Beyond Journey Times

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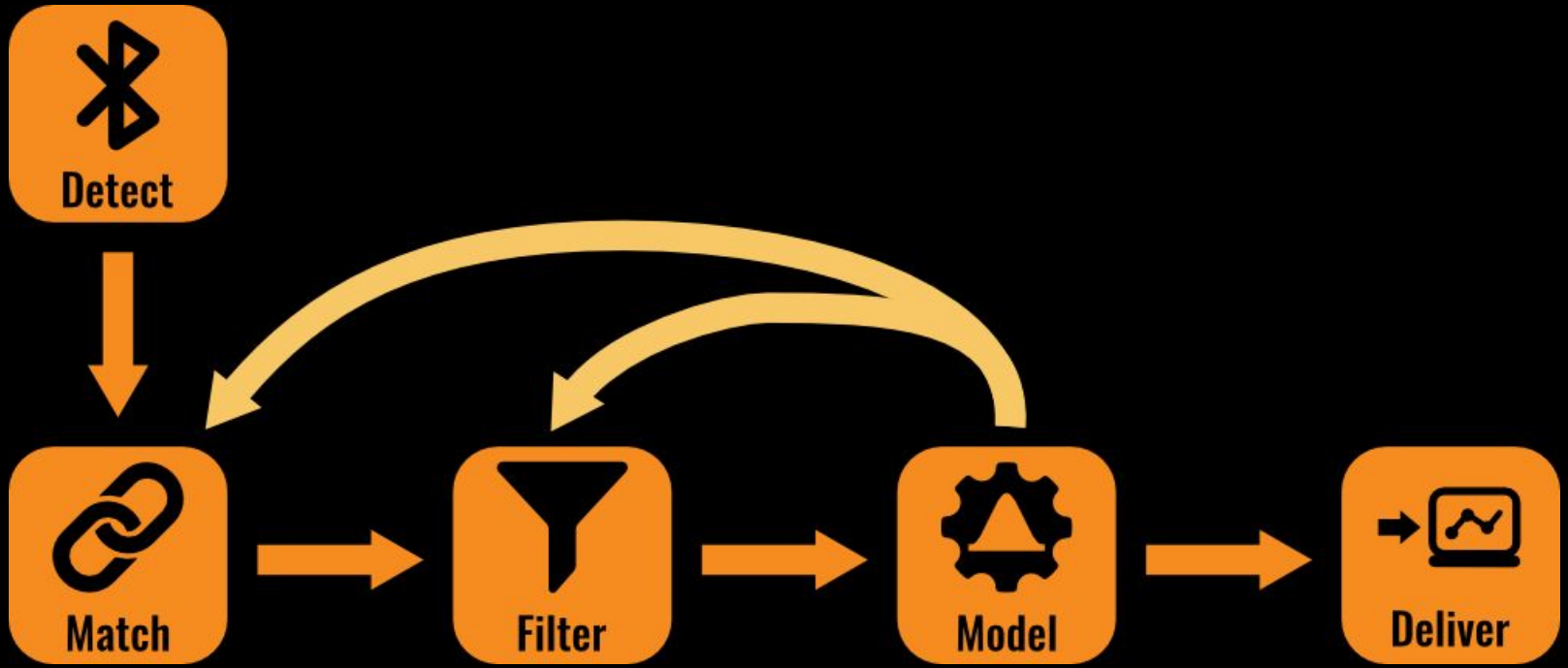
Bluetooth journey time process



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Moving beyond basic journey times

Modelling

Route analysis

Traveller segmentation

Visualisation and interaction

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Raw observation vs modelling

Moving from

> “what are we **seeing** right now?”

to

> “how can we find what we want to know,
> given **everything we currently know**?”

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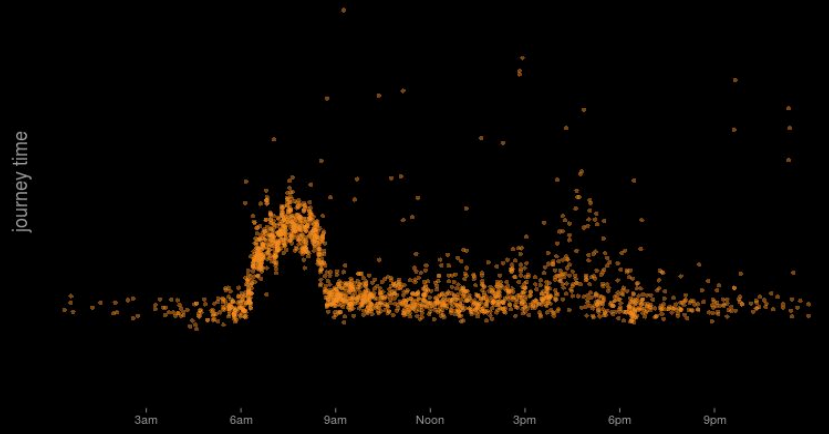
Combining information

Live matches



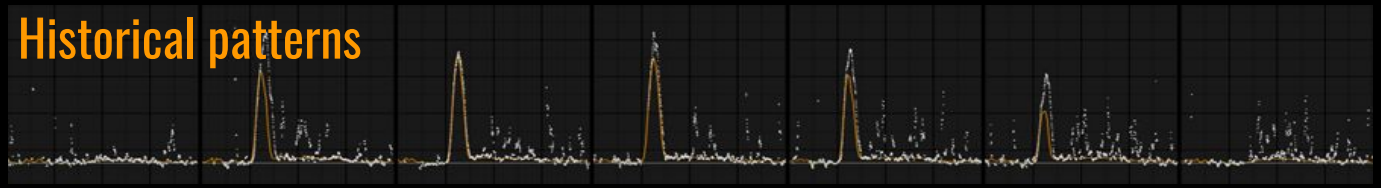
Smoothing

Simplification

Combination

Journey times

Historical patterns



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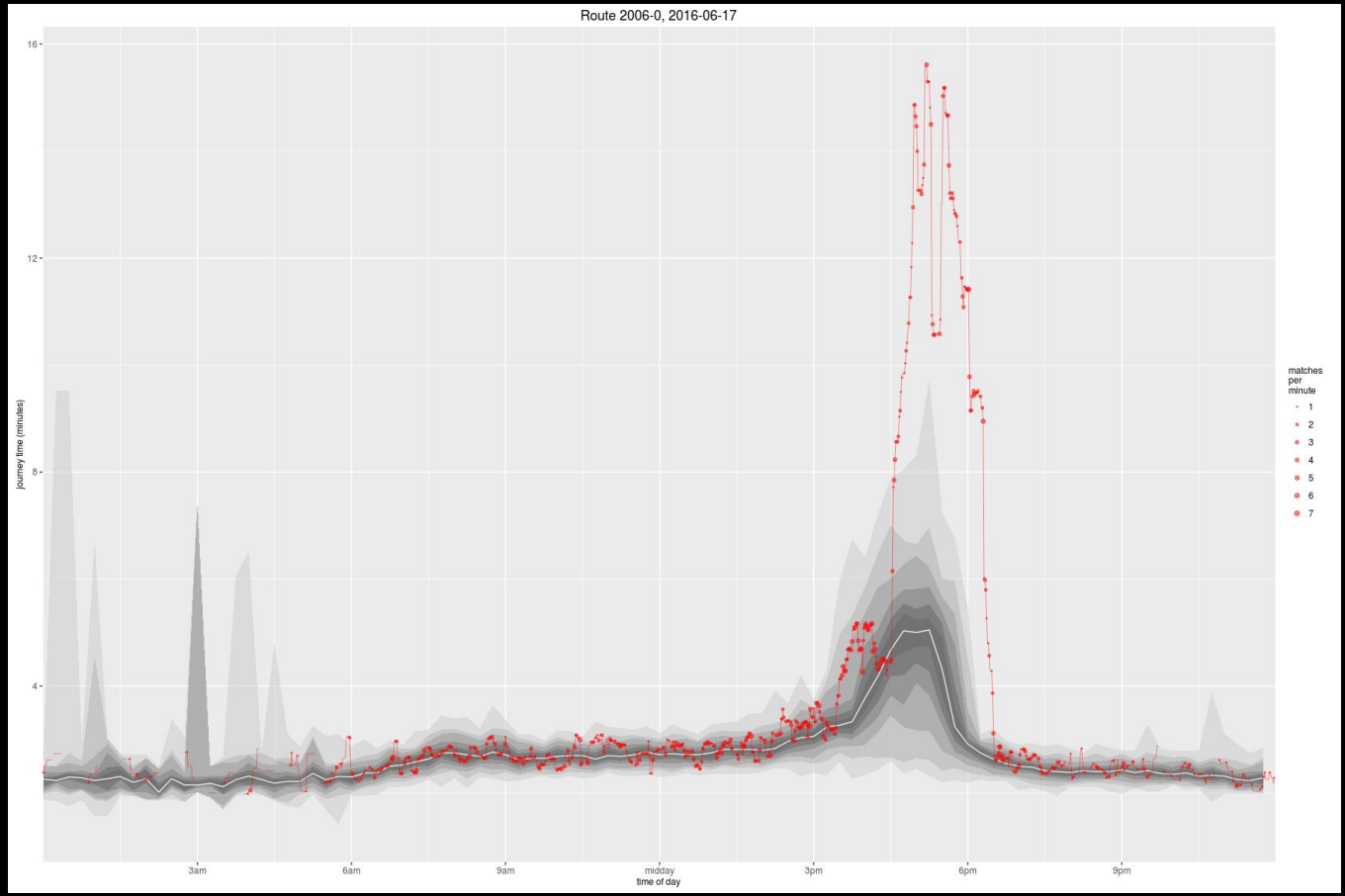
Incident alarms

Categorisation
+ normalisation
+ trend detection



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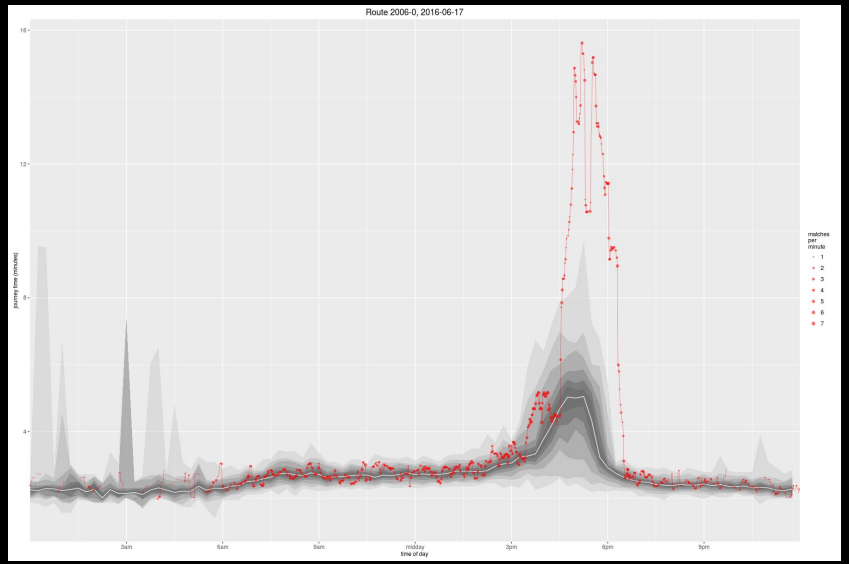
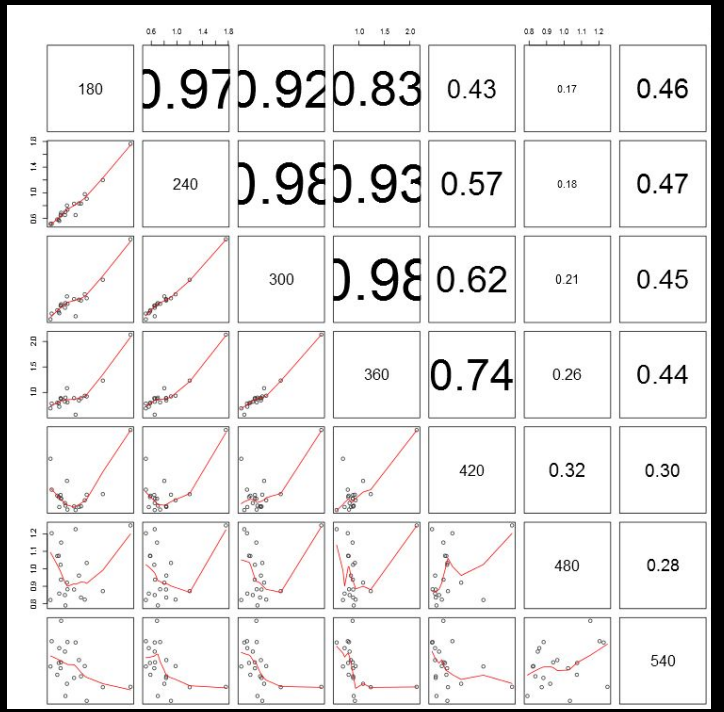
Predictive modelling

Categorisation + normalisation
+ statistical modelling + information balancing





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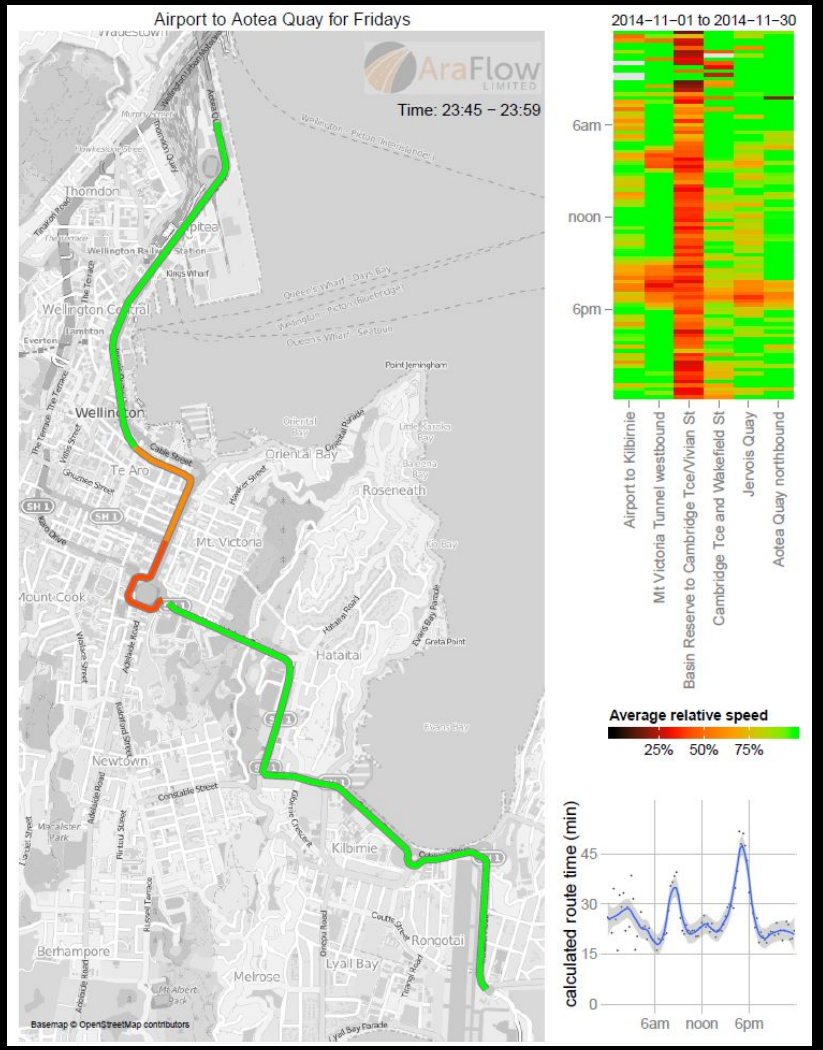
Whole-journey simulation

Journey times for each segment change as a vehicle moves along a journey.

Rather than adding simultaneous journey time snapshots,
simulate a vehicle's journey through a network with **dynamic journey times**.



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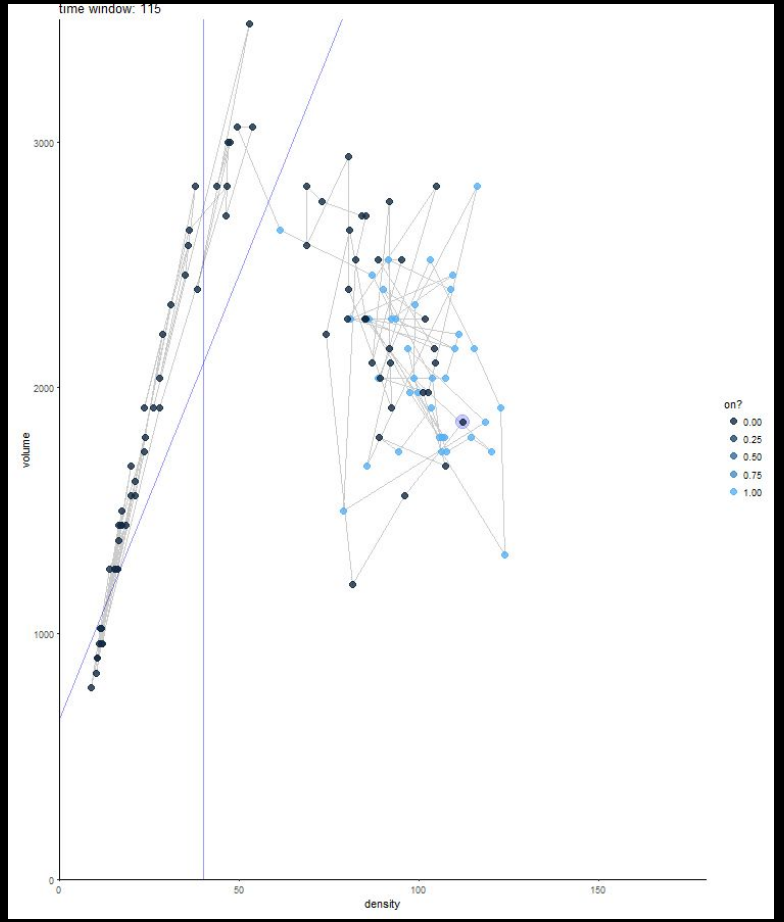
Variable Speed Limit automation

Only turn on VSL when it can make a difference: avoid driver frustration.

Use radar rather than BT: better for measuring density.

Have to **respond quickly** to imminent congestion, but not confuse drivers with too many speed limit changes.



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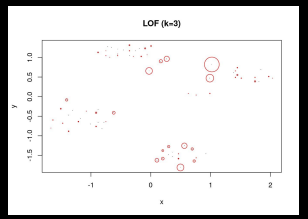
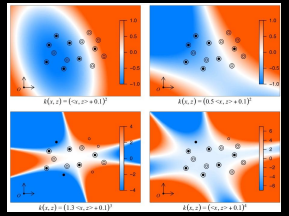
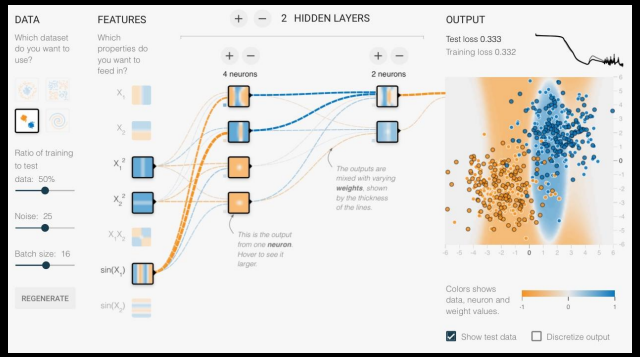
Methods

Machine learning

(e.g. clustering, SVM, DNN)



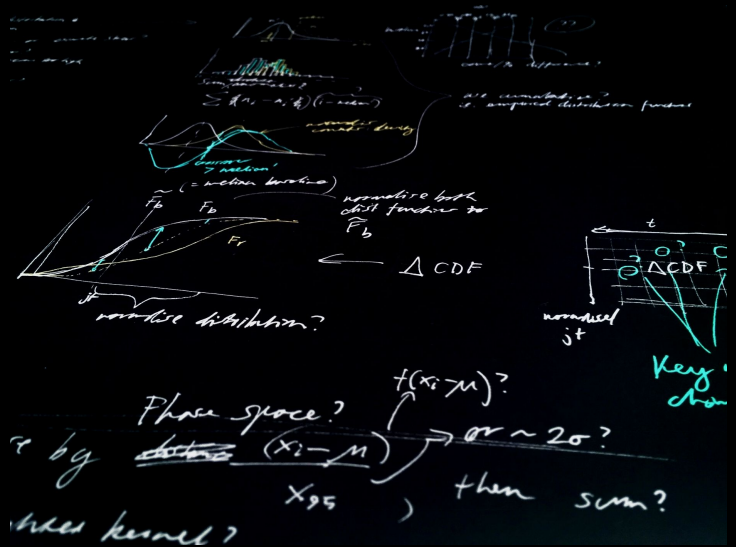




Complex, scalable, prone to overfitting

Statistics and signal processing

(filtering, time series analysis)



Transparent, fast, can apply domain knowledge

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Route analysis

More than just “**how fast** are vehicles getting from A to B?”

Where do they go next?

How do they get there?

What does their **whole journey** look like?

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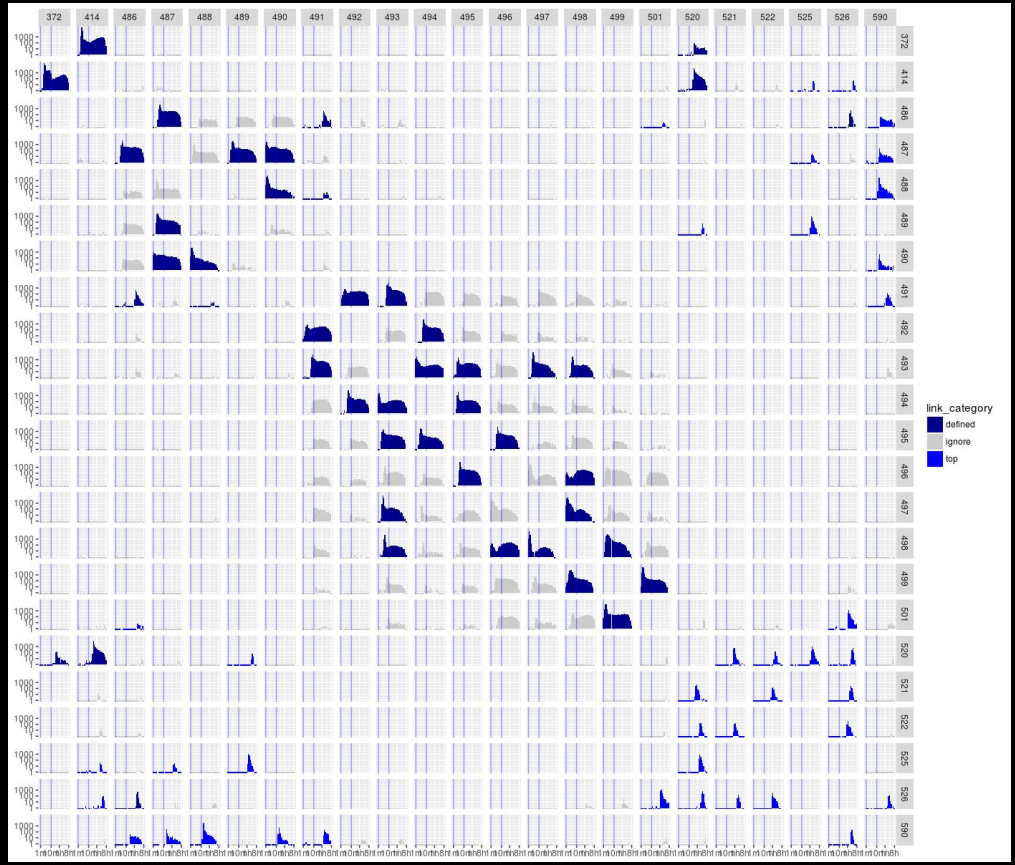
Origin/destination

Direct matching
(detection at sensor A, then immediately at sensor B)

vs

Indirect matching
(can travel via other sensors)



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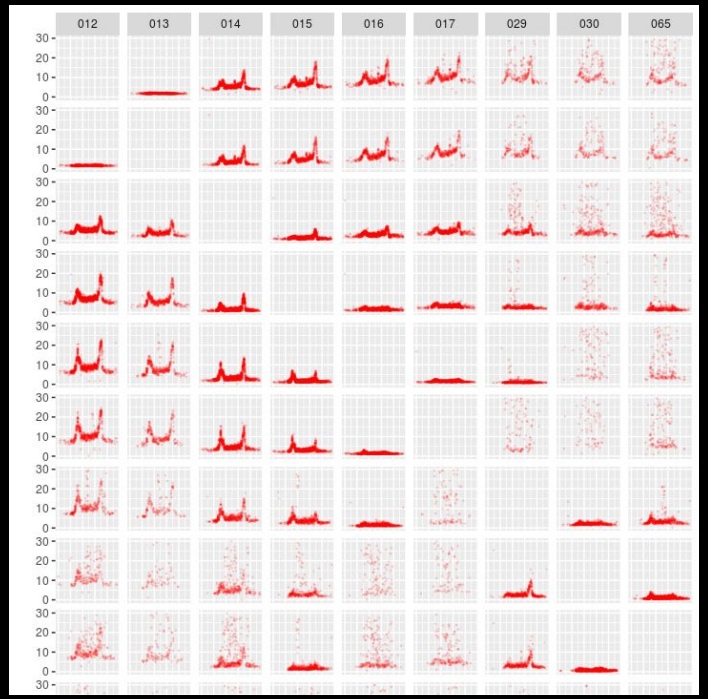
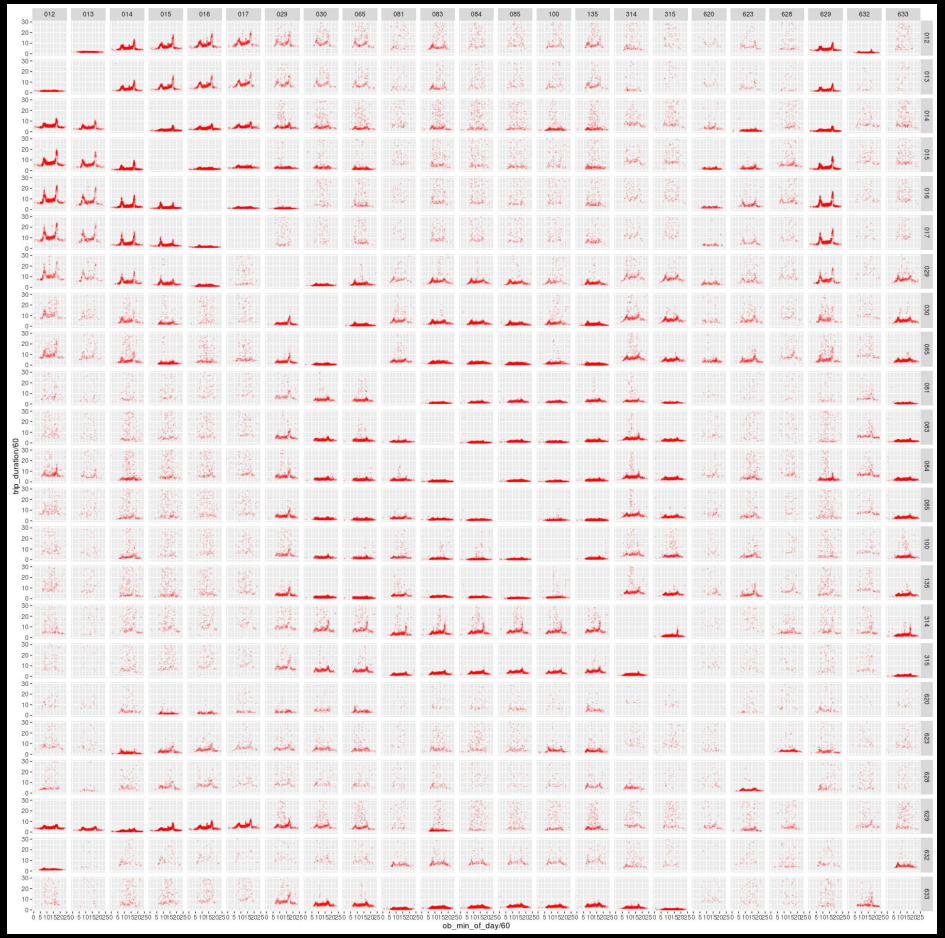
Indirect matching





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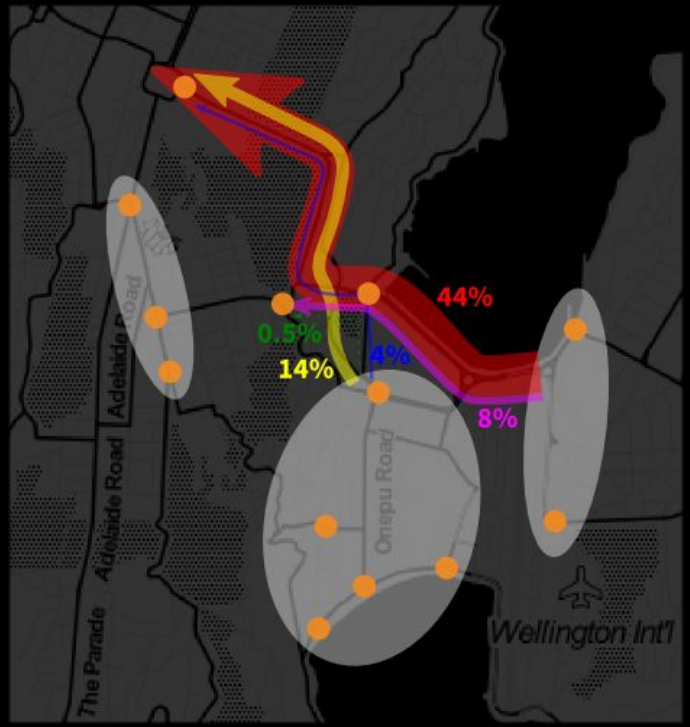
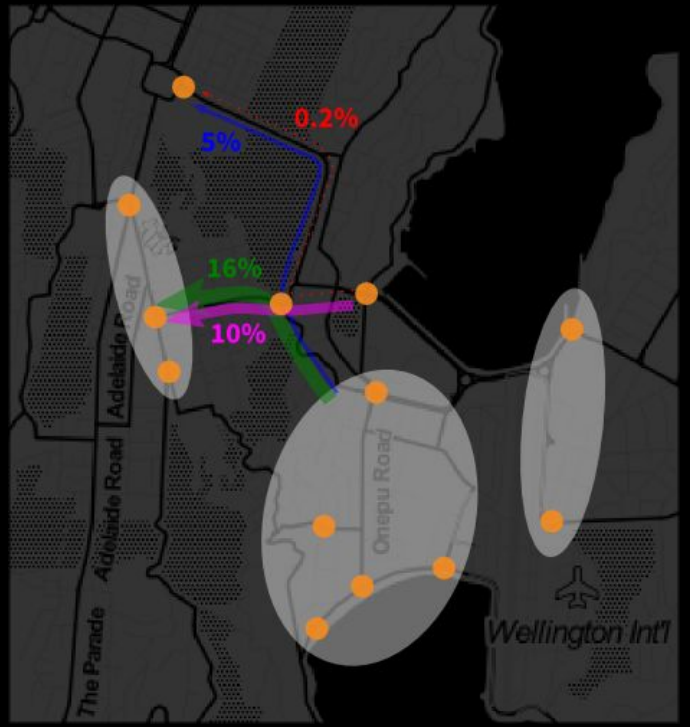
Route choice analysis





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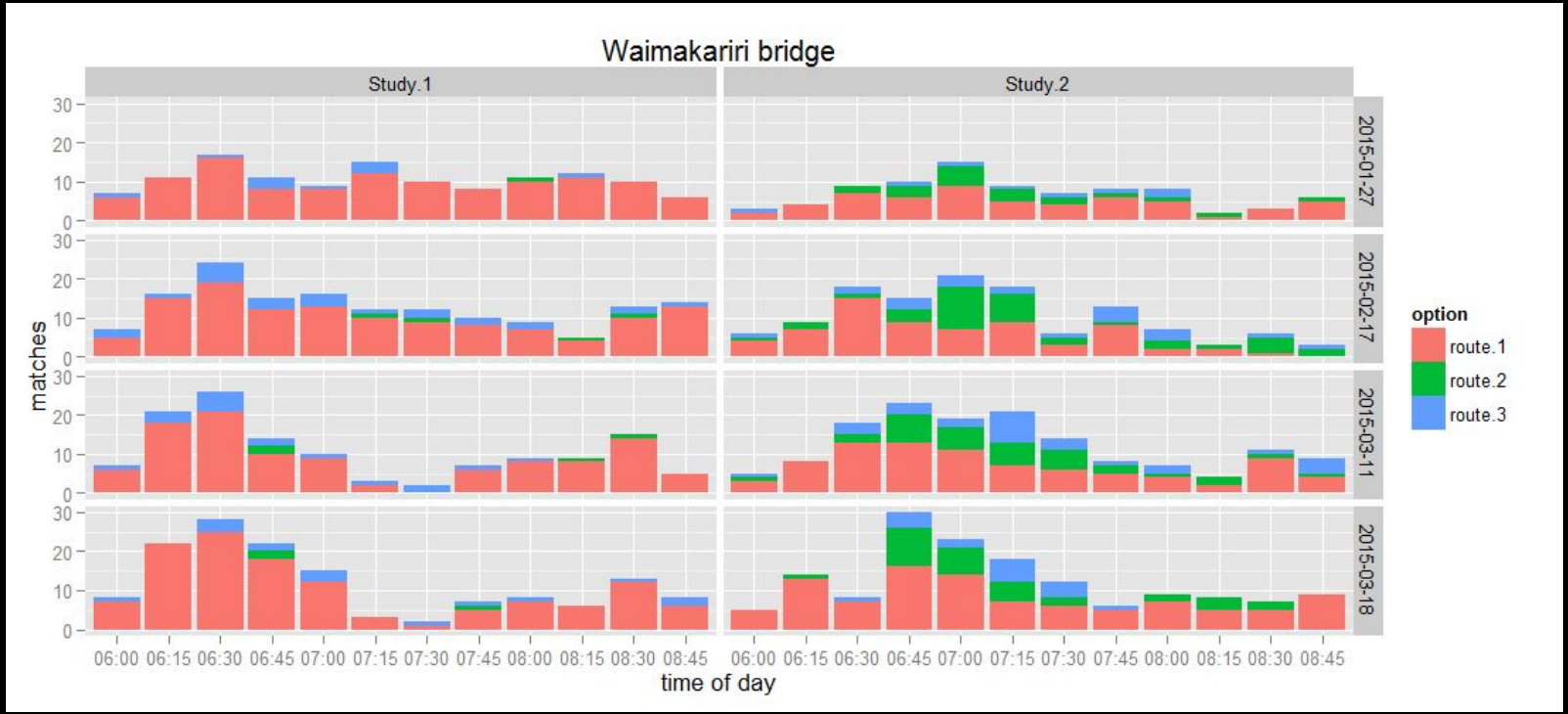
Route choice analysis: changes over time



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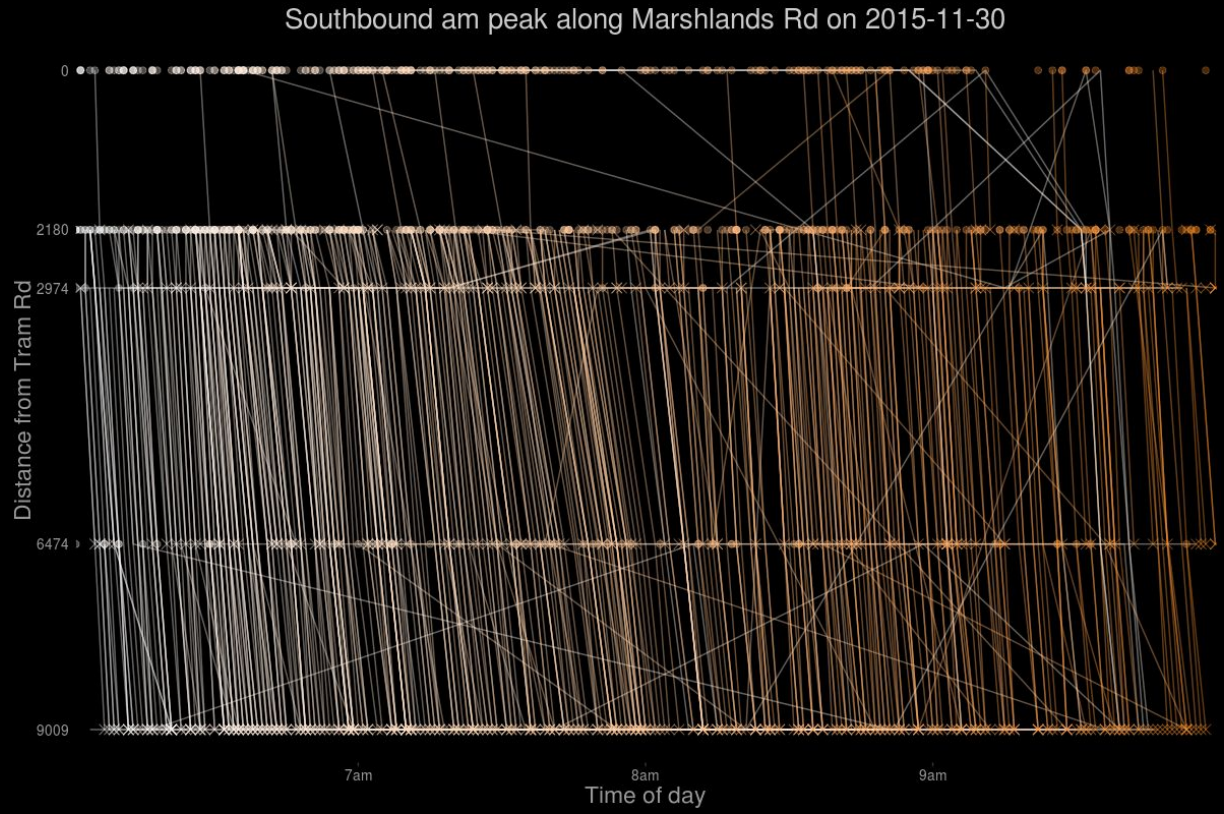
Linear routes



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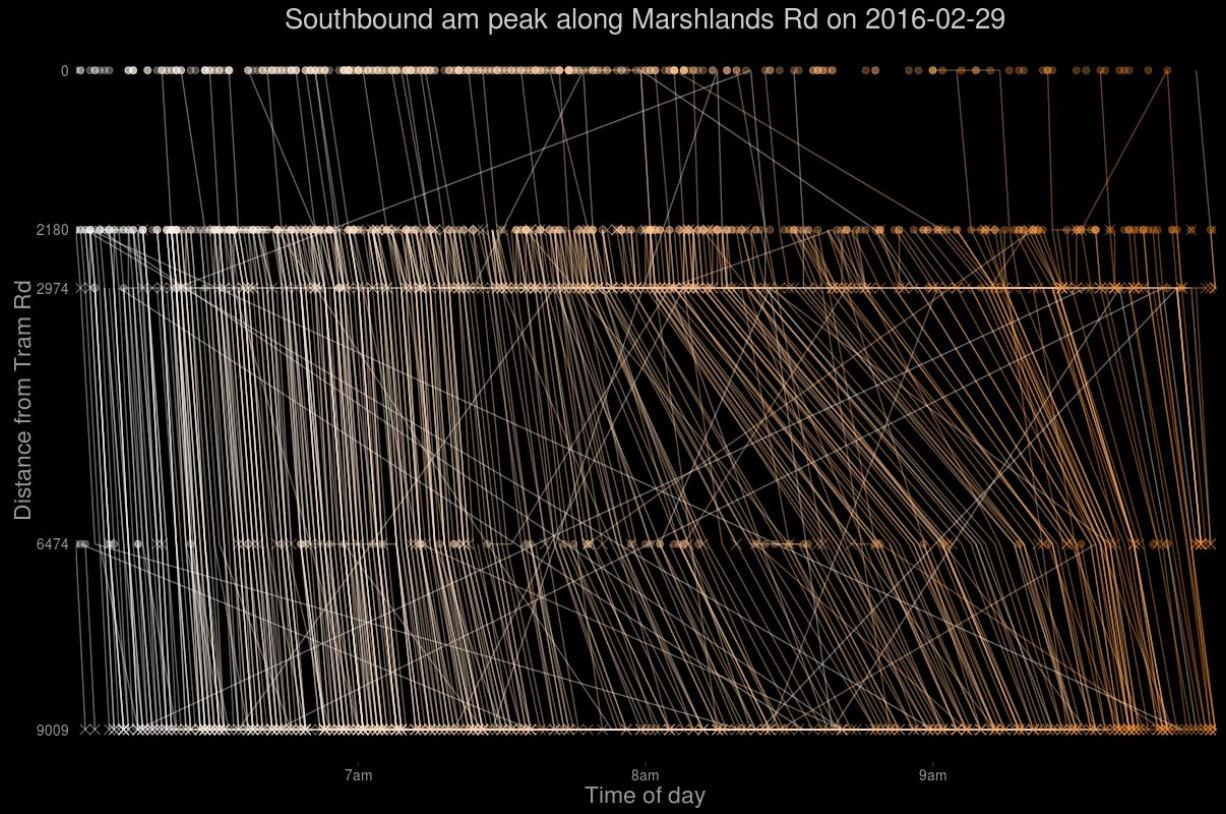
Linear routes



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Traveller segmentation

Categorising travellers* based on their typical **behaviour**,
then analysing **patterns and trends** in their journeys.

(* “travellers” includes other modes, not just drivers)

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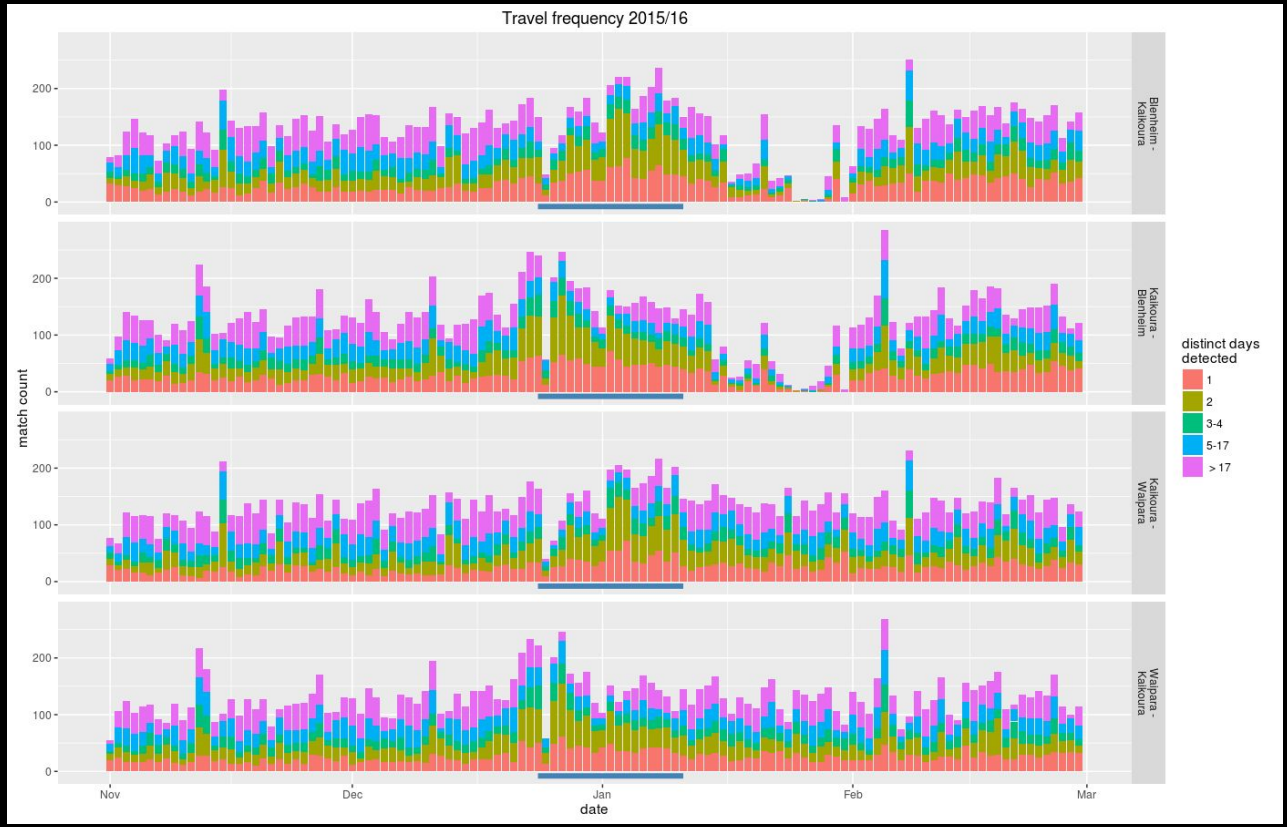
Upper South Island analysis

Segmenting by frequency of detection



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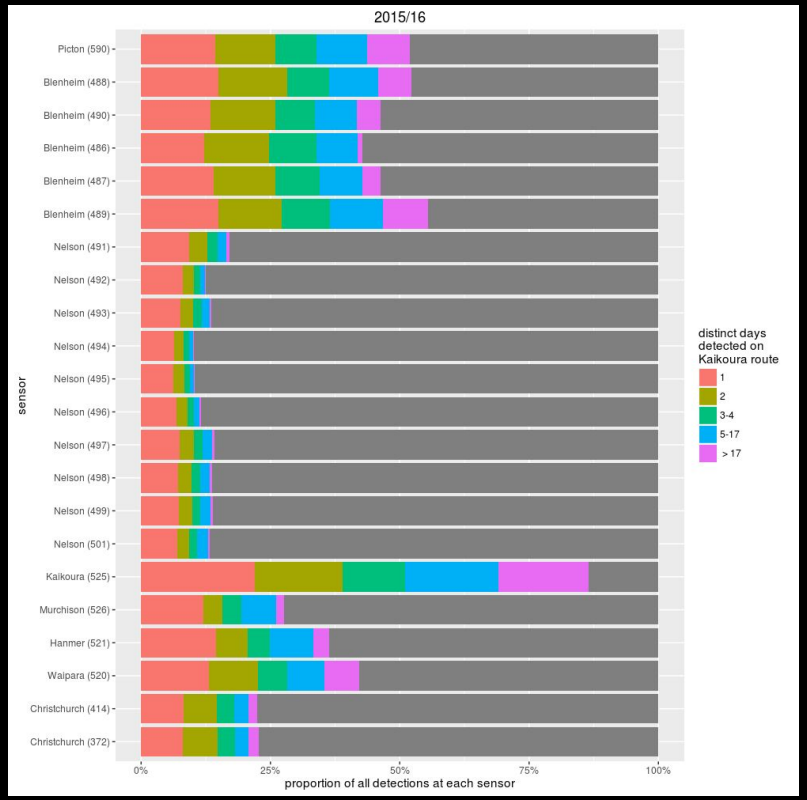
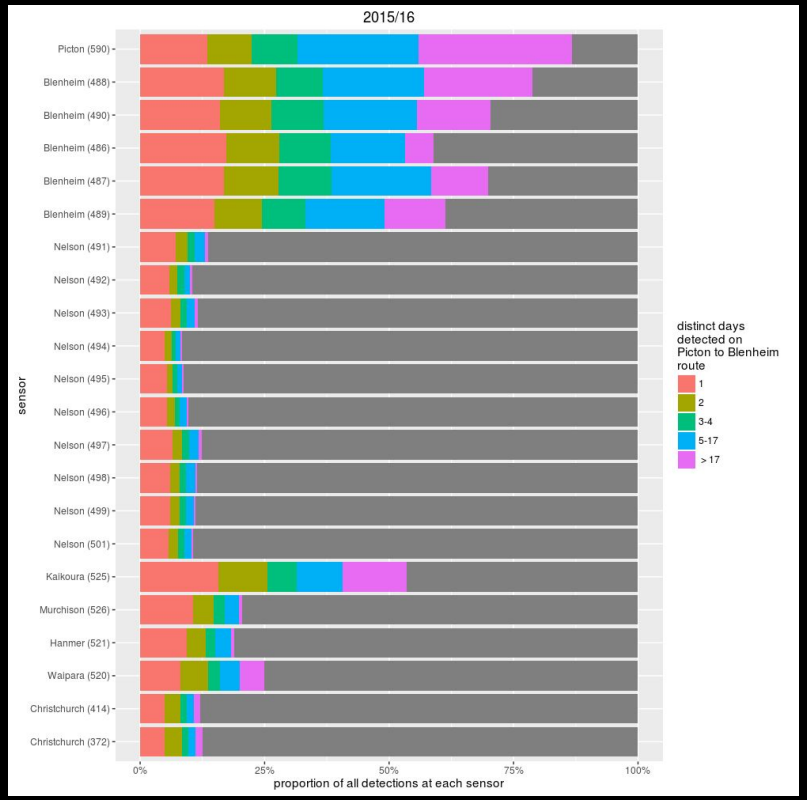
Upper South Island analysis





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Other potential analyses

Distinguishing modes by **speed history**

Changes in origin/destination patterns: week vs weekend; term vs holiday

Responses to severe congestion: **alternative routes**; rat running

Relationship of origin/destination to **availability of public transport**

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Visualisation and interaction

The key question for data visualisation and statistics:

“Compared to what?”

Provide the appropriate level of **context** and **complexity** to suit each user’s needs.

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Regular commuters

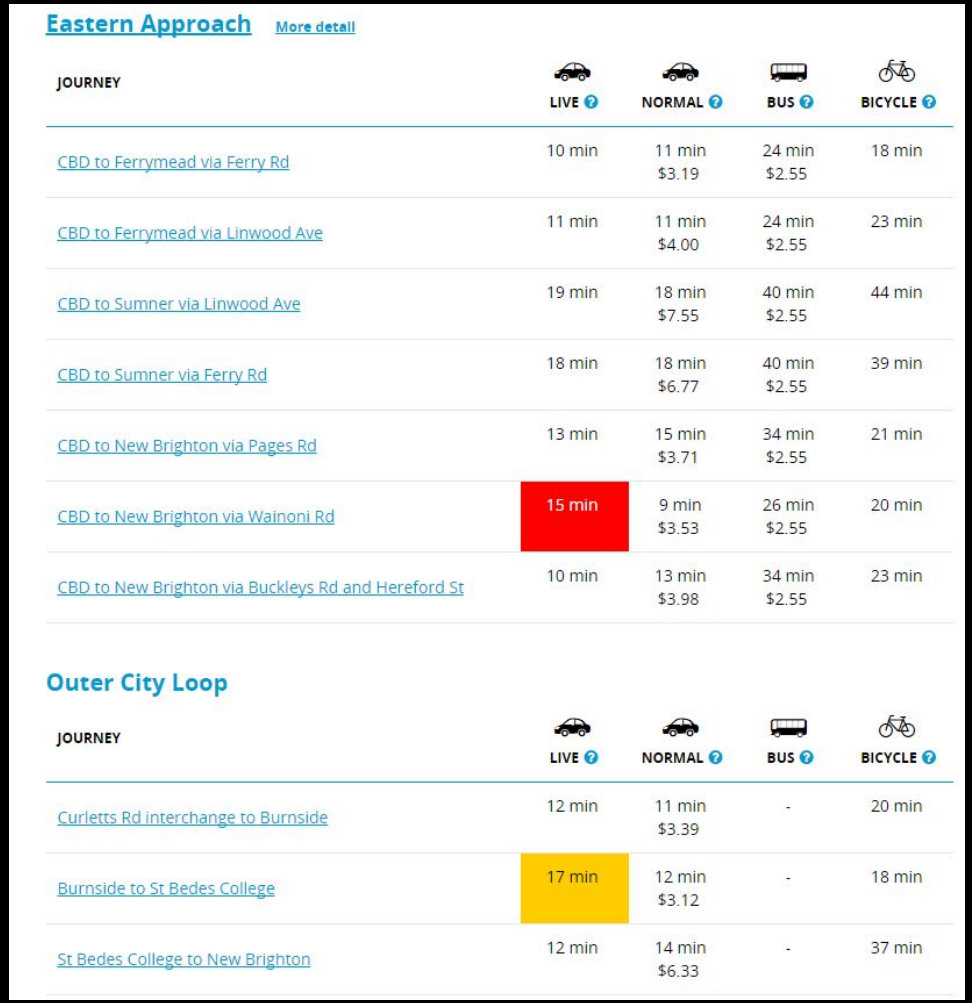
Set commuting route

Familiar with normal patterns

Just want to know:

"is it worse than usual?"

Highlighted dashboards; apps; push notifications



Eastern Approach

More detail

JOURNEY	LIVE	NORMAL	BUS	BICYCLE
CBD to Ferrymead via Ferry Rd	10 min	11 min $3.19	24 min $2.55	18 min
CBD to Ferrymead via Linwood Ave	11 min	11 min $4.00	24 min $2.55	23 min
CBD to Sumner via Linwood Ave	19 min	18 min $7.55	40 min $2.55	44 min
CBD to Sumner via Ferry Rd	18 min	18 min $6.77	40 min $2.55	39 min
CBD to New Brighton via Pages Rd	13 min	15 min $3.71	34 min $2.55	21 min
CBD to New Brighton via Wainoni Rd	15 min	9 min $3.53	26 min $2.55	20 min
CBD to New Brighton via Buckleys Rd and Hereford St	10 min	13 min $3.98	34 min $2.55	23 min

Outer City Loop

JOURNEY	LIVE	NORMAL	BUS	BICYCLE
Curletts Rd interchange to Burnside	12 min	11 min $3.39	-	20 min
Burnside to St Bedes College	17 min	12 min $3.12	-	18 min
St Bedes College to New Brighton	12 min	14 min $6.33	-	37 min

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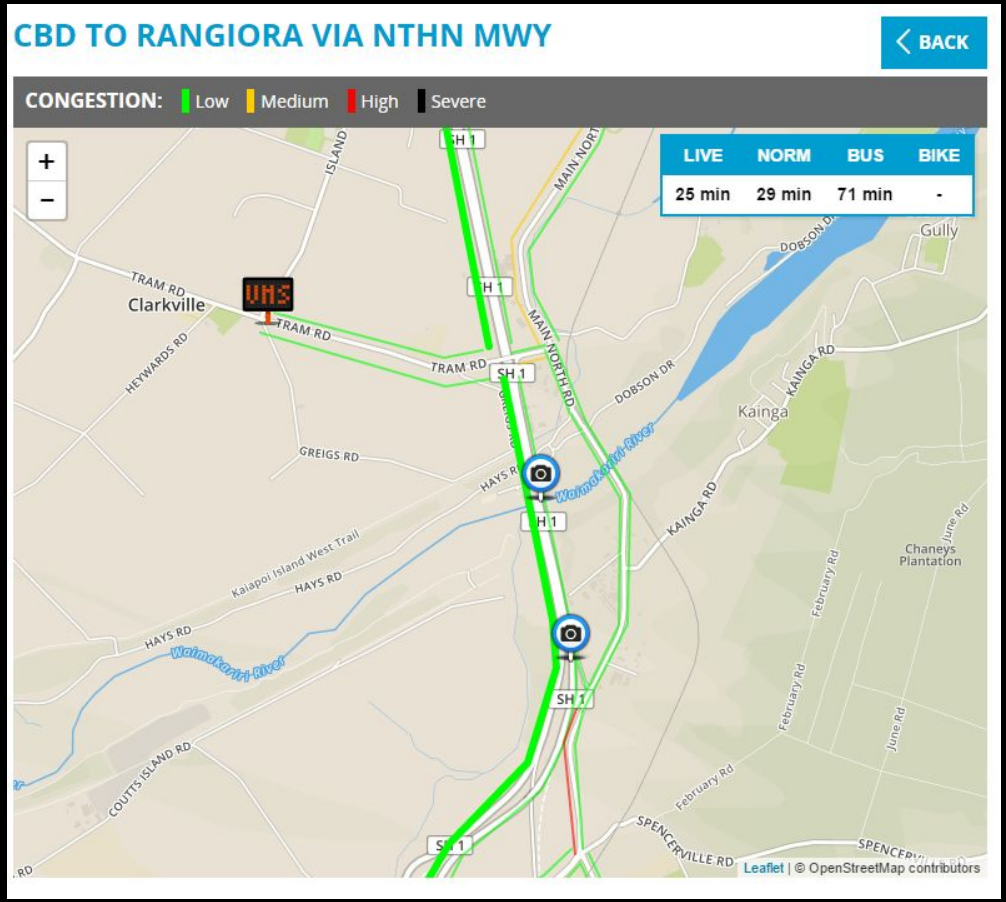
Other drivers

Visitors; professional drivers

Real-time route **options**

Predictions/normal times for **planning ahead**



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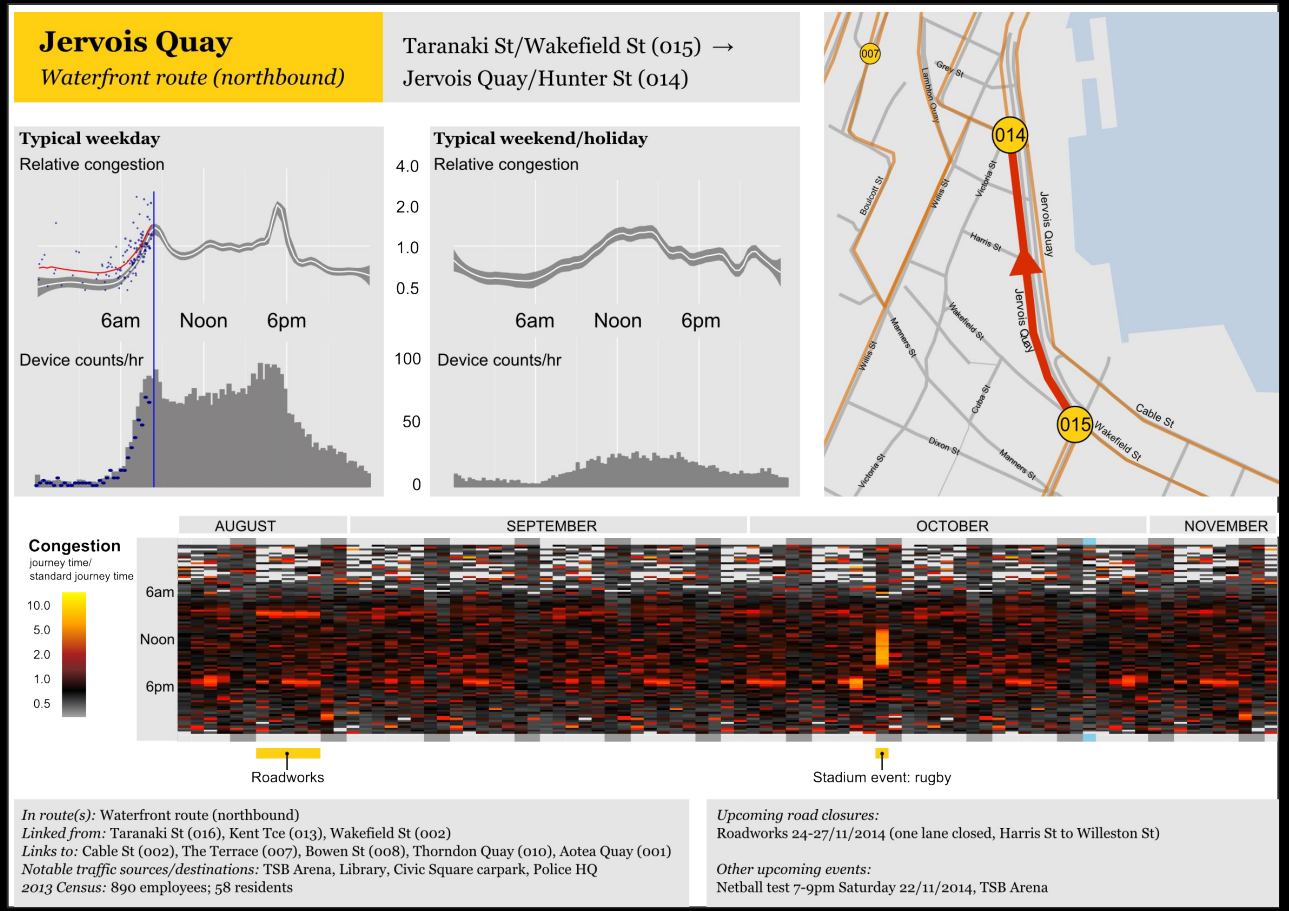
Operations

Quick access to **detailed context**:

across network

over time

extrinsic influences



In route(s): Waterfront route (northbound)
Linked from: Taranaki St (016), Kent Tce (013), Wakefield St (002)
Links to: Cable St (002), The Terrace (007), Bowen St (008), Thorndon Quay (010), Aotea Quay (001)
Notable traffic sources/destinations: TSB Arena, Library, Civic Square carpark, Police HQ
2013 Census: 890 employees; 58 residents

Upcoming road closures:
Roadworks 24-27/11/2014 (one lane closed, Harris St to Willeston St)

Other upcoming events:
Netball test 7-9pm Saturday 22/11/2014, TSB Arena

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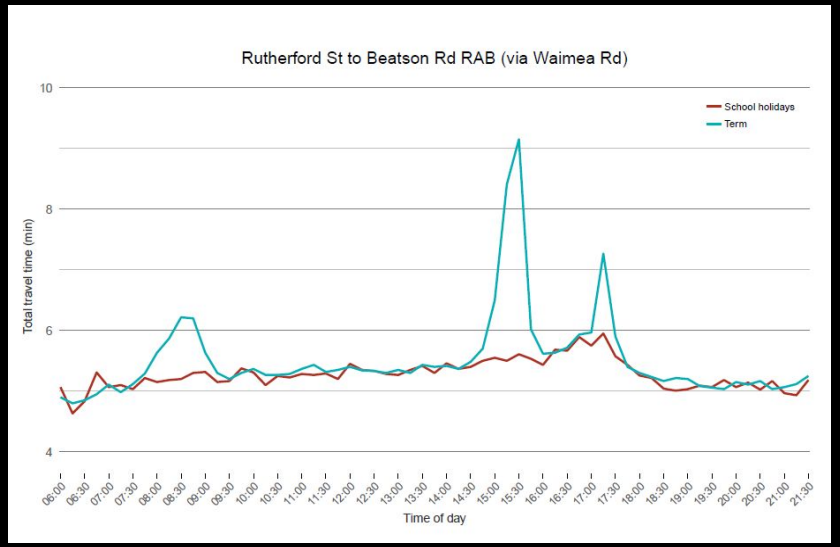
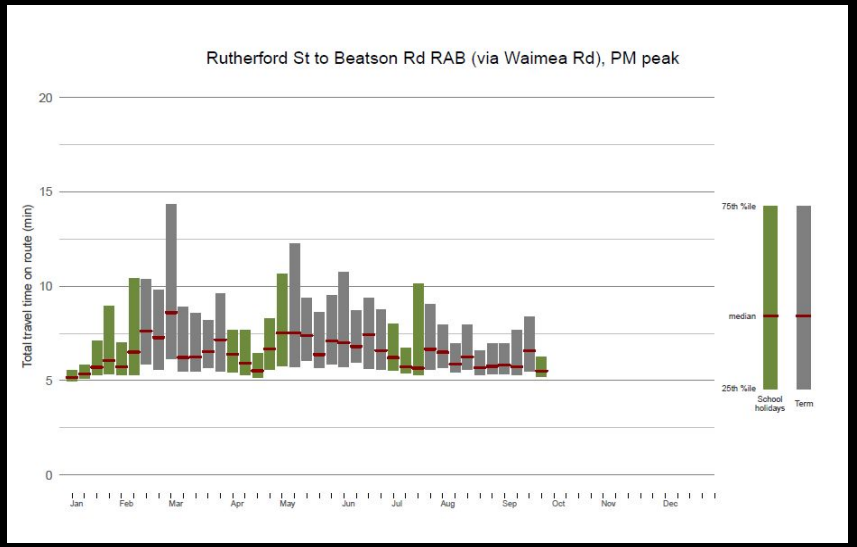
Analysts and planners

Pre-defined reports for monitoring and governance

Consistency is important





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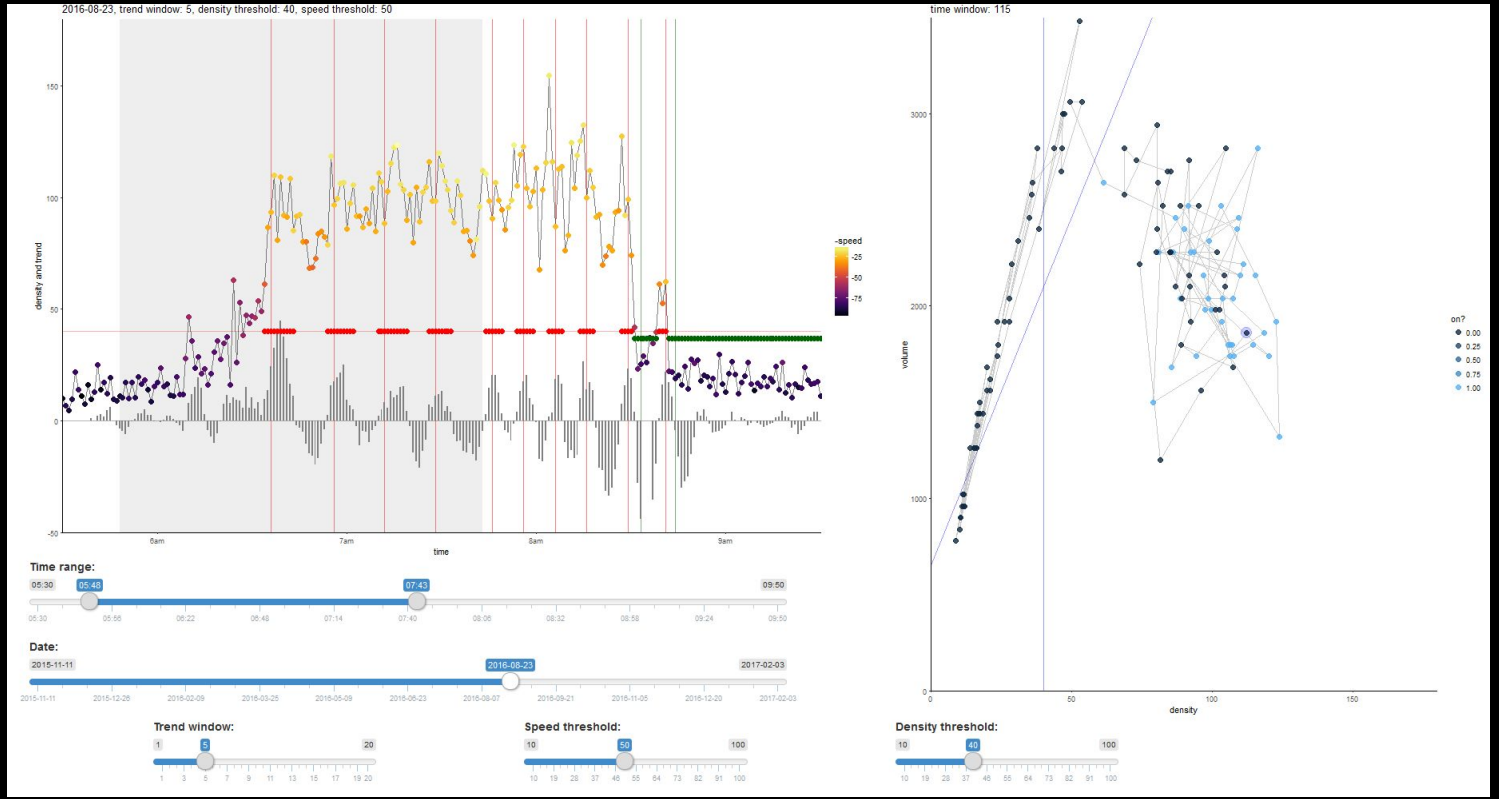
Analysts and planners

Interactive tools for exploration



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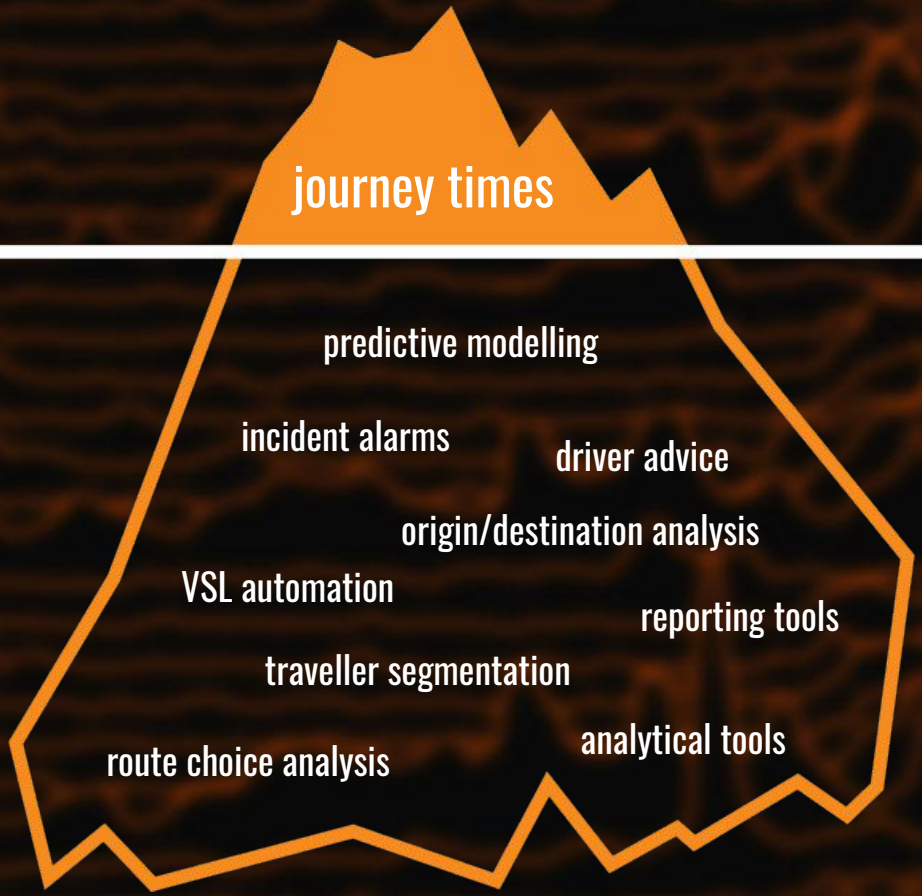

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