5-2013

Walk to School Route Planner for Miami Dade County, Florida

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Recommended Citation
Fu, Zhaohui; Guan, Boguan; and Hochmair, Henry, "Walk to School Route Planner for Miami Dade County, Florida" (2013). GIS Center. 1.
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Walk to School Route Planner for Miami Dade County, Florida

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Outline

• Project Background
  • Stakeholders and Partners
  • Purpose

• Demo

• Methodology
  • Data Preparation
  • Routing Criteria and algorithm
  • Web solutions (Google Maps API and ArcGIS Server Mesh-up)

• Future work -- validation of safe routes
  • Go Mobile
  • Validation of the network – User feedback
  • Expansion
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Project Background

- SRTS is a new federal reimbursement program with the following goals:
  - encourage children in grades K-8, including those with disabilities, to walk and cycle to school;
  - make walking and cycling to school safer and more appealing;
  - facilitate projects that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of schools.

- Find more information at [www.srtsfl.org](http://www.srtsfl.org)
Project Background – Stakeholders and Partners

Advisory members

Funding agency

Project team
Project Background -- Objectives

- An Interactive web application
- Students and parents can enter the location of origin
- Default destination is the designated school within the school boundary of the chosen location
- Dynamically generates the safest route
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• Demo
Live site: http://maps.fiu.edu/srts/
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## Methodology – Data Preparation

<table>
<thead>
<tr>
<th>Data</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Street network data</td>
<td>NAVTEQ NAVSTREETS</td>
</tr>
<tr>
<td>School locations</td>
<td>Miami Dade School Board</td>
</tr>
<tr>
<td>School Boundaries</td>
<td>Miami Dade School Board</td>
</tr>
<tr>
<td>Speed Limit</td>
<td>Miami Dade County GIS</td>
</tr>
<tr>
<td>Side Walk</td>
<td>Digitized by FIU GIS Lab</td>
</tr>
<tr>
<td>Cross Walk</td>
<td>Digitized by FIU GIS Lab</td>
</tr>
<tr>
<td>Traffic Lights</td>
<td>Miami Dade County GIS</td>
</tr>
</tbody>
</table>
Methodology – Data Preparation and Processing

- Sidewalks, Crosswalks – Digitize the sidewalks and crosswalks based on Google Maps and Google Street View.
- School Entries – Digitize the school entries based on Google Street View.
Methodology – Data Preparation and Processing

- Remove freeway segments from network layer
- Generate “Cross Point”
- Convert sidewalks information into an attribute
- Extract school zone flashing signal
- Manually adjust the location
- Remove “fake” junctions
- School Entries – Digitize the school entries
Methodology – Data Preparation and Processing
Methodology – Data Preparation and Processing

Side walks for the subject 13 school zones
Methodology – Data Preparation and Processing

Crosswalks for the subject 13 school zones
Methodology – Criteria and algorithm

Network contributors – Two ways to assign the impedance to a route network: Links and junctions

- Impedance to the links - Sidewalk, crosswalk, major street, inside the flashing school zone – the network will computed as cost distance in feet as follows (Pedestrian travel speed is estimated as 4ft/s as suggested by the Highway Capacity Manual)

\[
\text{Cost distance} = \frac{\text{Segment Length}}{1600} \times 5280 \times 1.3^{2-\text{Sidewalks}} \times 1.5^{1-\text{OnMajor}} \times 1.4^{\text{MaxCross}-\text{NumCross}} \times 1.6^{1-\text{InSchool}}
\]
Methodology – Criteria and algorithm

Network contributors – Two ways to assign the impedance to a route network: Links and junctions

- **Junction without traffic signal** - each junction will add one minute as cost time
- **Junction with traffic signal** – each traffic signal point adds 0.5 minutes as cost time

Cost distance = cost time * 4 ft/s
Methodology – Criteria and algorithm

Comparison of Shortest & Safe Routes

Safe route generated by safe route Model

Default shortest route generated by the network model
Methodology – Web Solution

Web Users

Client Application
- Desktop Browser
- Cell Phone Browser / App

Cloud APIs
- Google Search
- Google Analytic
- Google Maps

FIU Proxy Server

IIS Web Server
- Application Production Server

ArcGIS Server JavaScript APIs

ArcGIS Server
- Pedestrian Crashes
- Network Model
- School Zones
- School Entrances
- Sidewalks
- Crosswalks
- Traffic Signals

File Geo-Database
Methodology – Web Solution

- Fully enabled Google Search APIs
- Simple user interaction interface design for better user experience
- Printable map available
- ArcGIS Server integration
  1. School Zone layer
  2. School Entries
  3. Route from network model
Methodology – ArcGIS Server Integration
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• Future work
  • Go Mobile
  • Validation of the network – User feedback
  • Expansion
Future Work -- Go Mobile

- Adapt the user interface of route planner for Web browsers on mobile devices, including side panels, school selection menu, location search box, map window, and routing directions;
- Convert location selection through mouse-clicks to selection drop pins for the tactile user interface.
- Pinpoint the user’s current location in the map window using the integrated positioning capabilities of the mobile device, such as GPS or WiFi;
- Provides step-by-step turn instructions along the route in real-time using the user’s current location in the network.
Future work -- User-feedback

- Leverage on the current parent and teacher network and outreach/education platform
- Conduct usability studies of the current Web based Walk to School Route Planner.
- Customized feedback functions for user interface and computed routes.
- Feedback function to report on observed conditions in the network, e.g. poor sidewalk condition
Future work -- Expansion

Expansion from 13 to 63 school zones
Thank you!
Any questions?