Smart Phones and Smart Travelers

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AGENDA

• Multimodal trip planning using open data

• Mobile Apps – Opportunities for Real-time Data Collection and Travel Info Dissemination
Enabling Cost-Effective Multimodal Trip Planners through Open Transit Data

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Mobility and Travel Choices

- Mobility and travel choices mean multiple travel options for getting around
  - Not being car-, bus-, bike-, or walk-dependent
  - Being able to mix and match modes to meet needs
Why multimodal trip planners?

• If you want to drive, the question is “How do I get there?”
  – Road networks are dense, connected, complete
  – Google, Mapquest, Yahoo can easily tell you

• For bike/walk/bus, the question is “Can I get there (by a safe route)?”
  – Networks are sparse, incomplete, or both
  – For bike/walk, path is very important
Free, open-source software
– opentripplanner.org
Development led by TriMet and OpenPlans
Available for anyone to download, deploy, and modify
Non-profit OpenPlans can provide installation, customization, maintenance support
OpenTripPlanner = Multimodal

- USF’s OTP Demo for Tampa, FL - http://opentripplanner.usf.edu
  - Example: Bike->Bus->Bike
TriMet – Portland, OR

- Primary motivation was to merge separate transit and bike trip planners – http://rtp.trimet.org/
- Launched beta version Oct. 2011
- Will fully switch to OTP Summer 2012
Pune Bus Guide, India

- Production deployment of OpenTripPlanner
  - http://punebusguide.org/guide/
- Translated to Devanagari script, including right-to-left interface
Businfo, Tel Aviv, Israel

- Production deployment of OpenTripPlanner
  - [http://businfo.co.il/](http://businfo.co.il/)
- Translated to Hebrew
  - Also uses right-to-left interface
- Funded by regional transportation authority after reorganization of regional transit routes
goEuropa, Poznan, Poland

- Production deployment of OpenTripPlanner
  - http://iplaner.pl/iPlaner2/
- Translated to Polish
- Customized website interface, uses OTP to calculate routes on server
Mobile OpenTripPlanner

- CUTR is working on open-source Android app
- Can interface with any OTP server via the OpenTripPlanner REST API
- Other apps likely to follow by others
Why don’t we just use Google Maps?

- At USF, Google Maps can’t find USF building names or abbreviations
- Google Maps gives walking directions on Alumni Dr. (no sidewalks) and using a cross-street (instead of the nearby crosswalk)
Can Add New Transit Systems

HART
- BUS 12
  - 4:22 PM Depart 22nd St @ 131st Av (South to D)
  - 1 minute
  - 4:23 PM Arrive 22nd St @ 12401 University Villa

USF Bull Runner
- BUS D
  - 4:27 PM Depart University Club to ADM
  - 9 minutes
  - 4:36 PM Arrive ADM I

Trip Details:
- Start: Wed, Jul 27th 4:18 PM
- Valid: July 27th, 2011 @ 4:18 PM
- Time: 21 minutes
- Walk: 0.3 mi

Walk to footway:
1. Walk south on footway (233 ft)
2. Slight right to continue on footway (0.1 mi)
3. Right to continue on footway (78 ft)
Bike Routing Options

• OTP bike routing supports mix of multiple options:
  – Time (fastest)
  – Hills (flatest)
  – Safety (dedicated bike lanes)
    • Still open research area
Wheelchair-accessible routing

Shortest Route (with stairs)
Wheelchair-accessible routing

Route with no stairs
Open Data Sources - Transit

General Transit Feed Specification (GTFS)

- Over 200 agencies in US have transit data in GTFS, more than 447 world-wide
- See “GTFS Data Exchange” for list of agencies with “open” GTFS data:
- Challenges:
  - Not all agencies openly share their GTFS data
  - See City-Go-Round for list of “closed” transit agencies:
    - http://www.citygoround.org/
- Some agencies need help organizing data
Road/Bike/Walk - OpenStreetMap.org

- “Wikipedia for geographic data”
- Users contribute data under Creative Commons license
- Edit online, tracing GPS or donated imagery, or via code
- Anyone can download and use the data
- Challenge – Coverage is still sparse in some areas
Data - National Elevation Dataset (NED)

- Provides elevation data for biking/walking in OTP
- Currently used to produce elevation graph, and for some biking routing decisions
Geographic Information Systems (GIS)

- OpenTripPlanner can also support loading ESRI GIS (e.g., .shp) files
- Local government sources:
  - City
  - County
  - Special Districts (parks, etc.)
- Challenges:
  - Age of data
  - Bottle-neck/time required to add new attributes, update data
Mobile Apps – Opportunities for Real-time Data Collection and Dissemination

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Mobile Phone Opportunities

• Mobile phones have become widely-available methods of information dissemination
  – Global mobile subscriber rate is 90% (>5B) [1] Dec 2011
  – U.S. mobile subscriber rate is 102% (322.9M) [2] Dec 2011
  – 26.6% of U.S. households are wireless-only [3] April 2011

• Challenges:
  – Researchers - How can we leverage this technology?
  – Travelers - Face information overload

TRAC-IT

- GPS-enabled mobile phone app
- Created for multimodal travel data collection
- Can collect bus, bike, walk, car sharing trips
- Ex. USDOT Value Pricing project
  - 30 participants
  - 40 days avg. per participant
  - 4,023,917 GPS fixes
  - 1,633 processed trips
Mobile App Data Collection

• Advantages
  – High-resolution GPS sampling (every 4 seconds)
  – Passive and Active survey options
  – Costs can be low, esp. if using participant’s phone
  – Data is delivered wirelessly to the server
    • Don’t lose data if device is lost
    • Allows indefinite deployment without retrieving device

• Challenges
  – Battery life & Data Transfer!
    • Several patented and patent pending technologies extend battery life and minimize data transfer
Data Processing Challenges

- Amount of data can be overwhelming
- Automated data processing helps, but need improvements
  - Point-of-Interest Detection and Trip Segmentation via Clustering
Travel Information Challenges

• DOTs are starting to share traffic info via mobile subscriptions

• Challenge - Can be a fire hose of information

• Ex. MyFlorida 511
  – Avg. > 16 emails per Friday for I-75 and I-275 in Tampa

• Ex. FL511_Tampa Bay on twitter
  – Launched Feb. 22, 2012
  – Covers primarily I-275, I-4, and I-75 in Tampa
  – Averaging 270 tweets per day!!
Advanced Location Analytics

- Need real-time “hyper-personalized” alerts based on predicted travel path
- Only deliver alerts when stopped
- “Personal Travel Coach” suggests combining trips, using public transportation

Alert!
Your typical route home is delayed by a traffic incident

Soon-to-be Traveler
Real-time Transit Info

- **OneBusAway** – open-source transit information system originating from University of Washington in Puget Sound

- MTA has deployed open-source system in NY based on OneBusAway
  - OpenPlans and Cambridge Systematics as vendors
  - Uses Service Interface for Real-time Information (SIRI)-based interface for mobile apps

- CUTR will be working on additional OneBusAway deployment with mobile SIRI
Questions?

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