CENTER FOR TRANSPORTATION RESEARCH

A Map-Matching Algorithm for Applications in Multimodal Transportation Network Modeling (15-5081)

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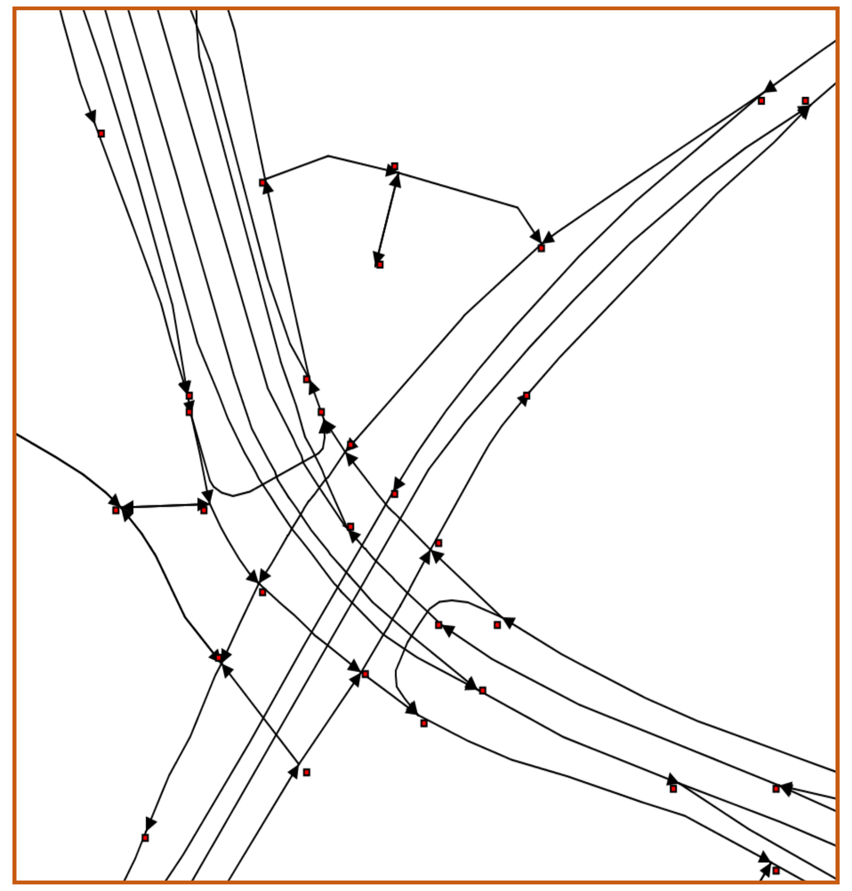
Objectives

Mapping georeferenced data to an underlying map

- *e.g.* GTFS shapes → Node-link road representation

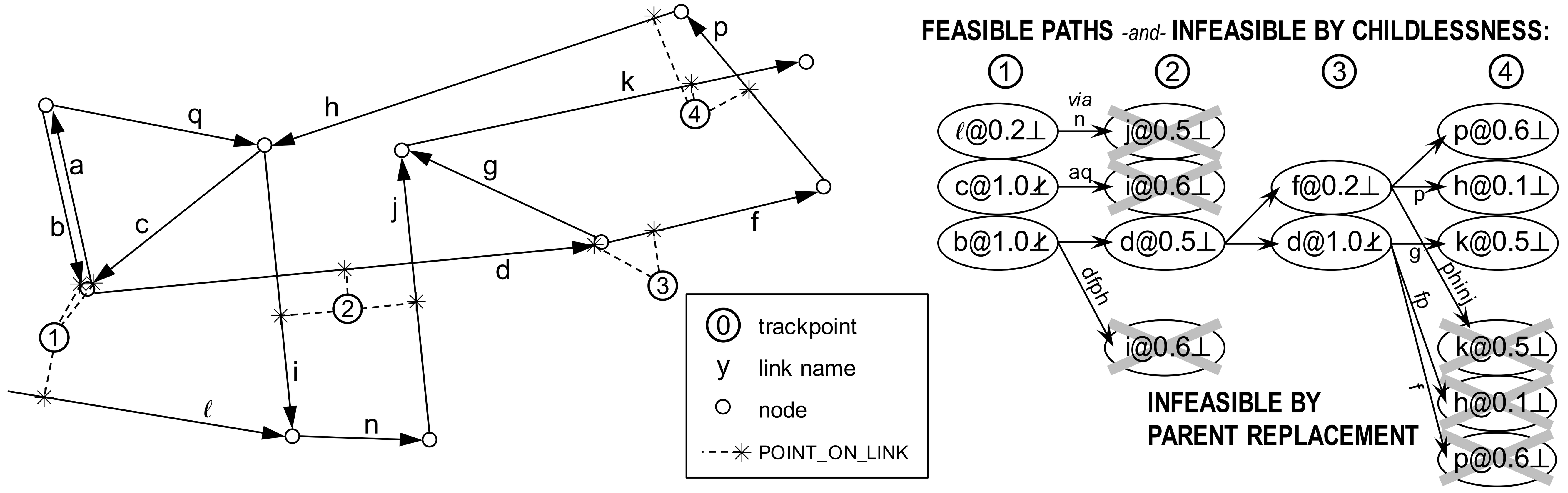


- Integrate DTA traffic model w/ transit planning model
- Validate DTA traffic model w/ GPS tracks
- Share data sources that vary by resolution & accuracy

Background

- Geometric vs. Topological
- Global vs. Local
- Trackpoint density
- Heuristics (overpasses, turns, speed, etc.)
- Challenge: A wrong routing decision leads to more wrong decisions. *WE NEED MULTIPLE HYPOTHESES!*

Example



Experiments

Trackpoint sets:

- CapMetro GTFS: 84 routes · 170 shapes · 45,476 points · 1,383 miles · 2 in - 3472 ft apart, avg. 161 ft
- GPS 1-sec.: 22 routes · 44 journeys · 44,298 points · 283 miles · 0 to 14 ft apart, avg. 34 ft

Maps of Austin, TX area:

- NMC CAMPO DTA: 11,393 nodes · 13,353 links
- OpenStreetMap: 123,046 nodes · 300,199 links

	Trackpoint Set	Underlying Map	Discontinuities	Routing Accuracy
#1	CapMetro GTFS	NMC CAMPO	0	95.9% *
#2	GPS 1-sec.	NMC CAMPO	0	100%
#3	CapMetro GTFS	OpenStreetMap	0	99.8% *

* In hand-checked cases, 3068 of 45,476 GTFS points

Conclusions

- No heuristics, multiple hypotheses, quasi-global algorithm
- High routing accuracy at regional scale
- Future work:
  - Observe link curvature
  - Computational speedups
  - Fixing underlying topology

Check It Out!

Source code (GPL license, Python):

http://ctr.utexas.edu/nmc/nmc-map-matcher

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