

### ESTIMATION OF WINTER ROAD SURFACE CONDITIONS (RSC)

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## **RSC** Monitoring...





### No Monitoring Solution Is Perfect!



o Spatial coverage
o Temporal coverage
o Incomplete description

### Research Problem: Inferring Road Surface State

Waterloo









### It is a Classification Problem!







Cyclic Variation Patterns: Spectral Analysis



#### Classification Modeling – Step 2: Model Calibration ...



- ✓ Naïve Bayes
- Logistic regression
- Artificial neural networks
- ✓ Decision tree

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## Study Site and Data











S2: No or little snow {0, 1, 2} S1: Road Surface State S3: Snow covered {3,4,5}







### Application: Model Implementation



Model



## What's Next?

#### • Validate and refine the models

#### • Develop RSC forecasting models

• Develop low cost condition monitoring technologies

# THIS RESEARCH IS PART OF ...

Condition Monitoring Treatment Effect

П

Benefit Analysis

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IV

Maintenance Optimization Traffic Management

V

