Calibration of Walkability Model: Case Study - Ames, Iowa

**Project Description**

To many, walkability (ease of walking access to amenities) would be an important measure of livability. At least one internet site, “walkscore.com” quantifies walkability. Walkscore.com computes walkability based on Euclidean (straight line) distances to a market basket of Google mapped amenities/attractions. Could estimations of neighborhood “walkability” be affected by how distances to walkable destinations are calculated? How would walkability estimated using Euclidean distances compare to those computed using grid-distance? How could other, network-based attributes (sidewalks, lighting, perceived security, etc.) figure in to a more comprehensive measure of walkability? This poster provides a beginning for investigating the sensitivity of walkability metrics to some of these issues. To do this, a baseline “walkability” regression model was calibrated for the City of Ames, Iowa, population 52,000 (home of Iowa State University). Data collected or derived include:

- walkability as calculated by the online web tools of walkscore.com for 245 sampled locations in Ames
- coordinates of commercial amenities downloaded from Google Earth that are within 1-mile of each of the 245 sampled locations
- Euclidean distances to each amenity from each sample point
- “idealized” grid-distances to each amenity from each sample point
- network distances to amenities from each sample point
- aggregated number of amenities within four distance categories

Linear and non-linear models were calibrated to predict walk scores based on the number of amenities within four distance categories from each sampled location (a methodology similar to that used by walkscore.com). The intent of the calibration was to develop a “walkscore-like” model that could be used to test the effect of network routing methods, illustrated by the graphs below. The models are not intended to be a substitute for the walkscore.com methodology, rather, simply tools for testing the sensitivity of scores to inputs.

After calibrating the models based on Euclidean distances to amenities, walkability scores were estimated based on idealized grid “Manhattan” distances to amenities. As expected, a paired t-test confirmed that the mean walkability score based on grid distance was significantly less than the mean walkability score based on Euclidean distances to amenities.

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The plot above shows some areas in Ames where network distances make the most significant differences in computation of walkability.

As expected, assessment of sidewalk coverage in the study area indicated that as walkability increased, percent of area covered by sidewalk also increased.

Sidewalks

<table>
<thead>
<tr>
<th>Area Covered by Sidewalk</th>
<th>Continuity of Sidewalk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing Sidewalk Coverage</td>
<td>Ratio of Sidewalk Length to Roadway Length</td>
</tr>
<tr>
<td>WalkScore Category</td>
<td>Area of WalkScore Category (Sq. Meters)</td>
</tr>
<tr>
<td>Walker’s Paradise</td>
<td>37,693,508</td>
</tr>
<tr>
<td>Very Walkable</td>
<td>13,712,603</td>
</tr>
<tr>
<td>Somewhat Walkable</td>
<td>27,547,067</td>
</tr>
<tr>
<td>Car Dependent</td>
<td>27,179,428</td>
</tr>
</tbody>
</table>

Key to Sidewalk-to-Roadway Length Ratio

Ratio > 2.0 ➔ Sidewalk on both sides of each road
Ratio < 2.0 ➔ Sidewalk only on one-side of road and/or some roads do not have sidewalks

As expected, assessment of sidewalk coverage in the study area indicated that as walkability increased, percent of area covered by sidewalk also increased. Correspondingly, the ratio of sidewalk length to roadway length also increased. Future work could include computing composite scores based on true network distances and weighted for walk friendliness based on presence of sidewalks, lighting, or other characteristics.