# Route choice sets for very high-resolution data



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# Route Choice Sets for Very High-Resolution Data

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# Motivation and objectives

GPS data offers more accurate and reliable information about the actually chosen routes

Participant burden can be reduced substantially

But extensive data processing is required to derive suitable input data for route choice modelling:

- Derivation of modes and trips
- Identification of chosen routes
- Choice set  generation

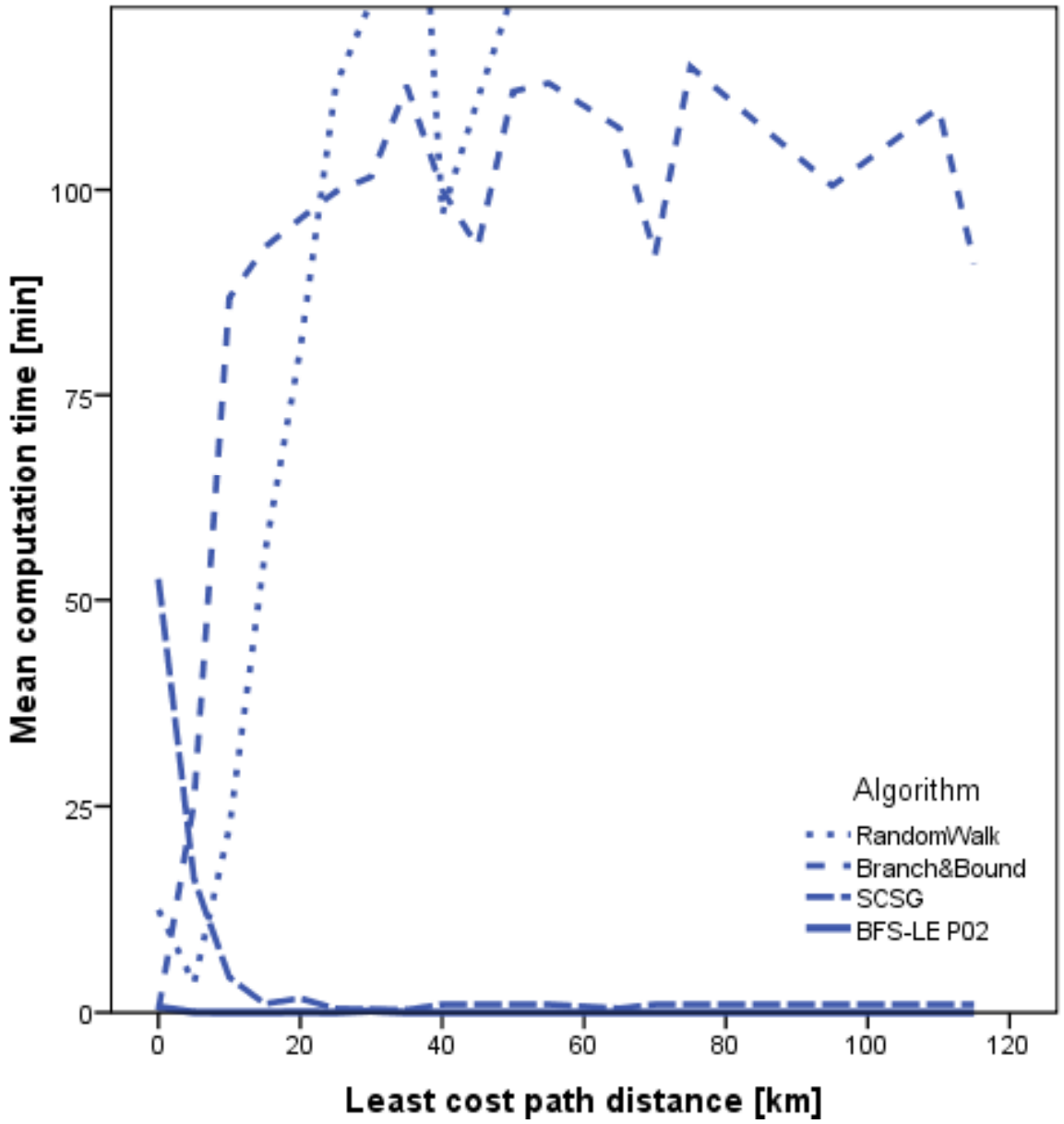
# Choice set generation

Choice set generation for 500 car trips on the Swiss Navtec network (408,636 nodes and 882,120 unidirectional links)

Choice set generation procedures tested:

- Random Walk (Frejinger, 2007)
- Branch & Bound (Prato and Bekhor, 2006)
- Stochastic Choice Set Generation (SCSG)
- Breadth First Search on Link Elimination (BFS-LE)

# Performance of all 4 algorithms



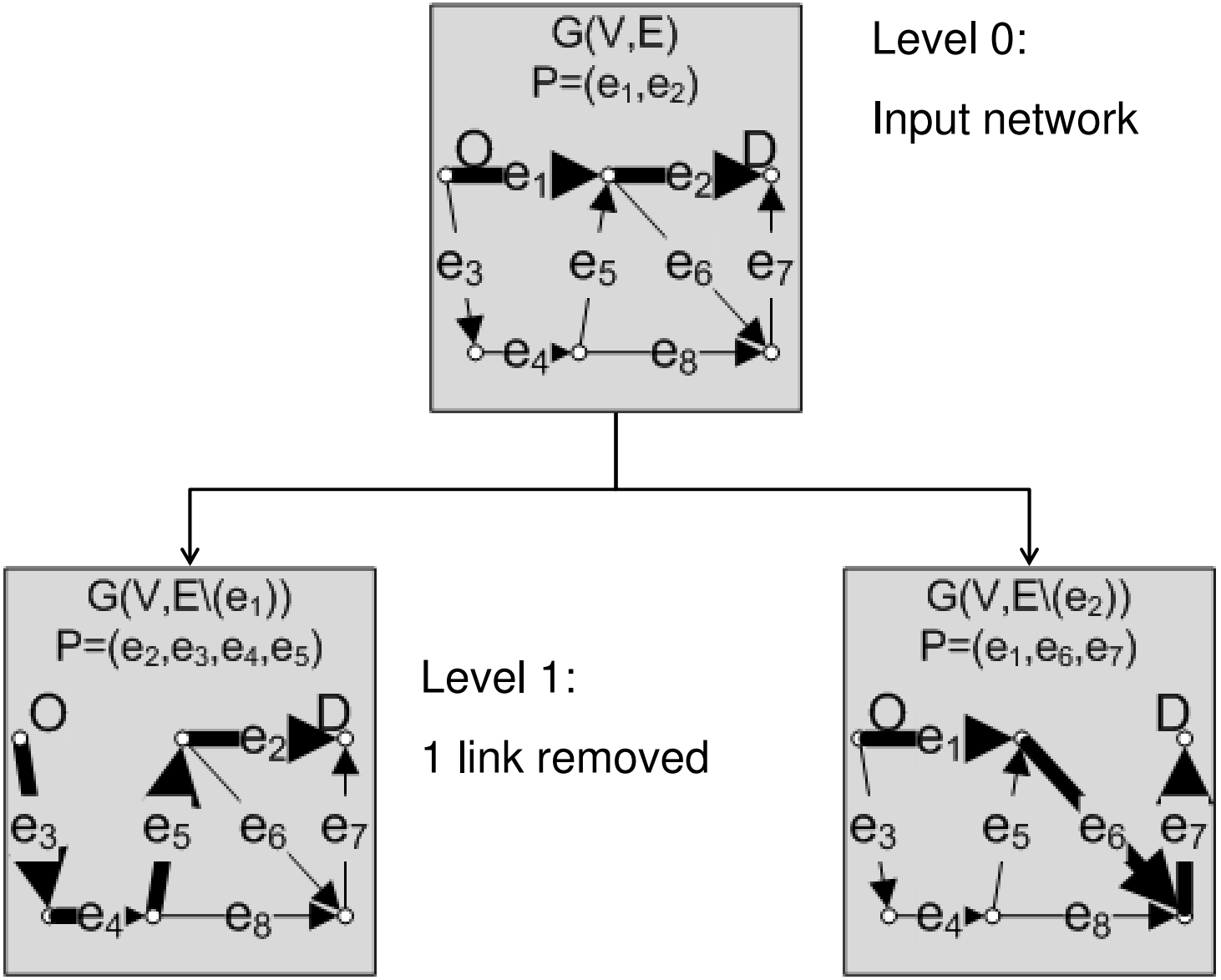
# The Stochastic Choice Set Generation (SCSG)

Repeated shortest path search

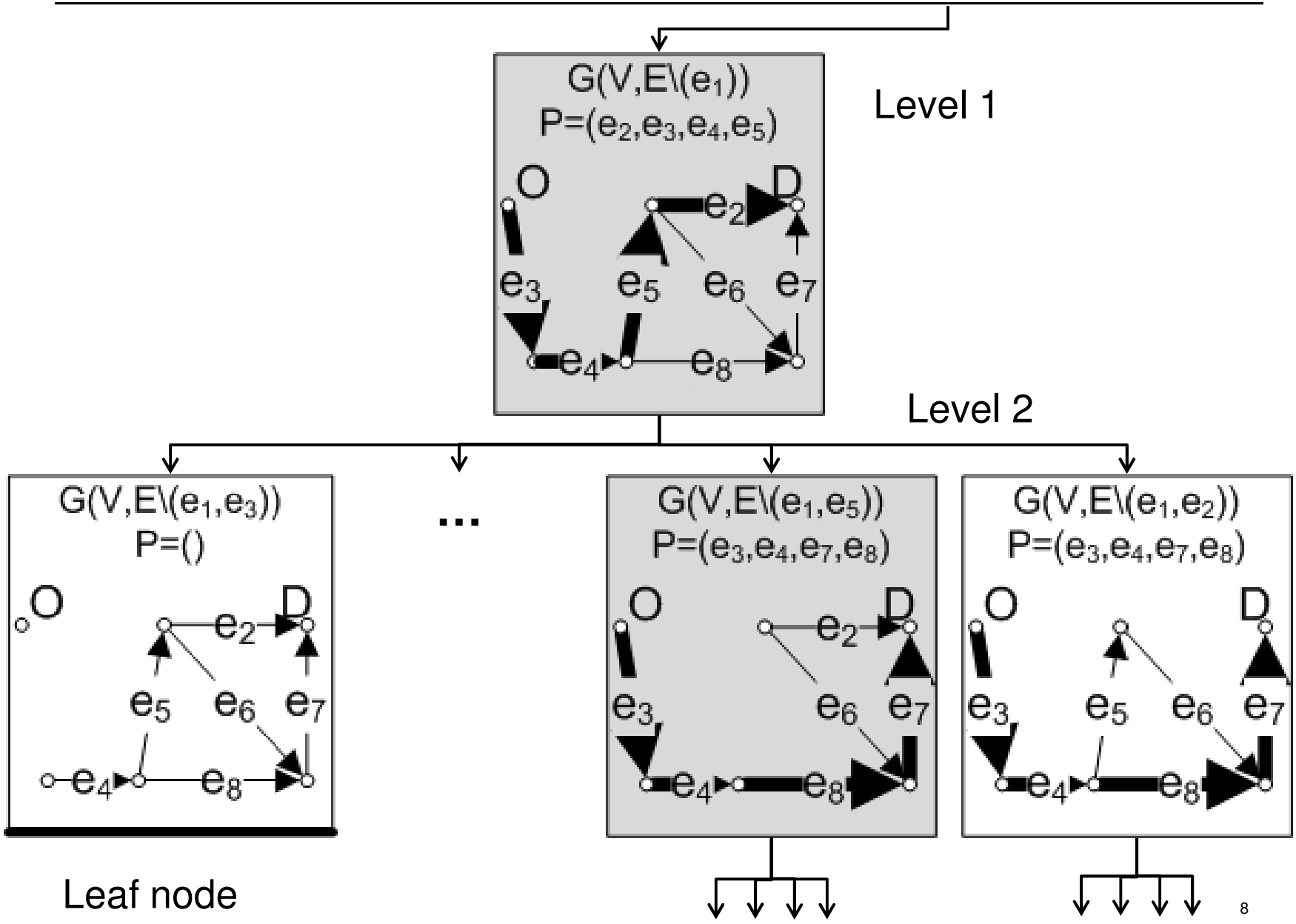
Random variation of link costs, i.e. free flow travel times

Uniform distribution, ranging from zero to twice the initial link costs

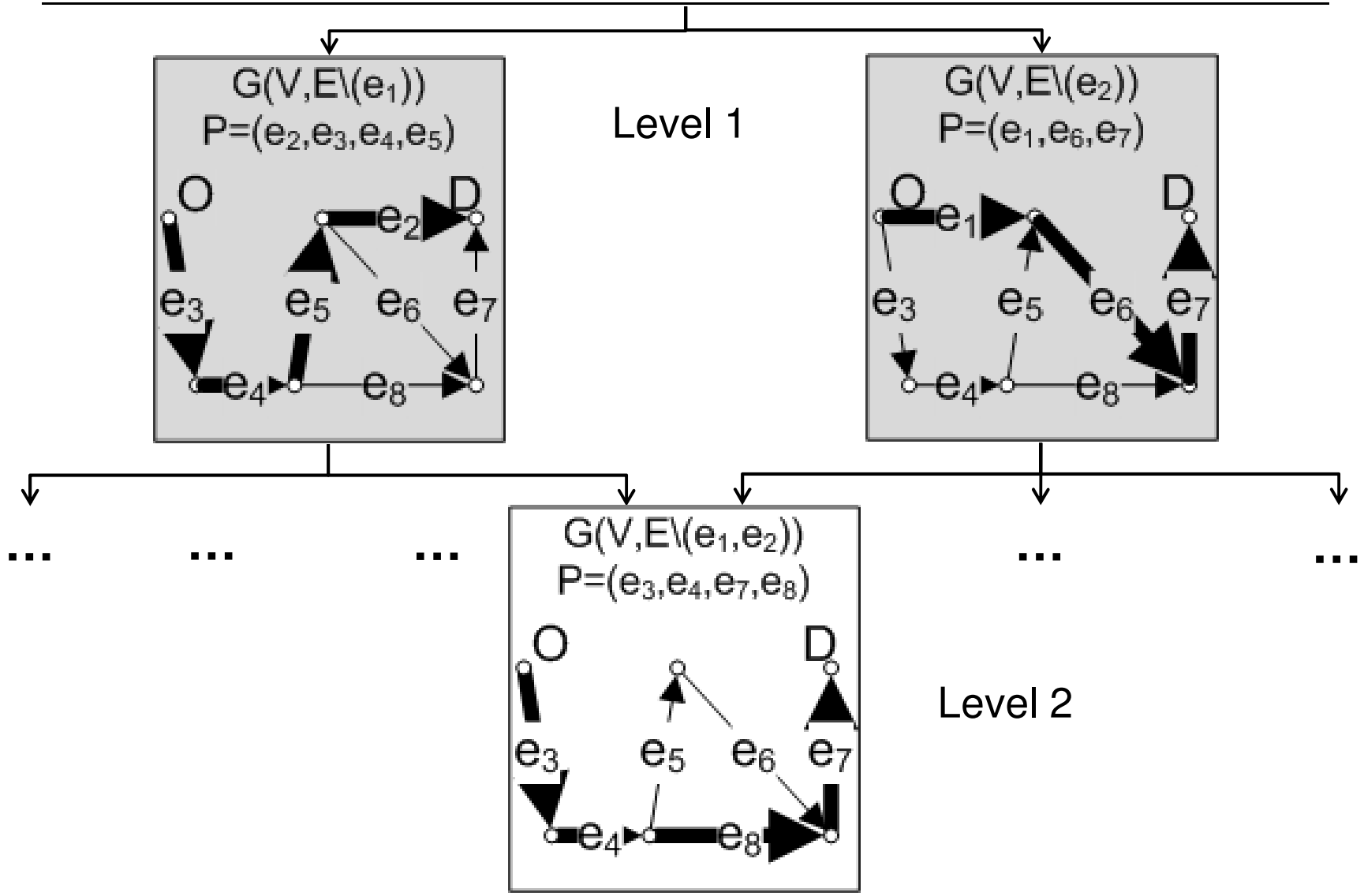
# The Breadth First Search on Link Elimination (1)



# The Breadth First Search on Link Elimination (2)



# The Breadth First Search on Link Elimination (3)

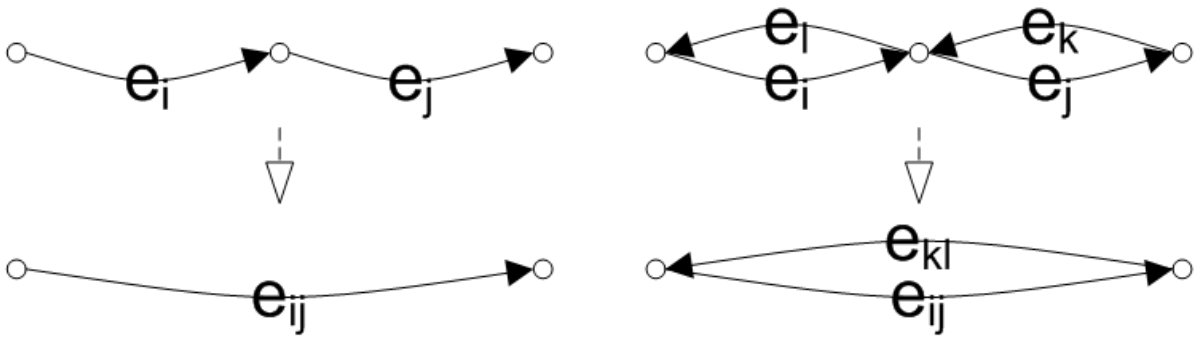


# BFS-LE performance optimisation

Two approaches for performance optimisation

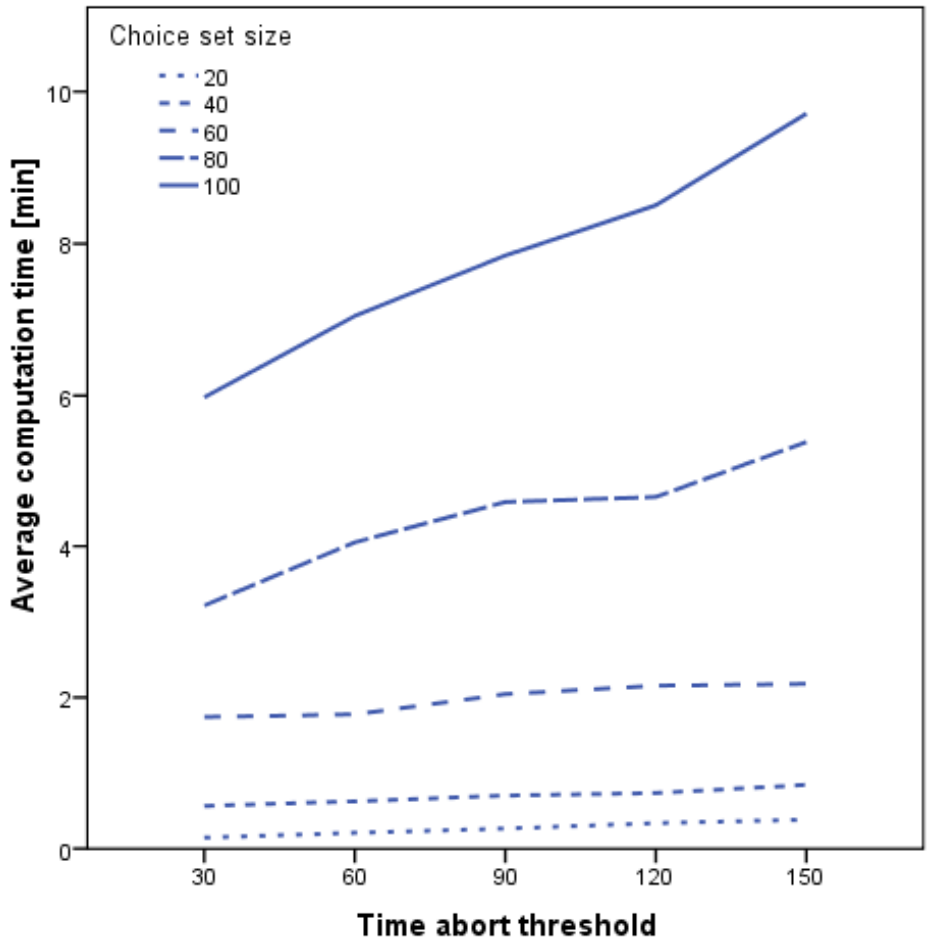
1. Randomly shuffle the processing order in each tree-level

2. Topologically equivalent network reduction

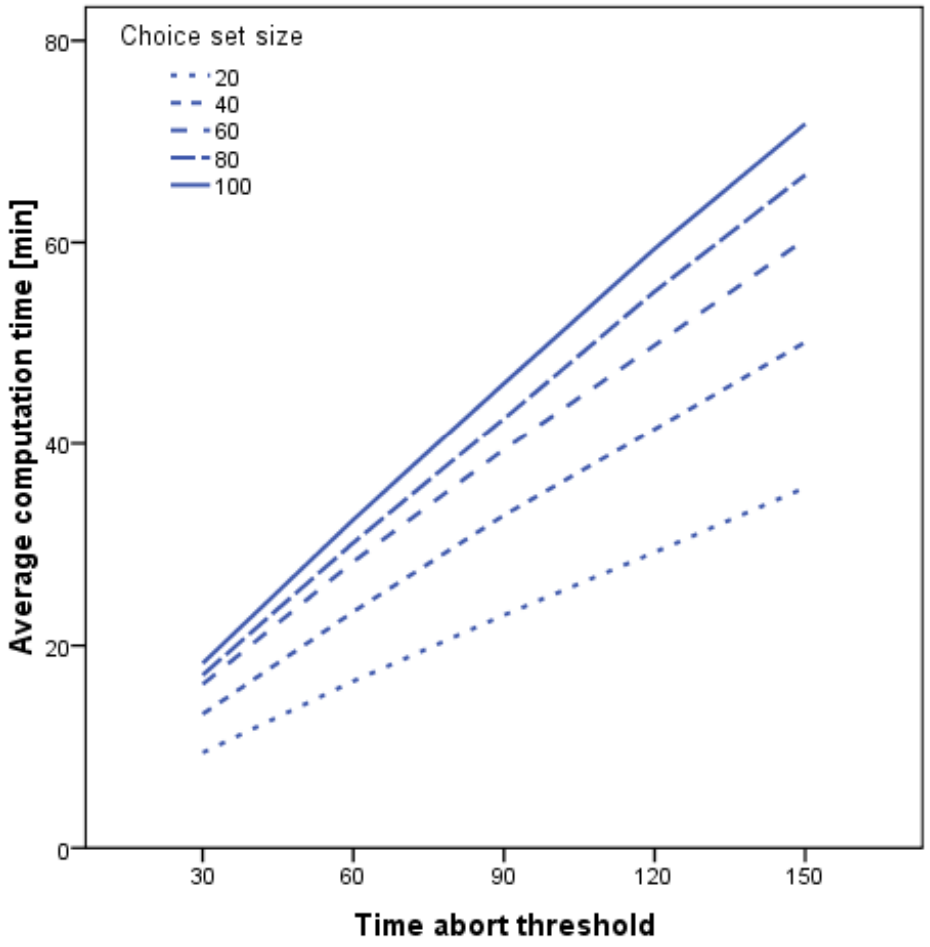



In addition: Time abort threshold for pathological cases

# Computational performance BFS-LE(P02) vs SCSG

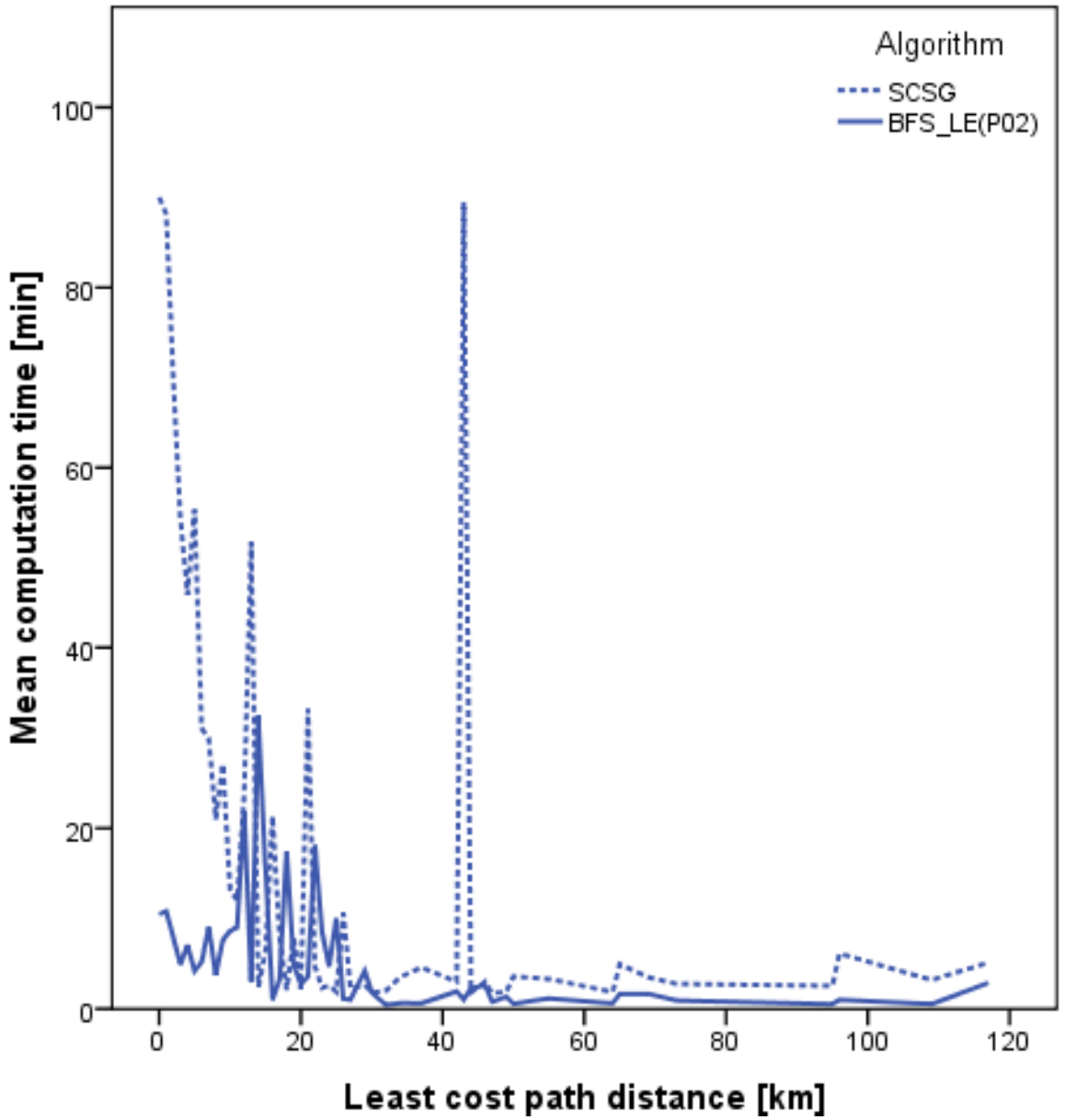



BFS-LE(P02)




SCSG

# Performance depending on least cost path distance



# Choice set structure

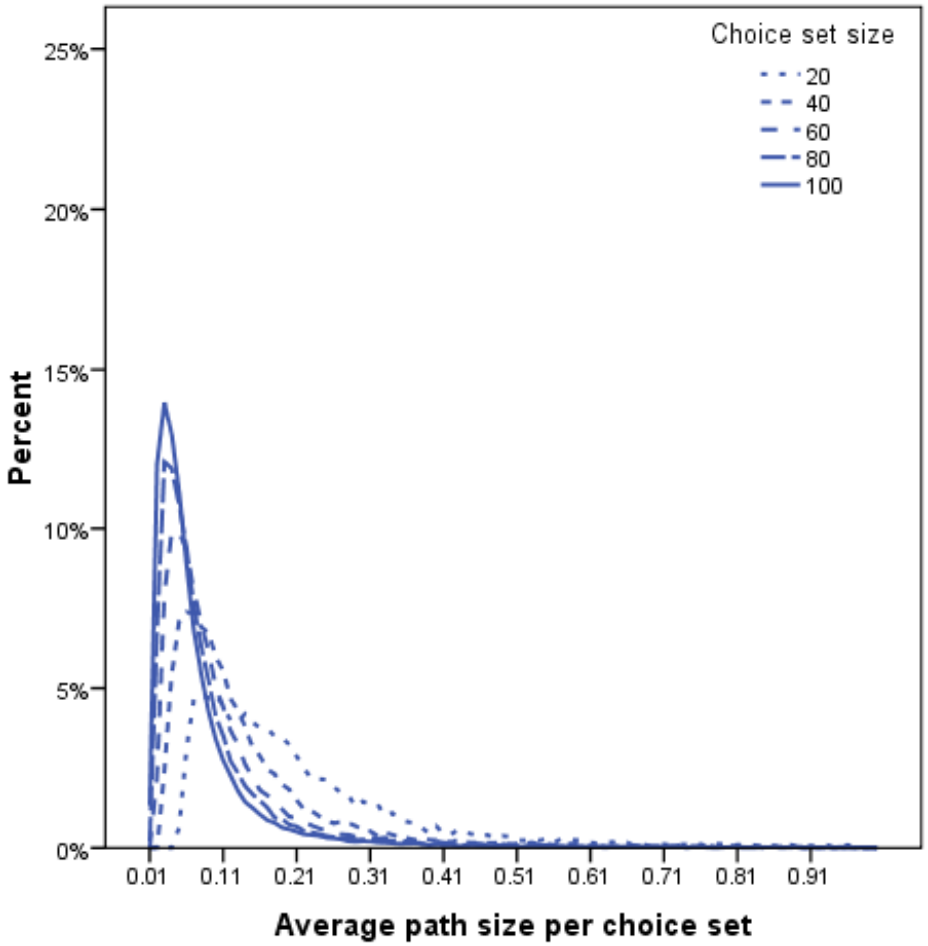
Chosen route reproduction (choice set size 100)

BFS-LE: 73%

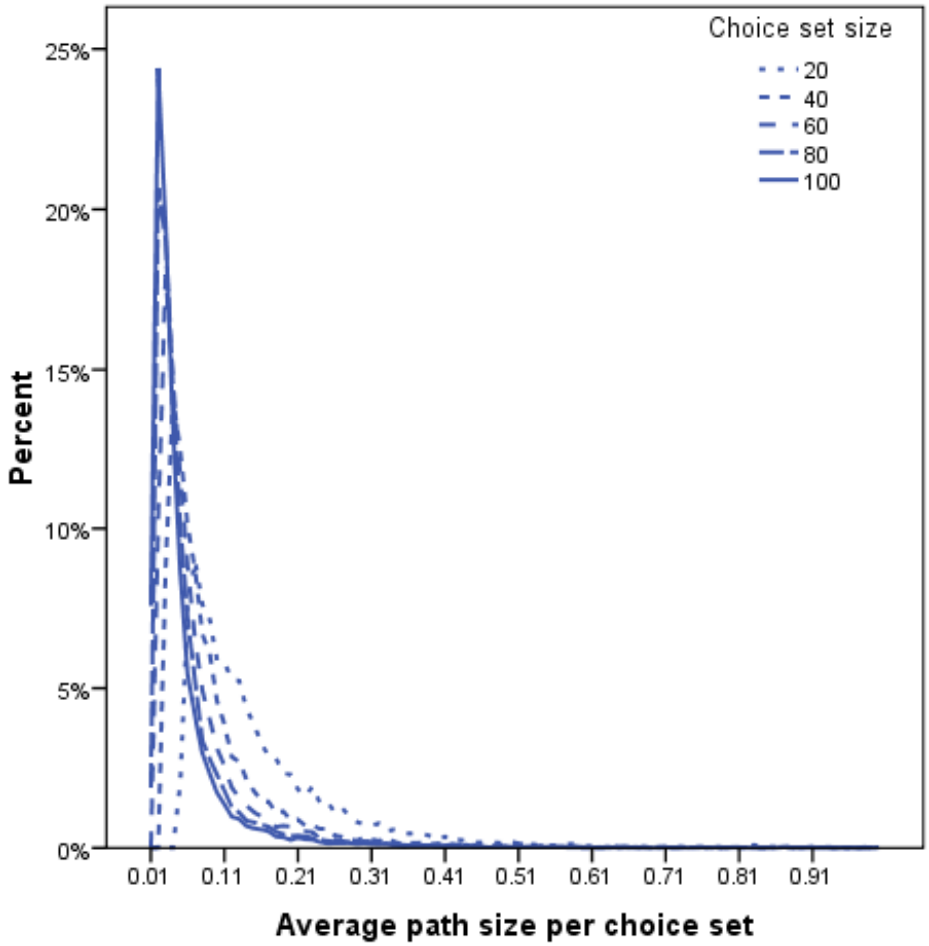
SCSG: 75%

| Distance travelled on | SCSG | BFS-LE | Chosen routes |
|---|---|---|---|
| Motorway | 16% | 17% | 12% |
| Extra-urban main roads | 18% | 18% | 16% |
| Urban main roads | 34% | 35% | 36% |
| Local roads | 32% | 31% | 36% |

# Path Size distributions

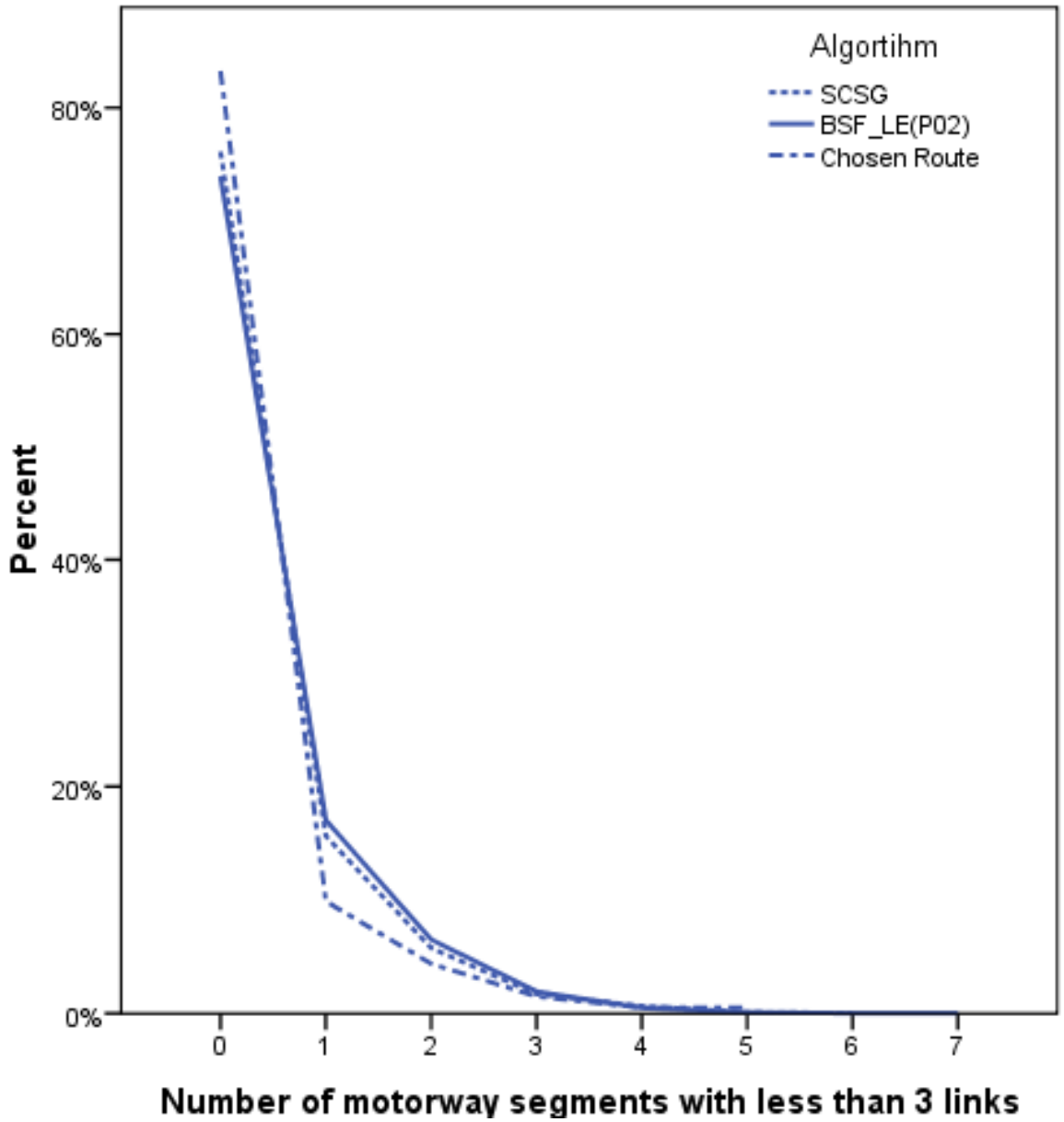



BFS-LE(P02)




SCSG

# Number of motorway segments with less than 3 links



# Conclusions

The high network resolution imposes new challenges to the choice set generation – especially computationally

Only approaches based on repeated shortest path search are applicable

The BFS-LE(P02) clearly outperforms the SCSG, particularly for typical urban trips under 10 km

The BFS-LE(P02) can be applied to loaded networks with dynamic travel times without any increase in computation time

# References

Frejinger, E. (2007) Random sampling of alternatives in a route choice context, paper presented at European Transport Conference, Leeuwenhorst, October 2007.

Prato, C.G. and S. Bekhor (2006) Applying branch-and-bound technique to route choice set generation, Transportation Research Record, 1985, 19–28.