EmoMap

Acquisition and Application of People's Affective Responses to Environments

Haosheng Huang

Vienna University of Technology, Austria

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1. Introduction

- Humans perceive and evaluate environments affectively.
    - Unsafe places, attractive places, …

- These affective responses to environments influence people's daily behavior and decision-making in space.
    - E.g., choosing which places to visit, which routes to take
    - We approach interesting and beautiful places, but avoid unsafe ones.

    - Subjective well-being

Research Project EmoMap

- Funded by Austrian BMVIT (Ministry for Transport, Innovation and Technology)
  - Partners: Salzburg Research, WildUrb

- Aims:
  - Acquisition of people's affective responses **to environments**
    - Mobile crowdsourcing via smartphones
    - Social media data analysis

  - Applications of affective responses
    - Understanding people's experiences at and interaction with different environments
    - Enabling human-centered geospatial applications: e.g., "the most comfortable route" in navigation systems

2. Acquisition of affective responses

2.1 Crowdsourcing affective responses to space

- Affective responses **evoked by** and **in** space

- How can affective responses be collected from a large number of people?
  - Crowdsourcing people's affective responses to space via smartphones
    - "human as sensors"
    - The increasingly use of GPS-enabled smartphones
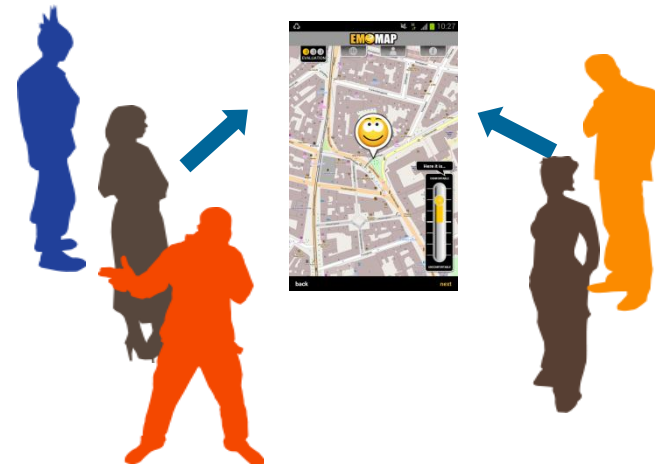
2.1 Crowdsourcing affective responses to space

- Affect-Location-Model: making affective responses to environments easily reportable
  - Affect: a two-level structure
    - Level of <u>comfort</u> (valence)
    - Level of affective environmental qualities: <u>safety</u>, <u>attractiveness</u>, <u>diversity</u>, and <u>relaxation</u>
      - Obtained from two empirical studies

  - Location
    - Location: Linking each affective response to its GPS location (Point data)

2.1 Crowdsourcing affective responses to space

- An Android mobile app was developed based on the Affect-Location-Model.

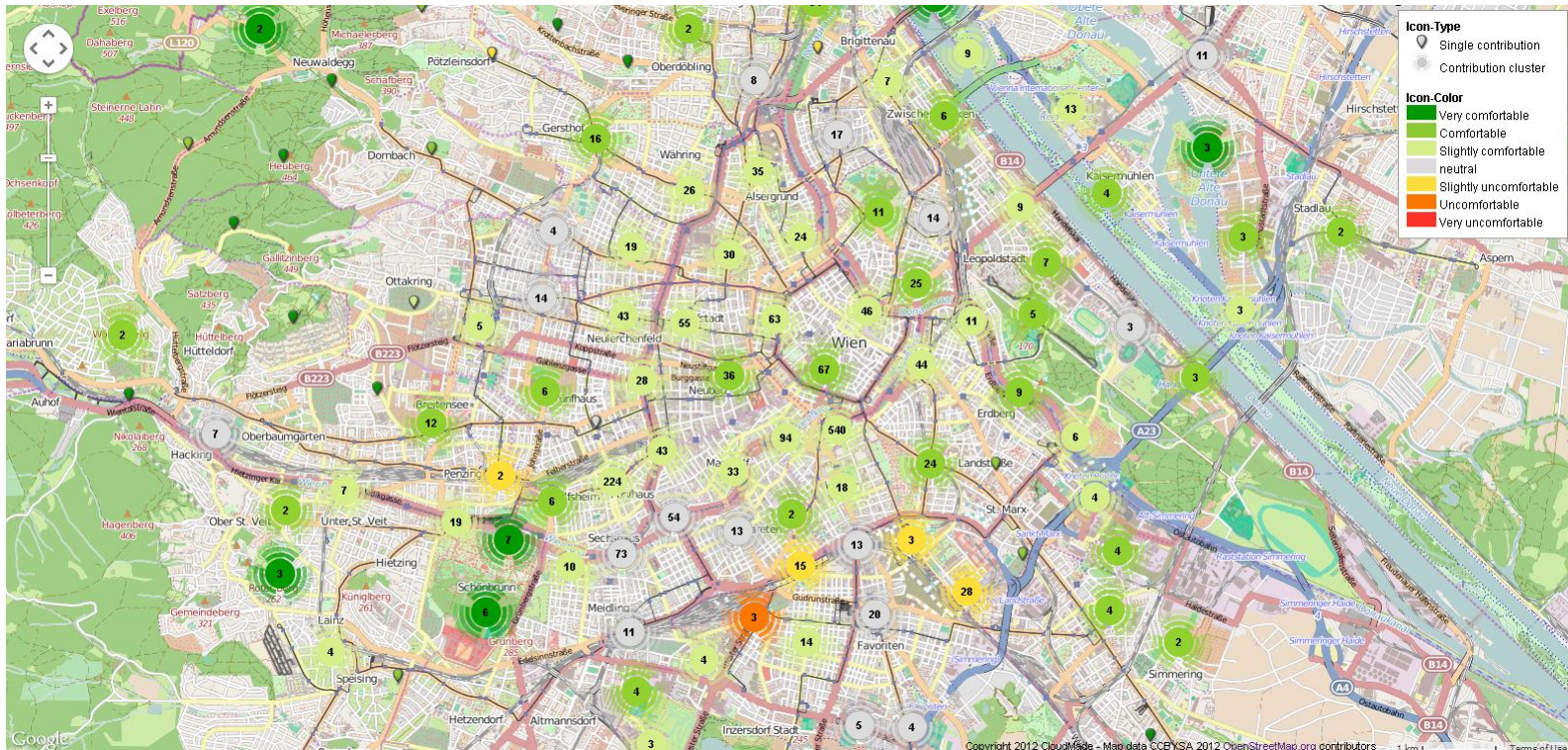Other contextual information

Level of Comfort

safety, attractiveness, diversity, and relaxation

2.1 Crowdsourcing affective responses to space

- Promoting the app
  - Students
  - General people: via an urban walking community (WildUrb, http://www.wildurb.at/)

- 06.2012-12.2013, > 3500 contributions

  ~ Most of the contributions are for the city of Vienna (Austria)

2.2 Identifying people's affective responses to the environment from social media data

- Social media data: Twitter, <u>Flickr (photo descriptions)</u>,...

Photo description: "A beautiful church in Wien"

Photo description: Some really nice apartments

Photo description: "this is a stressful station"

- **Sentiment analysis** (natural language processing): determine valence (negative-positive) of the photo descriptions.
  - "This is a <u>lovely</u> and <u>beautiful</u> place" → Valence: 5 (positive)

2.2 Identifying people's affective responses to the environment from social media data (cont.)
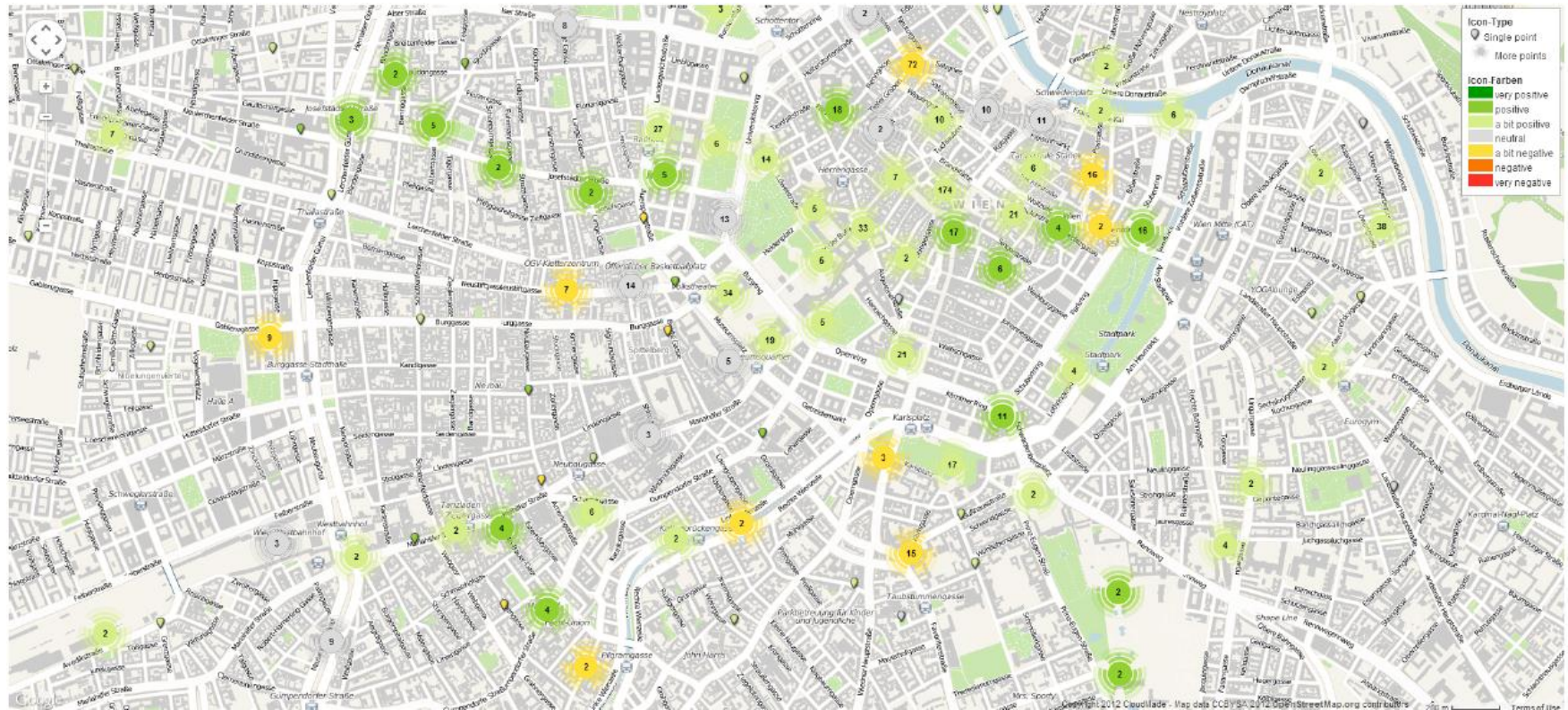
Using Flickr metadata (photo titles, and photo descriptions)

3. Applications of affective responses

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- Applications
  - Case study 1: Impact of environmental characteristics on people's affective responses, e.g., **Do humans really feel more comfortable in green areas?**

  - Case study 2: Navigation systems considering people's affective responses to environments, e.g., **the most comfortable route**

3.1 Impact of environmental characteristics

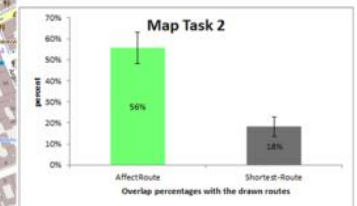- Case study 1: Impact of environmental characteristics on people's affective responses
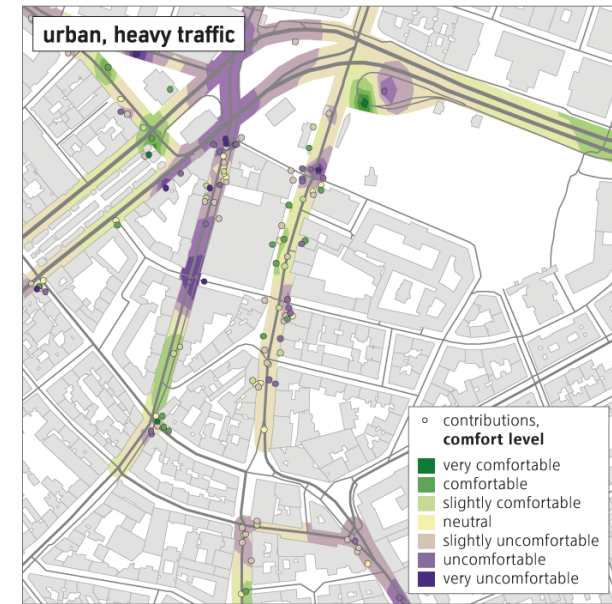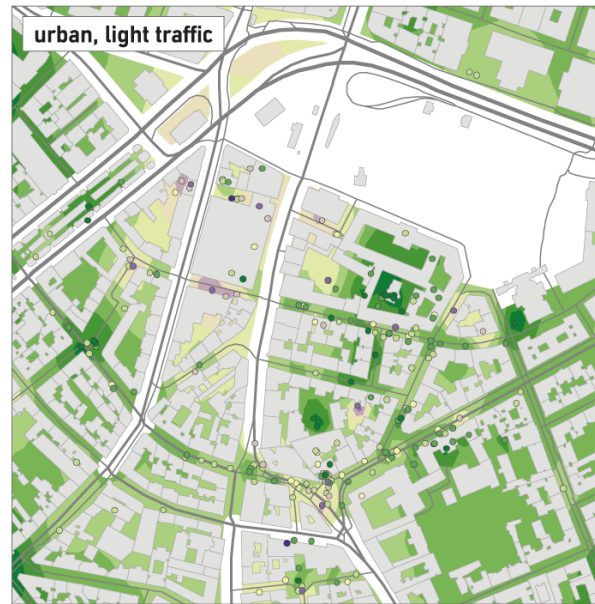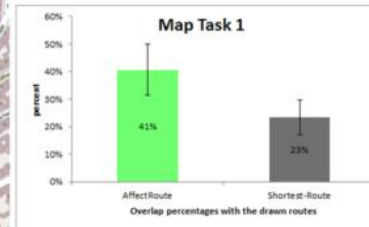

Participants feel <u>more comfortable </u>in natural and green areas than in built and heavy traffic environments.

3.2 Enabling smart human-centred geospatial applications

- Route planning in navigation systems: e.g., the most comfortable route

Navigation systems considering people's affective responses to environments can provide <u>more satisfying routing results.</u>

EmoMap: Work in Progress

- A hybrid method
  - Mobile crowdsourcing
  - Social media data analysis
  - Technical sensors
    - Galvanic skin response (GSR)
    - Electrocardiogram (ECG)

- Impact of environmental characteristics on people's affective responses
  - "What makes people feel comfortable?" "Why do people feel uncomfortable at this place?"

- The political, social, and cultural implications of affective data
  - Correlate with other well-being statistics, …

- Smart services: mobile city guides, location-based social networking, …

Crowdsourcing and social media analysis

- Crowdsourcing and social media analysis are promising for studying people's affective responses to environment.

  - Social media provides rich new sources of population-level data on affect, and crowdsourcing (e.g., via smartphones or sensors) potentially allows researchers to collect information on individuals' affective responses.

  - Traditional surveys: expensive and time-consuming
  - Crowdsourcing allows researchers to gather huge amounts of data, cheaply and easily in a short period of time.

  - Mobile crowdsourcing is especially useful for collecting people's **subjective** information/opinions/experiences in the field (e.g., well-being, affective responses).

Challenges (1)

- ## Motivating people
  - Key to the crowdsourcing projects
  - How to attract participants?
    - Provide (real or perceived) "benefits" for the contributors
    - Provide simple and intuitive ("easy-to-use") interface/tool

- ## Data quality
  - People contribute in an un-controlled setting .
  - People's affective responses are subjective.
  - No reference data are available for cross-checking.
  - How can we deal with the data quality of the crowdsourced affective data?

Challenges (2)

- Digital divide
  - "A representative sample?"
  - Mobile crowdsourcing can not completely replace traditional surveys.

- Data interpretation
  - Limitations/bias brought by crowdsoucring tools and participants

- Privacy
  - People's affect data contain sensitive personal information.
  - Anonymisation techniques don't always work.

Thank you!

Haosheng Huang

Research Group Cartography
Vienna University of Technology
http://cartography.tuwien.ac.at
http://tiny.cc/hhuang
haosheng.huang@tuwien.ac.at