Visual Perception and Mobility in Cities

Knowledge Lab Team Presentation

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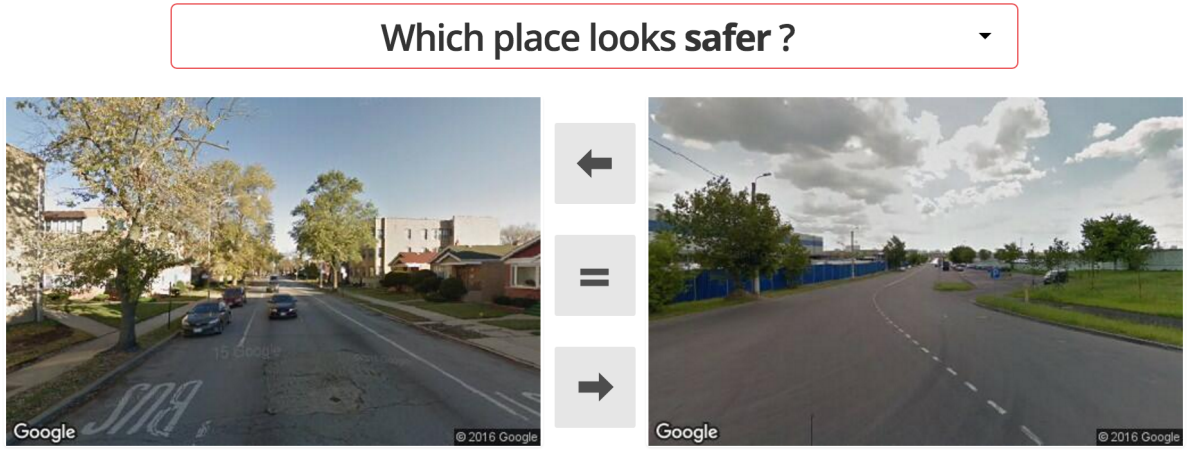
Overview

- What are some visual characteristics of cities that may impact human mobility decisions?
  - Safety, Beauty, Wealth, Uniqueness
- We can generate data on these rankings
  - Using a voting platform:
  - 

  - Using Deep Learning to extract image features.
  - Using active learning to present choices intelligently
- But we also need data on *how* people move in a city
  - Cellphone data
  - GPS data

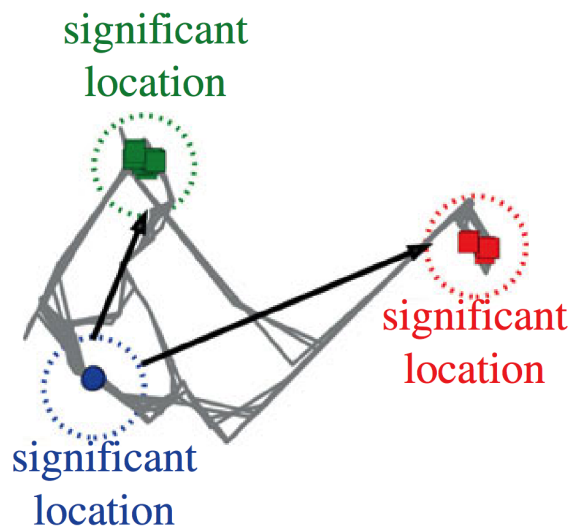
Feature Extraction using Deep Learning Software

Top 3 Predictors: (office building, apartment building, hospital)

Top 3 Predictors:(yard, residential neighborhood, driveway)

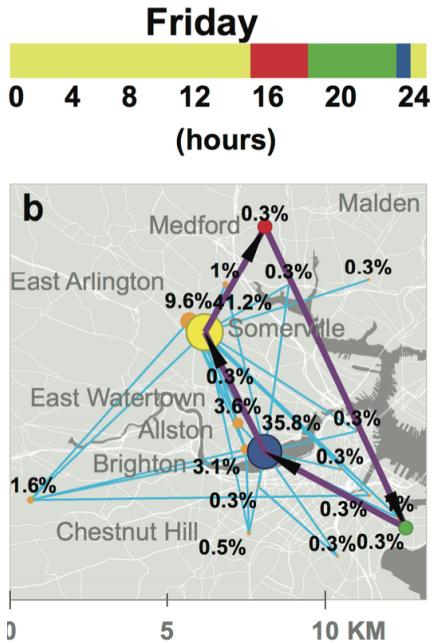
GPS Data from Spain

- Human Mobility and Networks Lab at MIT – PI Marta Gonsalez
- Paper: "Understanding individual routing behaviour" (2016) – Lima et el.
- Data: anonymized GPS trajectories of personal cars over an 18-month period
- Findings:
  - most drivers tend to have a preferred route for frequent trips.
  - a significant fraction of drivers routes are not optimal from cost-minimization perspective
- Open Question: How are preferred routes characterized? Why do drivers choose economically suboptimal routes?



Cellphone Data from Boston

- Paper: "TimeGeo: a spatiotemporal framework for modeling urban mobility without surveys " (2016) – Yang et al.
- Data: 1.92 million anonymous mobile phone users, 6 weeks, Greater Boston area.
- Findings:
  - methodological: assign labels to *'stay'* locations
  - provide origin destination matrices by converting sparse mobility traces into daily trajectories
- Open Question: What characterizes places where individuals cluster or linger?



Our Paper

- Aim: Attempt to answer open questions from mobility data
- Methods: Using Streetscore on images sampled from the locations in the GPS and cellphone datasets
- Next Steps:
  - Setup an active learning interface on NEXTML
  - Employ MTurkers to find streetscore ratings
  - Get demographic and economic data corresponding to image locations
  - Estimate impact of visual characteristics on human mobility choices that aren't explained by demographic characteristics.