
Route Choice Analysis: Data, Models, Algorithms and Applications

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Route Choice Analysis:

Data, Models, Algorithms and Applications

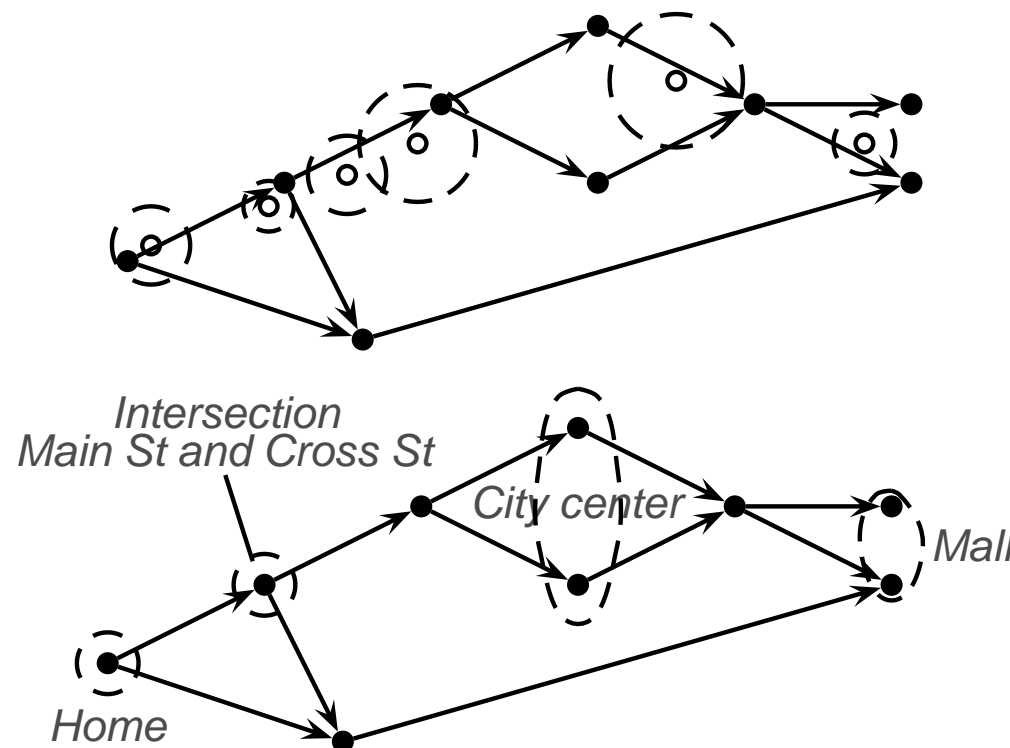
Which route would a given traveler take to go from one location to another in a transportation network?

- Car trips (uni-modal networks)
- Discrete choice models
- Disaggregate revealed preference data

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Bierlaire, M. and Frejinger, E. (2008)

Route choice modeling with network-free data, *Transportation Research Part C* **16**(2): 187-198.



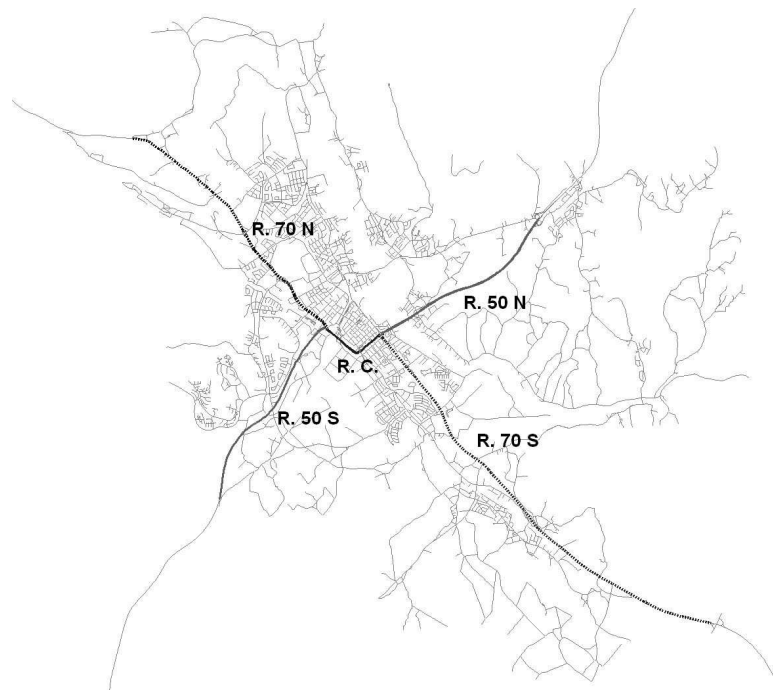
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- Route choice data often ambiguous
- Errors may be introduced when matching one observation to **one** path
- Modeling scheme that reconciles network-free data (original trip observations) with a network based model
- Several paths can correspond to the same observation
- Tested on reported long distance trips in Switzerland with good results

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Frejinger, E., and Bierlaire, M. (2007)

Capturing correlation with subnetworks in route choice models,
Transportation Research Part B **41**(3): 363-378.



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- Approach for modeling correlation
- Key concept: subnetwork
- Model path choice in detailed network but correlation on subnetwork
- Factor analytic specification of mixture of logit model

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Gao, S., Frejinger, E., and Ben-Akiva, M. (2008)
Adaptive Route Choice Models in Stochastic Time-Dependent
Networks, *Transportation Research Record* **2085**: 136-143.



Source: *The Economist*, March 13, 2008

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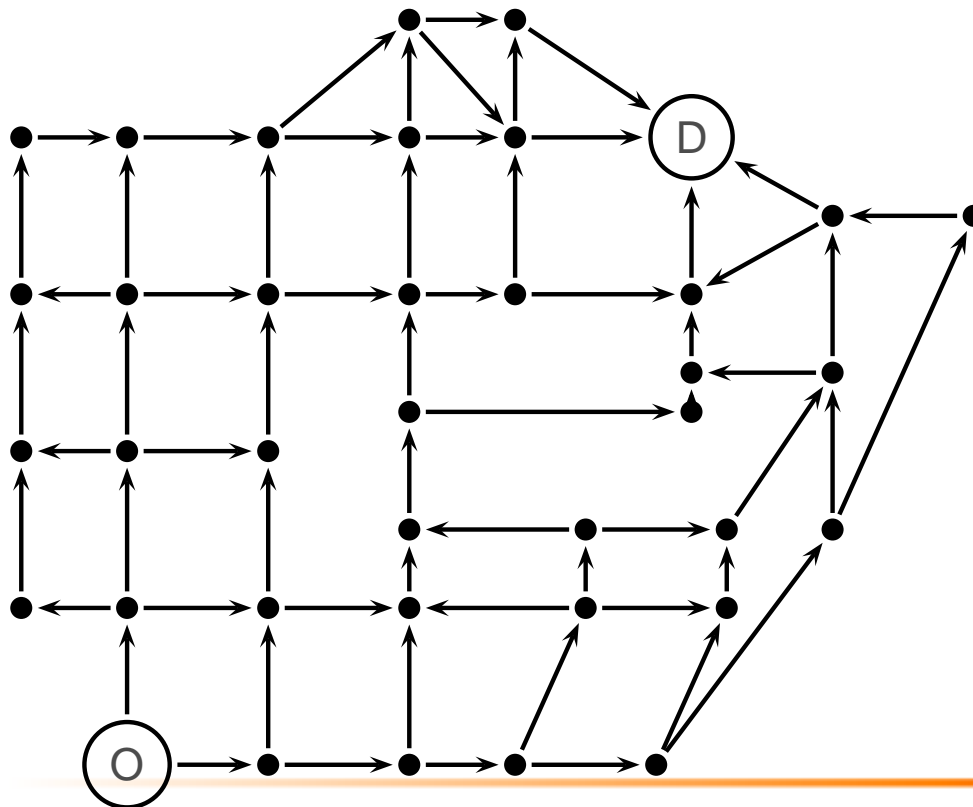
- Adaptive route choice in stochastic and time dependent networks
- En-route adaptiveness in response to real-time traffic information
- Estimation of routing policy choice model based on path observations (synthetic data)

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- Comparison between prediction results of
 - non-adaptive path choice model
 - sequential path choice model (at each intermediate nodes)
 - routing policy choice model
- Routing policy model best captures the option value of diversion

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Frejinger, E., Bierlaire, M., and Ben-Akiva, M. (2009)
Sampling of Alternatives for Route Choice Modeling,
Transportation Research Part B **43**(10): 984-994.



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- Choice set generation for the estimation of route choice models
- Two frameworks: generation of consideration sets and sampling of alternatives from the set of all paths
- Most algorithms designed for generating consideration sets but fail in general (not all observed paths are generated)

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- Sampling approach: observed path as well as all considered paths in the choice set by design
- A sampling correction for path size logit (MNL) model is derived and an operational algorithm defined (biased random walk)
- Focus: unbiased parameter estimates
- Assumption: bias of not including a considered alternative is larger than including many non-considered alternatives

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- Two RP datasets have been used



GPS data from Borlänge, Sweden
3000 nodes, 7500 links,
2980 observations



Reported trips for long distance travel
in Switzerland
15000 nodes, 40000 links,
780 observations

Ongoing research on route choice modeling



- Dynamic discrete choice model for route choice
Joint work with Mogens Fosgerau and Anders Karlström
- Adaptive route choice modeling in stochastic and dynamic networks continues
Joint work with Moshe Ben-Akiva and Song Gao
- Bioroute under development
Joint work with Michel Bierlaire



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