Towards a MATSim model for active transportation in Melbourne

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MATSim User Meeting
22 March 2021

MATSim Melbourne project

https://github.com/agentsoz/matsim-melbourne

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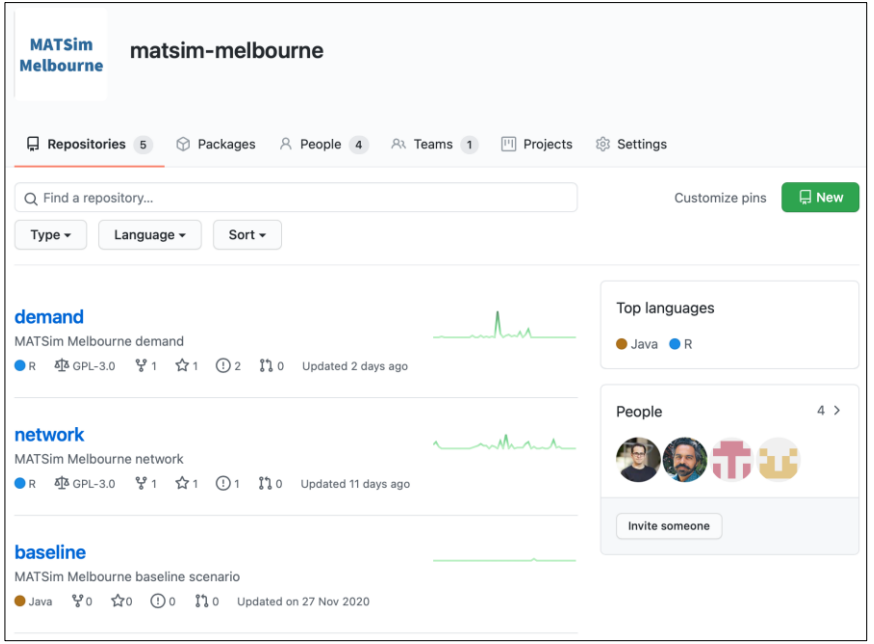
About this project

This repository will provide an open and validated MATSim traffic model for the greater Melbourne area. The project is a collaborative effort between individuals and groups from RMIT University, University of Melbourne, CSIRO Data61, Swinburne University, KPMG Australia, and others.

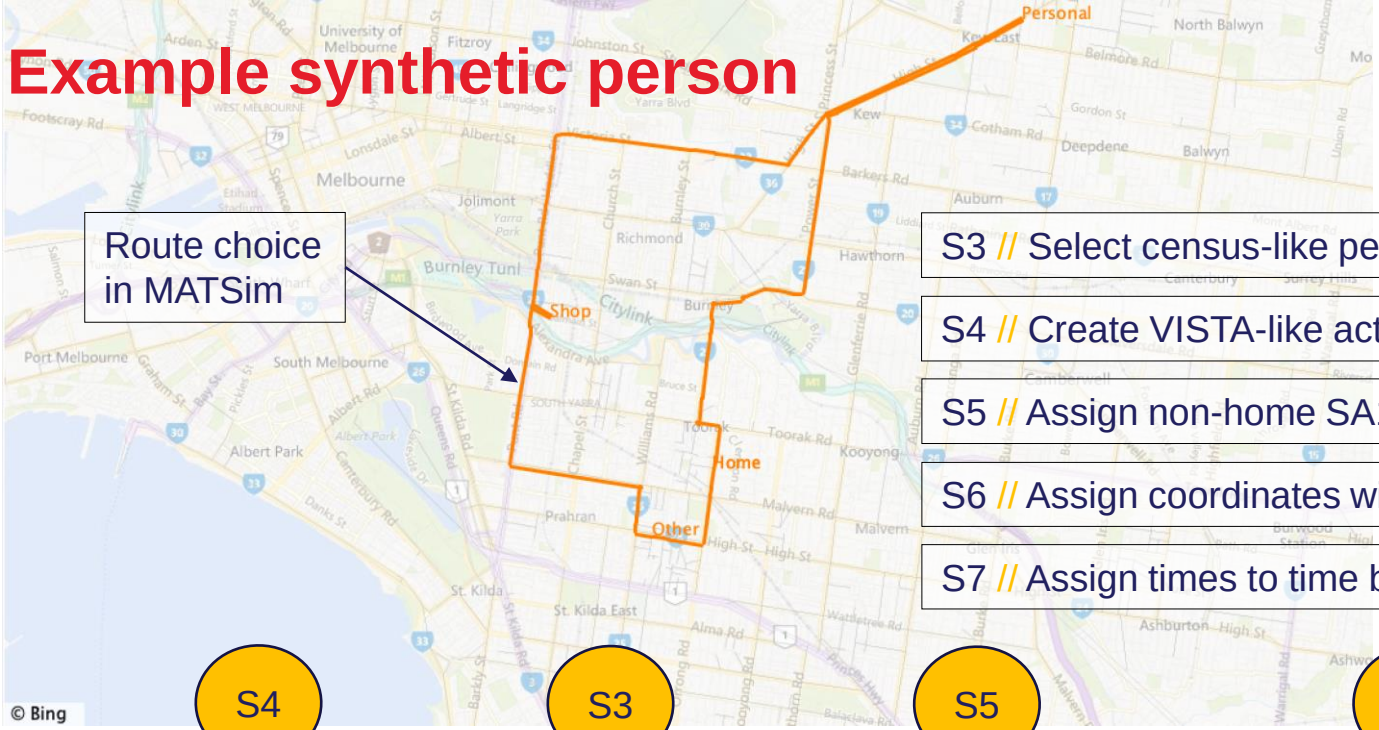


Demand Generation

Constructing census-like synthetic persons with VISTA-like travel itineraries
https://github.com/matsim-melbourne/demand

Both, A., Singh, D., Jafari, A. (2021) *What dost thou do? Reconstructing Melbourne's daily activities from travel diaries*, Work in progress paper.

Example synthetic person



Route choice in MATSim

S3 // Select census-like person from cohort

S4 // Create VISTA-like activity plan in 30-min time bins

S5 // Assign non-home SA1 locations and arrival mode

S6 // Assign coordinates within SA1

S7 // Assign times to time bins

S4 S3 S5 S6 S7

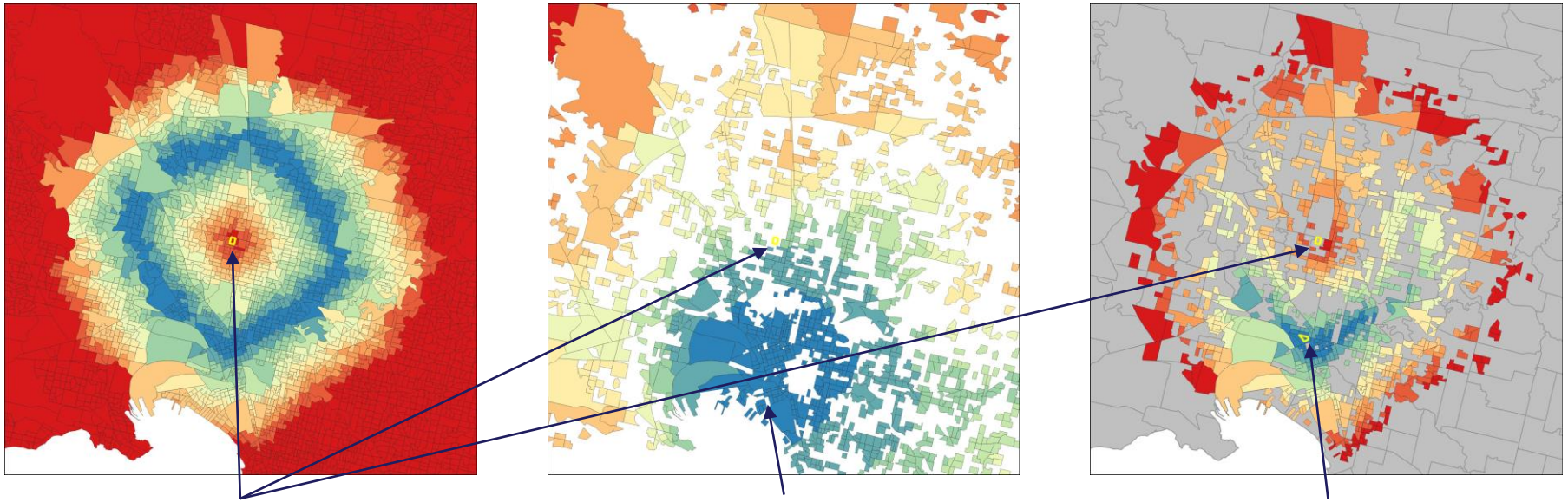
Id	Activity	sBin	eBin	AgentId	SA1	LocType	ArrMode	X	Y	sTime	eTime
3857	Home	1	19	206061138P1947787	20606113828	home	NA	325204	5809300	00:28:00	09:08:00
3857	Personal	19	22	206061138P1947787	20701115409	commercial	car	328741	5814870	09:10:00	10:32:00
3857	Shop	22	28	206061138P1947787	20607114466	commercial	car	323238	5811164	10:52:00	13:38:00
3857	Other	29	32	206061138P1947787	20606113625	work	car	324392	5808585	14:29:00	15:36:00
3857	Home	32	48	206061138P1947787	21302134322	home	car	325204	5809300	15:56:00	23:56:00

Activity area (SA1) selection example

Distance likelihood

Attraction (work) likelihood

Combined likelihood



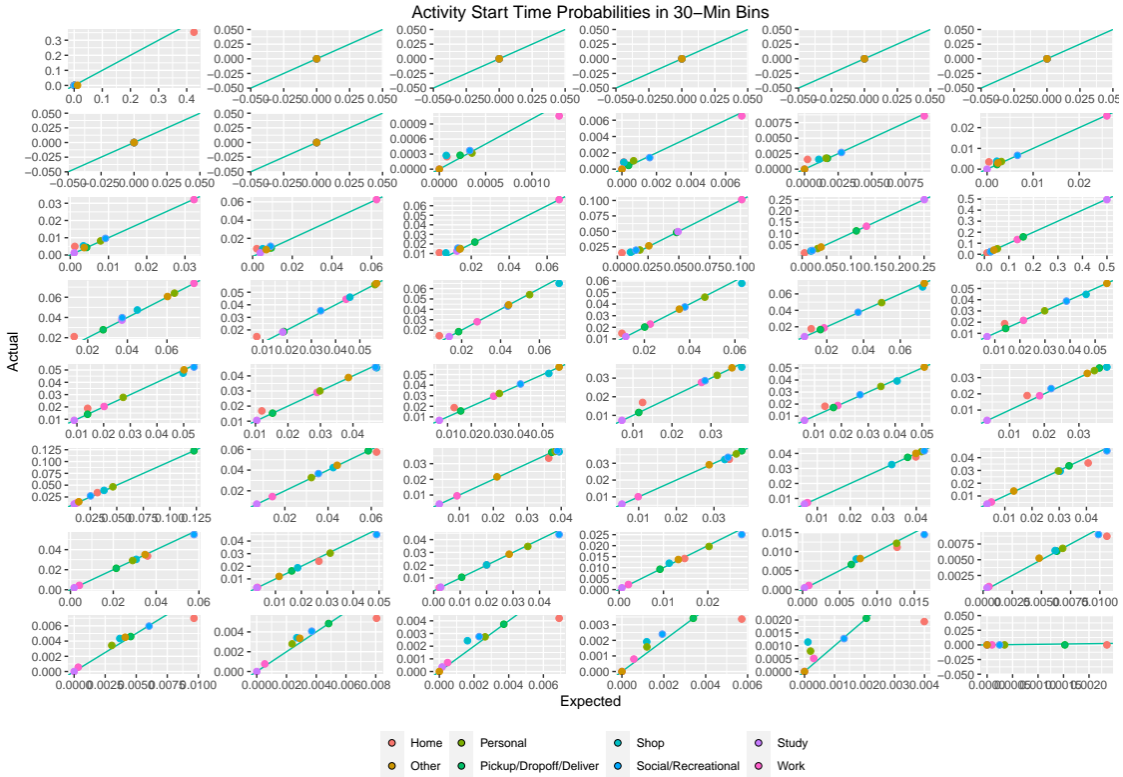
Origin

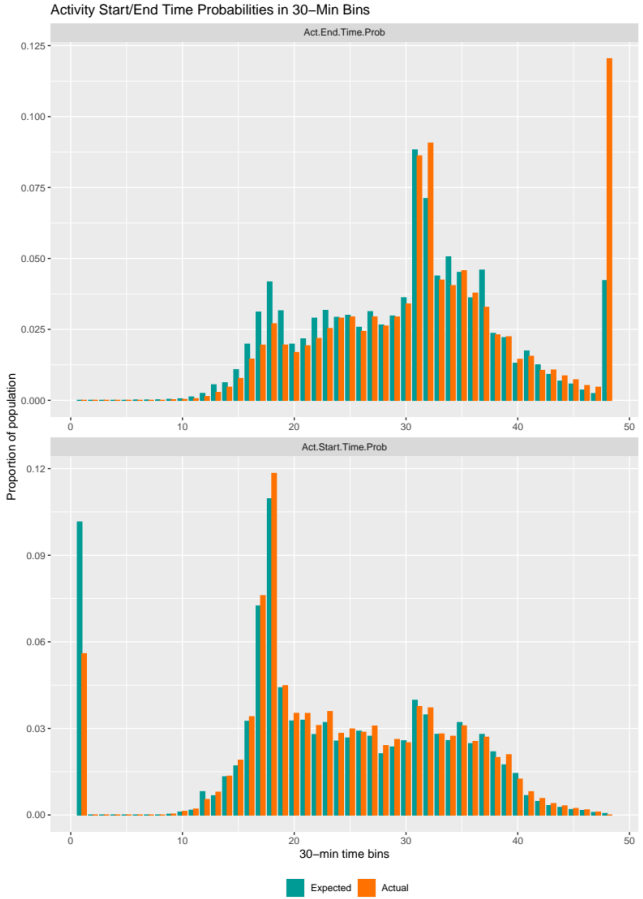
Central Business District

Destination

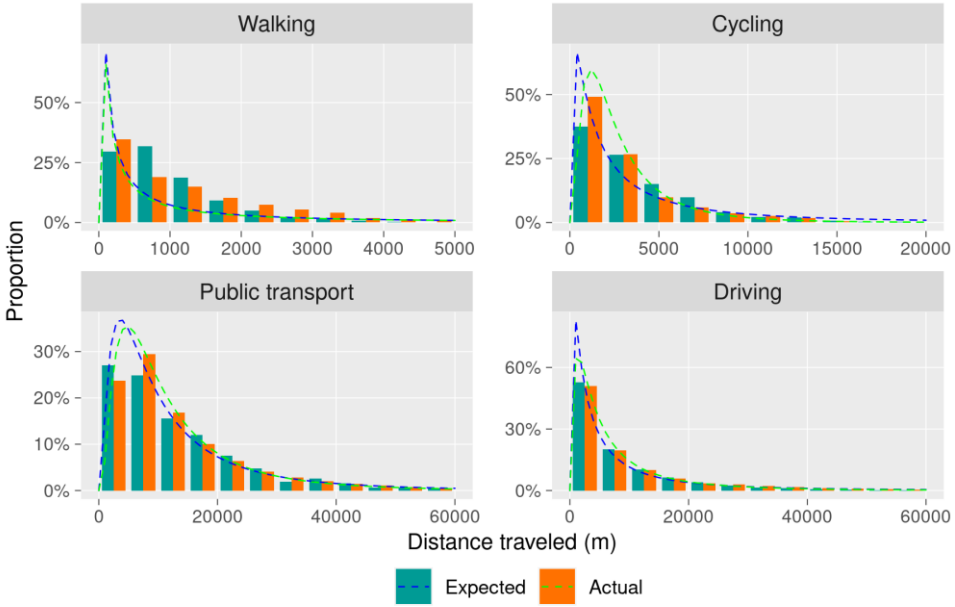
Uses geo-coded travel survey data, VISTA 2012-14, (not publicly available)

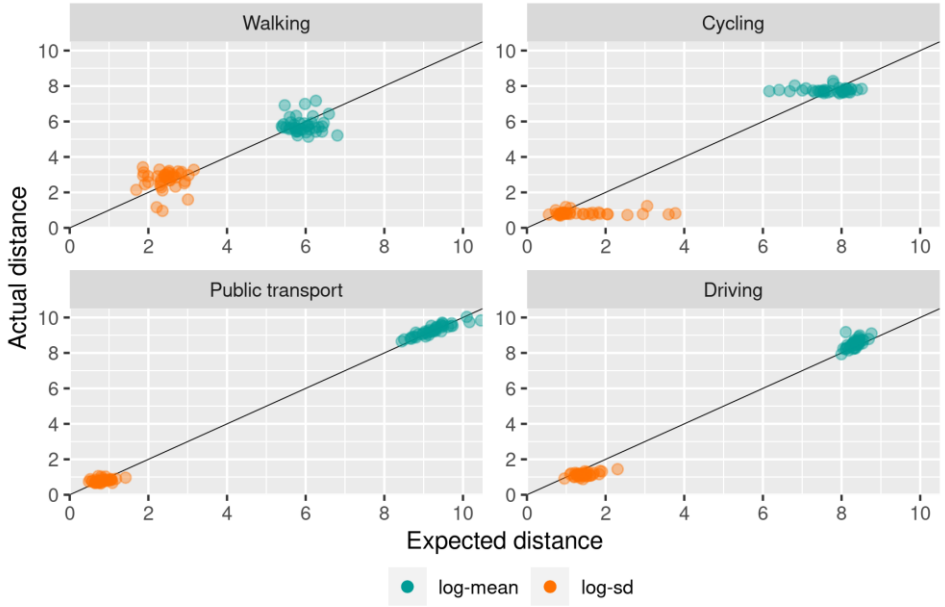
Synthetic plans vs VISTA





Synthetic distances vs VISTA (beeline)



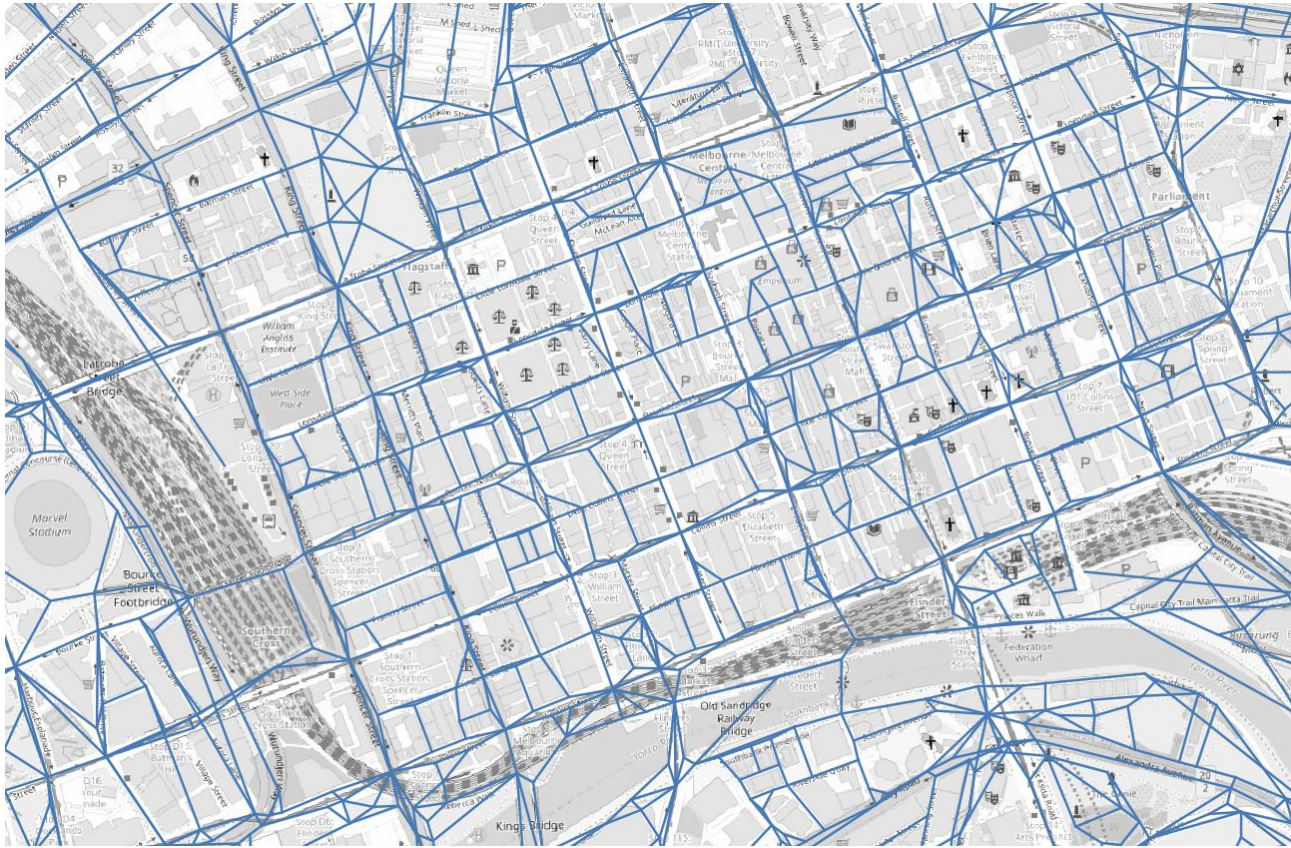


Network Preparation

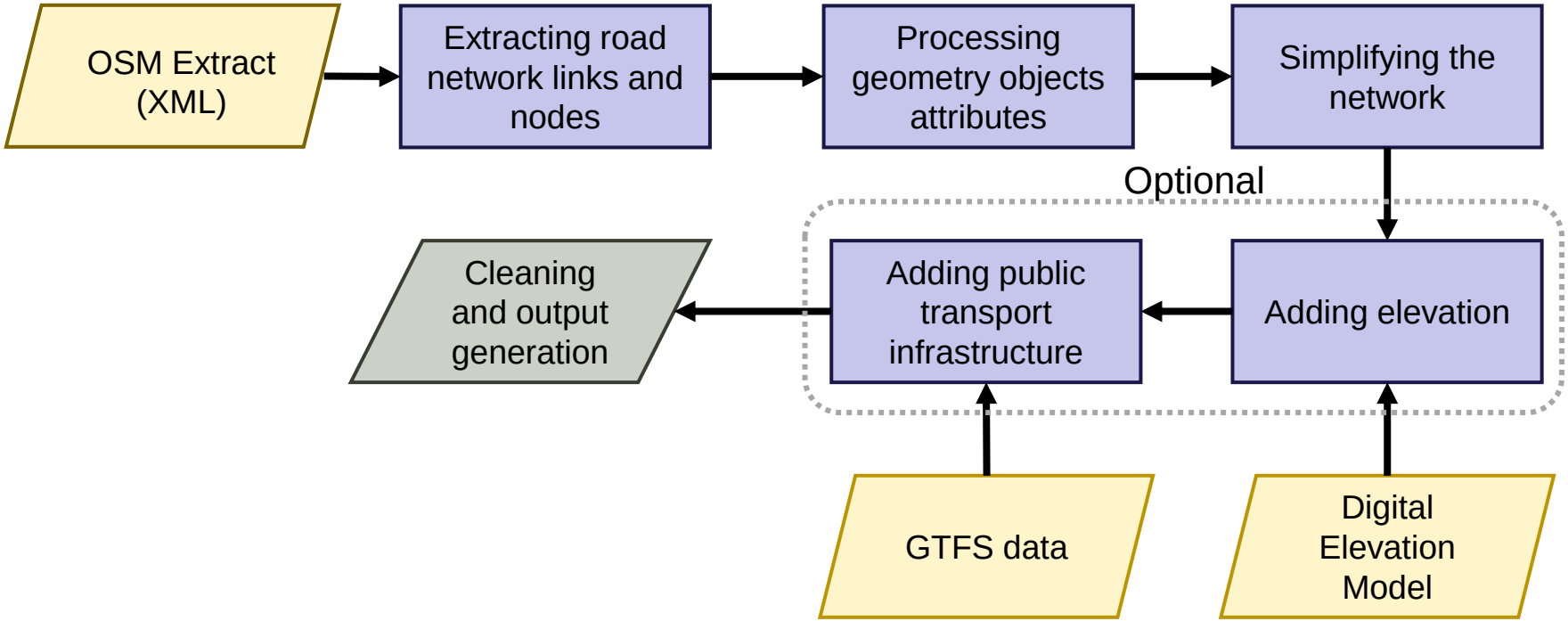
Constructing a MATSim-compatible transport network using open data
https://github.com/matsim-melbourne/network

Jafari, A., Both, A., Singh, A., Gunn, L., Giles-Corti, B. (2021) *Building the road network for city-scale active transport simulation models*, Work in progress paper.

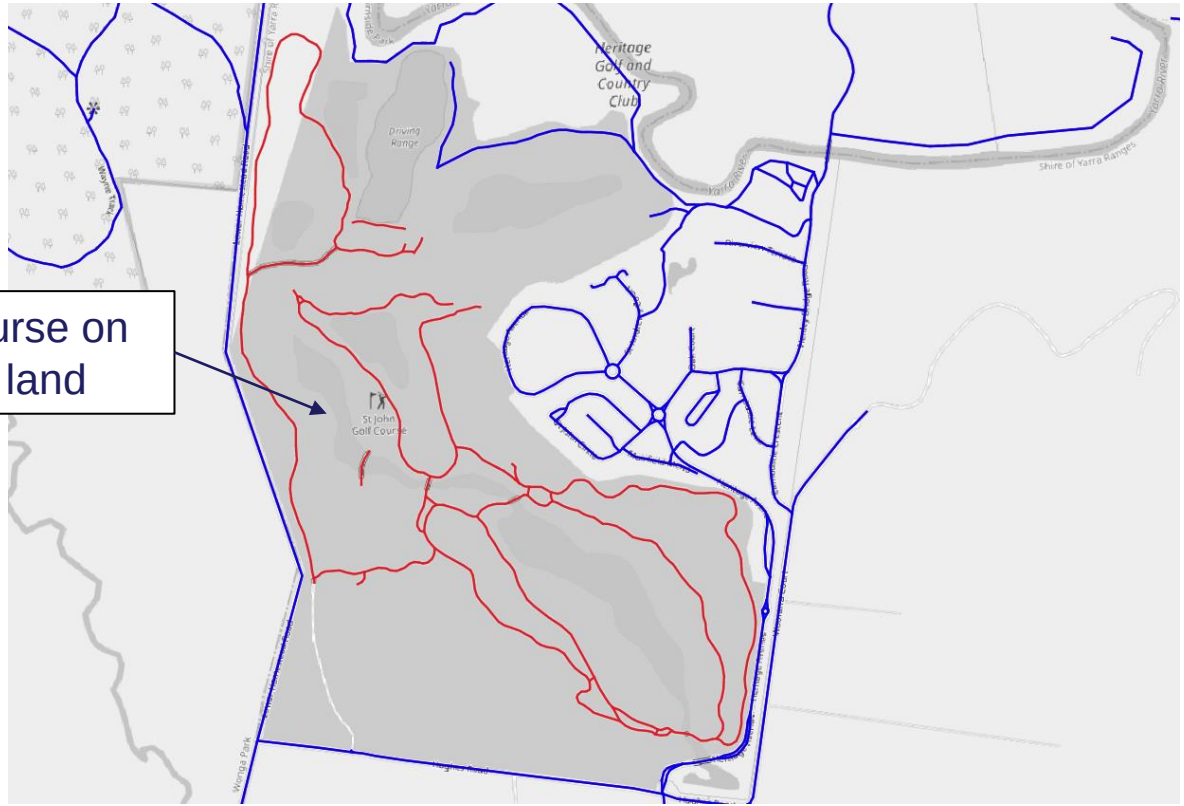
Customisation of network detail



Process


OSM Extract (XML)
Extracting road network links and nodes
Processing geometry objects attributes
Simplifying the network
Optional
Adding elevation
Adding public transport infrastructure
Cleaning and output generation
GTFS data
Digital Elevation Model

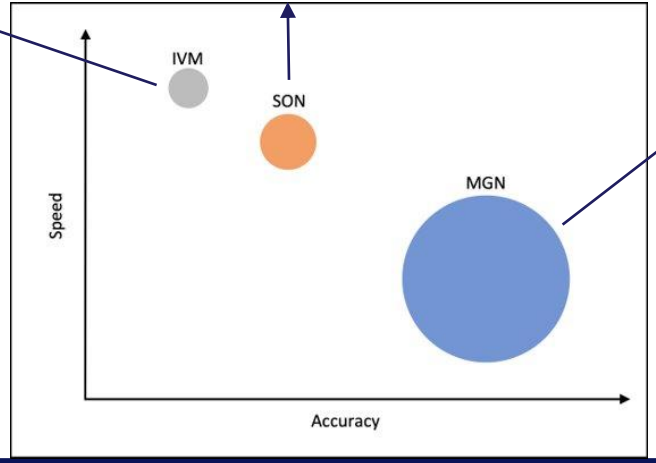
Removing disconnected links



A golf course on private land

Intersection simplification

Results



MATSim Melbourne Model - Baseline

https://github.com/matsim-melbourne/baseline

Singh, D., Jafari, A., Both, A. (2021) *MATSim Melbourne Model: an open activity-based transport model for Greater Melbourne*, Work in progress paper.

Parameter estimations

- Baseline MATSim Melbourne Model
  - Multinomial logit model
  - Car, Public Transport, Bicycle, Foot
  - VISTA 2012-14 - Journey to work trips
  - ATAP for fuel and a flat rate for PT
  - Google Distance Matrix API
- Next step:
  - Parameter estimation for environmental factors affecting cycling – Bicycle Contrib

Parameter		Estimation
Marginal utility of money	β_m	17.56
Marginal utility of time spent travelling by:		
Car	$\beta_{trav,Car}$	−0.0
Public transport	$\beta_{trav,PT}$	−1.02
Bicycle	$\beta_{trav,Bike}$	−5.93
Foot	$\beta_{trav,Walk}$	−3.43

Validation and calibration

- Automated vs manual calibration
- Destination choice:
  - Attractiveness and distances
- Mode choice:
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- Route choice:
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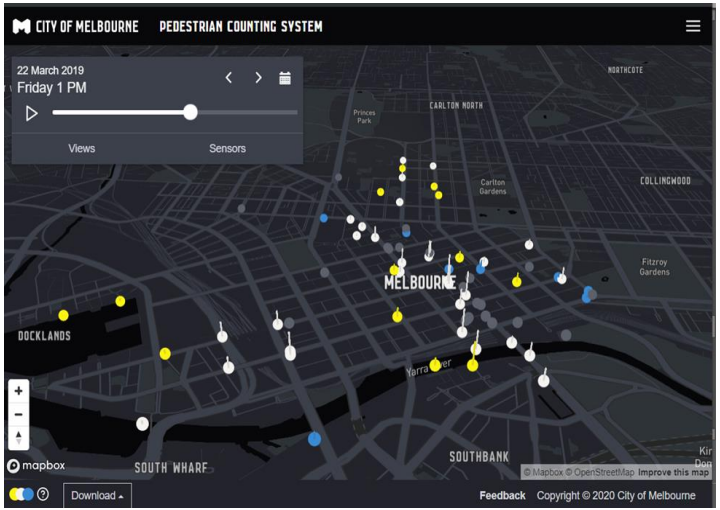

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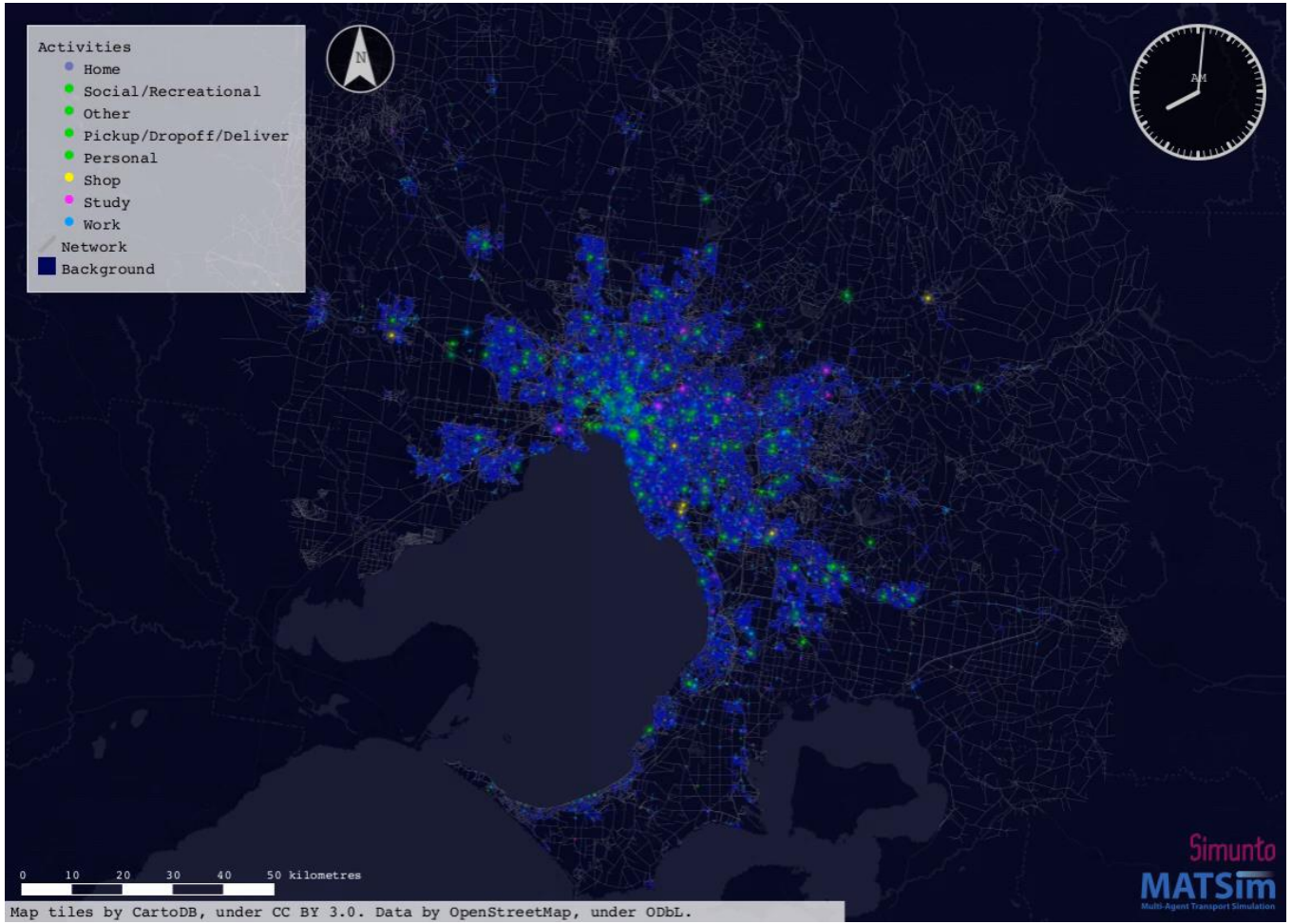
  - Walking: City of Melbourne pedestrian count data
  - Public transport: PT survey data

Baseline

- 1% sample
- AM peak



Intervention scenarios

- A participatory scenario identification approach
  - 20+ active transport planning and decision makers
- Example scenarios:
  - Impact of a major public transport project on the transportation system
  - Current bicycle infrastructure usage and identifying gaps
  - Health impact of encouraging more people to use active transportation

Questions and discussion

Acknowledgements:

The Australian Prevention Partnership Centre
Data61, CSIRO
Healthy Liveable Cities Group, CUR, RMIT
MATSim Melbourne Community

RMIT UNIVERSITY