participants
  - No: preferred by female participants

  → Females like to be in control over the trip planning process



- Trip Planning Experience Difference
  - Global: preferred by less experienced
  - No: preferred by more experienced

  → More experienced trip planners like to be in control over the trip planning process



Conclusion

- Summary
  - Incremental trip planning seems to be appealing
  - Explorative experience, dynamic user preferences and quick overview on information space need to be supported
- Future Work
  - Investigate the usability and learnability of SARA
  - Explore trip planning patterns
  - Enlarge the system for other cities
  - Add additional features (more flexibility, search function, other activities)
  - Integration of a learning algorithm

Thank you for your attention!

Trip Plan Quality

- Formula
  - Route Quality

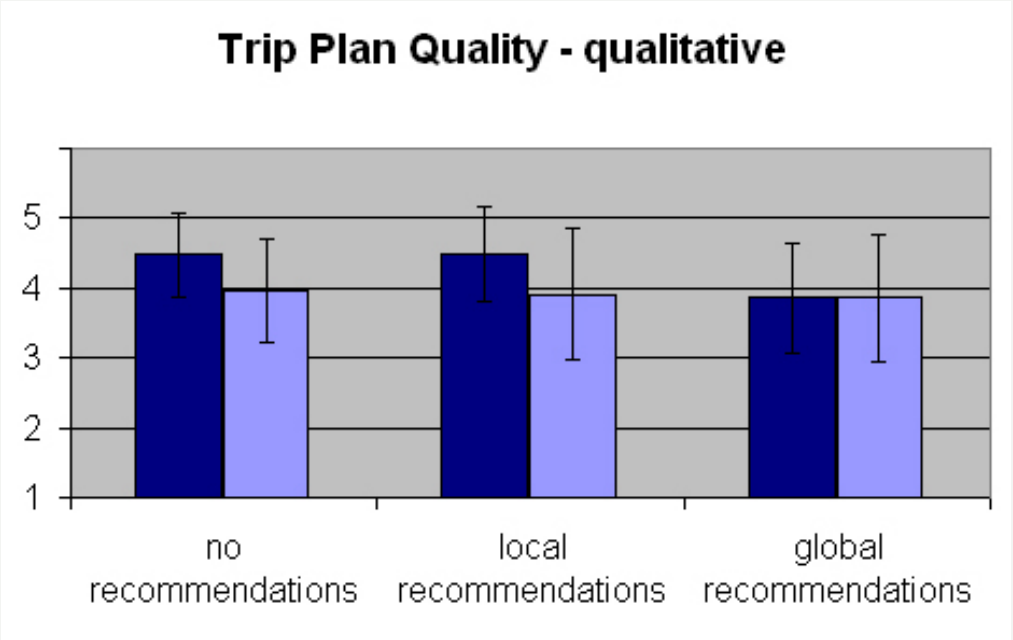
$$routeQuality(tripPlan) = \frac{\sum_{i=1}^{n} sight_i.duration}{\sum_{i=1}^{n} sight_i.duration + \sum_{i=1}^{n-1} duration(sight_i, sight_{i+1})}$$

  - Sight Quality

$$sightQuality(tripPlan) = \cos(\alpha) = \frac{\vec{V_u} \circ \vec{V_t}}{\|\vec{V_u}\| \cdot \|\vec{V_t}\|}$$

- Example (Sight Quality)
  - Sight preferences: 80%, 20%, 100% → V_u = (40%, 10%, 50%)
  - Sights included: 3, 3, 6 → V_t = (25%, 25%, 50%)
  - Sight Quality: 0.945

Trip Plan Quality



Differences in Mode Preference