Measuring Pedestrian Accessibility
an urban informatics perspective
1. Condition of sidewalks
Motivation: Sensors are becoming ubiquitous and powerful

Image: Structure Sensor, a $379 mass market LiDAR device.
“Non-ADA-compliant curb cuts present enormous challenges to pedestrians like me who are blind or visually impaired. The bumps of the warning surfaces, part of an ADA-compliant curb cut, give me vital information about a street crossing. When the curb cut is flat, I have no clue about where the street begins, which is dangerous.”

- Audrey Schading, Advocate for Blind and Visually Impaired People
Forty staff and volunteers spent one year to check ADA compliance:

Of 1,200 sites:
- 28% were too steep
- 18% blocked by street furniture

Source: Broadway Curb Cut Survey, Manhattan Borough President’s Office, 2015.
“Better way to acquire streetscape condition data?”

Field survey app: https://bit.ly/2I85t5Z
Hand-held 3D sensor successfully measures ADA compliance
Streetscape condition data today

Mobile GIS
- Agency data collection
- Citizen feedback

Tomorrow – new sensing inputs
2. Accessibility metrics with OSM
Workflow: Pedestrian accessibility metrics

1. **Build road network**
   - Acquire and clean street networks algorithmically
   - OSMNX, Pandana

2. **Get POIs**
   - Pull selected amenity types
   - Overpass API

3. **Snap POIs to network**

4. **Calculate accessibility**
   - Metrics:
     - mins to nearest hospital
     - percent jobs within 60 mins
     - mins to nth nearest amenity
     - custom ‘WalkScore’
   - GOSTnets
1. Build road network

Kampala’s streets as a graph object:
- 49,100 edges
- 21,460 nodes

\[ G = \text{ox.graph_from_place('Kampala')} \]

- Downloaded 25mb OSM data
- Removed superfluous nodes

Time: 42 seconds
2. Get amenities from OSM

Amenities from OSM:

- Schools: 538
- Banks: 390
- Restaurants: 332
- Clinic: 286
- Pharmacy: 184
- Café: 61
- Hospital: 57
3. Do natural hazards or planning interventions affect the network?

Kampala flood analysis:

- Flood depths for 10, 50 and 100-yr events
- Interrupt roads where depth > n

Run OD analysis with baseline and flooded networks.
Kampala: Walking distance to nearest hospital (meters)
Kampala: Most walkable neighborhoods
Questions and extensions

“How do floods (or planning interventions) affect trip times?”

“How many jobs accessible within 60 mins walk?”

“Which neighborhoods meet accessibility needs?”

- WalkScore: Weighted index of POIs
- Property valuation models
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