

NETWORK-WIDE SCREENING USING CONNECTED VEHICLE DATA

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## NETWORK-WIDE SCREENING USING CONNECTED VEHICLE DATA



- WHAT IS CONNECTED VEHICLE DATA?
- FRICTION
- BEARING CAPACITY
  - HERE'S WHERE I'M GONNA IMPRESS YOU
  - PREPARE TO BE AMAZED



# CONNECTED VEHICLE DATA

#### WHAT'S THE FIT OF CV DATA?





# FRICTION SCREENING

- ONLY A SUBSET OF THE ROADS ARE CANDIDATES FOR ACTION!
- WHAT ACTION IS RIGHT, FRICTION TREATMENT OR MITIGATE THE DEMAND?

### MAXIMIZE SAFETY FOR FRICTION MANAGEMENT

ON A ROAD SECTION, A CAR GENERATES AVAILABLE FRICTION AND UTILIZED FRICTION, RELATED TO THE CONDITIONS FOR WHEN THEY WERE GENERATED (E.G., WEATHER, SPEED, TRAFFIC, TIRES). OVER A GIVEN PERIOD, MULTIPLE MEASUREMENTS OF THESE VALUES ARE COLLECTED.



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### WHAT IS A NETWORK SCREENING?

Observations made:

- AF DATA COVERAGE = 96.2% (89% INCLUDING RC3)
- UF DATA COVERAGE = 2.6% (3.3% INCLUDING RC3)
- ABS OBSERVATIONS = 403
- TCS OBSERVATIONS = 14
- P(UF>AF)(%) ≥ 0.01 = **1.0** %
- FR ≤ 0.85 = **21.5** %



# BEARING CAPACITY

Any moment a "NIRA" car is driving on a road section, a new roughness value is measured.

IRI

This value is then aggregated with all the other values produced in the same day by all the NIRA cars who crossed the same section



Average Daily Roughness Roughness Variance Sum. of Passes



Roughness develops over time at different rates, development rate is affected by pavement properties, traffic and climate. IRI SECTION A: High Development Rate

Major road network approx. 5.000 passes a month



Time

Pro crese

Monthly aggregated

Daily agaregated IRI



Roughness develops over time at different rates, development rate is affected by **pavement properties**, traffic and climate.

**SECTION B: Low Development Rate** 



Time

Monthly agaregated



IRI

Roughness develops over time at different rates, development rate is affected by pavement properties, traffic and climate.

SECTION C: Section Re-paved/Re-built



Monthly aggregated

Time



IRI

## Assessment of the Bearing Labels

Phase 1) Analyze historical roughness data and calculate Features

Phase 2) Get FWD data from the same locations

Phase 3) Compare FWD and Features



## Get FWD data from the same locations

# Latvian Road agency shared FWD data collected in 2023 and 2024

- Considering that our features are based on historical data, if it is expected that comparison analysis can be affected by the Road status.
- FWD data were matched to our map
- FWD are point measurements while our data are referred to 25 meters sections.
- D0 under loading plate

	Ctourt	< 5 meters		End
	STON		Estimated GPS	
'IAN E ROADS		Road segment - 25 meters		

## Compare FWD and Features

#### **IMPORTANT INITIAL CONDITIONs**

Number of lanes / traffic – in the roughness development rate analysis the number of lane and/or heavy traffic. It would be ideal to use a shape file of the road network containing these information





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## Compare FWD and Features



#### DATA INFO

- Min. Number of Increasing Trends 3
- Improve data matching due to lack of info in the reference map



# Generating bearing capacity labels Different Bearing classes are defined, and the thresholds are given according to the network metainfo

- Define Thresholds using FWD data OR
- Distribution
- < 20% Very High
- 20 40% High
- 40 60% Medium
- 60 80% Low
- > 80% Very Low



## Generating bearing capacity labels

### MnDOT work in progress: focus on understanding how we can improve planning of TSD campaigns and estimation of remaining life.







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