Camera-Based Road Snow Coverage Estimation

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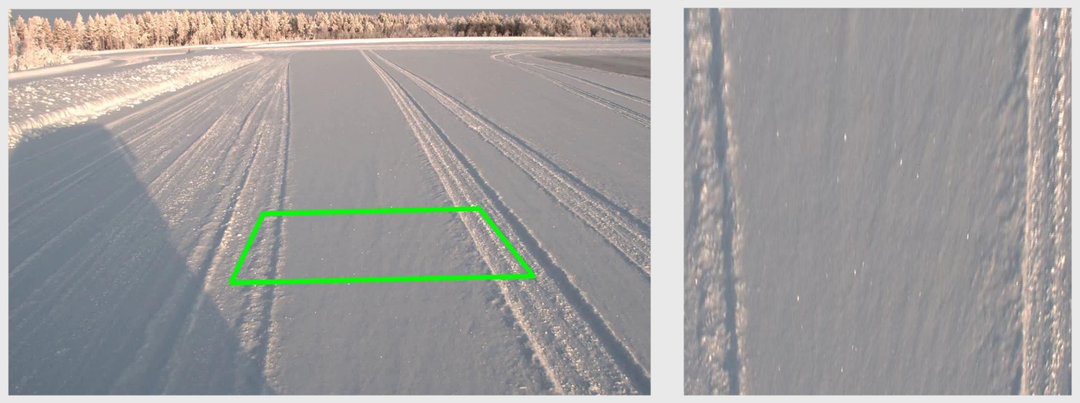
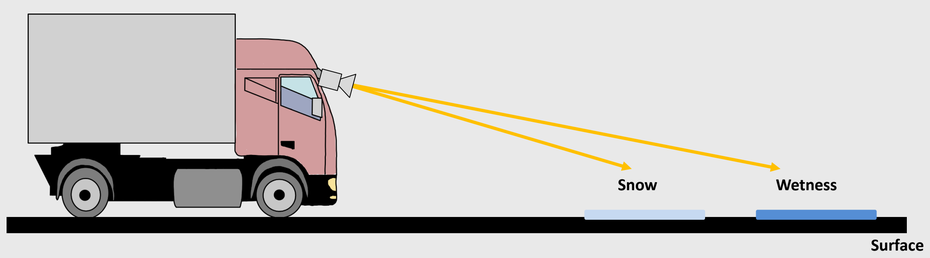
RoadSC Dataset

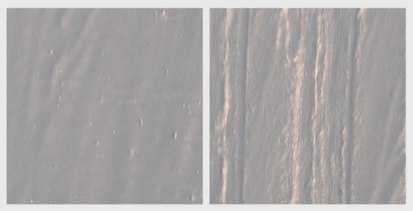
Objective: Road Condition Estimation (RCE)

- RoadSaW [1] : Surface and Wetness Estimation
- **RoadSC : Snow Covered Surfaces**
  - *Bird's Eye View* from calibrated cameras
  - 3 snow types (**RoadSC^3**)
  - Compatible with RoadSaW
    - 15 surface types (**RoadSC^{15}**)



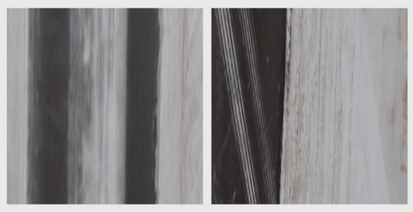


Fresh Fallen Snow



Fully Packed Snow

Partially Covered



Evaluation/Uncertainty Estimation

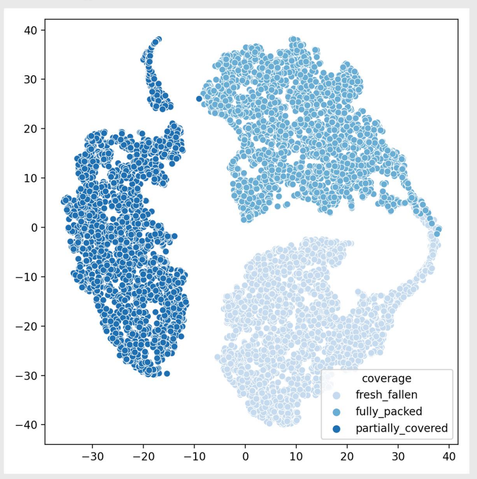
Deep Deterministic Neural Network [2]

- Single forward pass classification and uncertainty estimation
- Hyperparameter evaluation
  - *Out-of-Distribution* (Ood) data

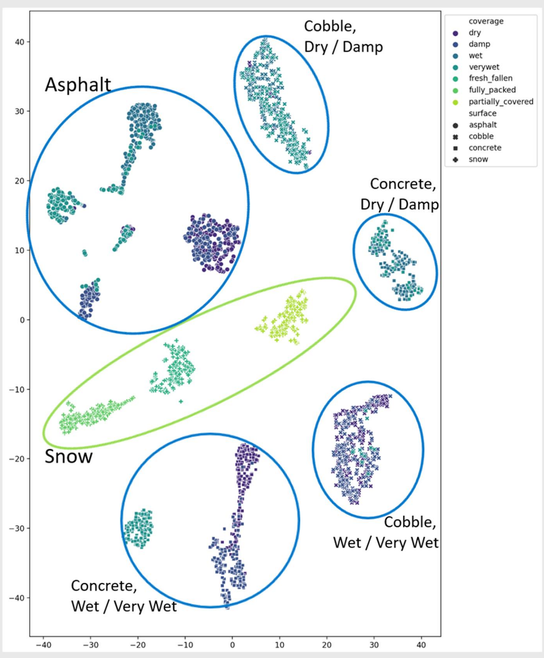
In-Vehicle Implementation

- *Jetson Nano TX2*
- 15 Hz : capture, preprocessing, inference, CAN
  - 28.5 Hz : *MobileNet V2* [3]

Embeddings RoadSC^3



Embeddings RoadSC^{15}



Application: Road Condition Estimation (RCE)

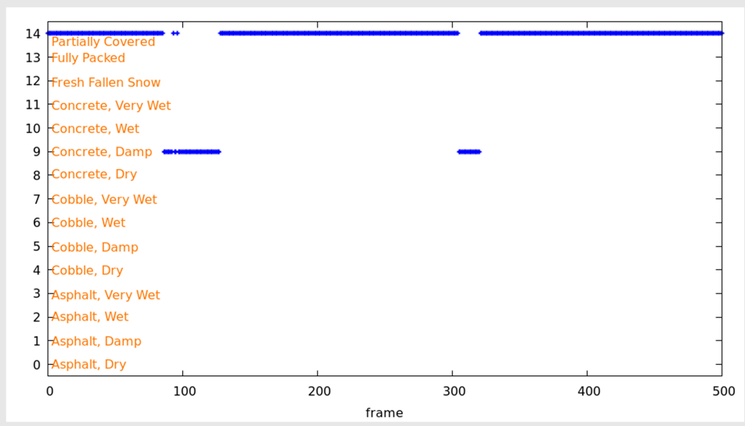
Results

- Classification
- Confidence estimation

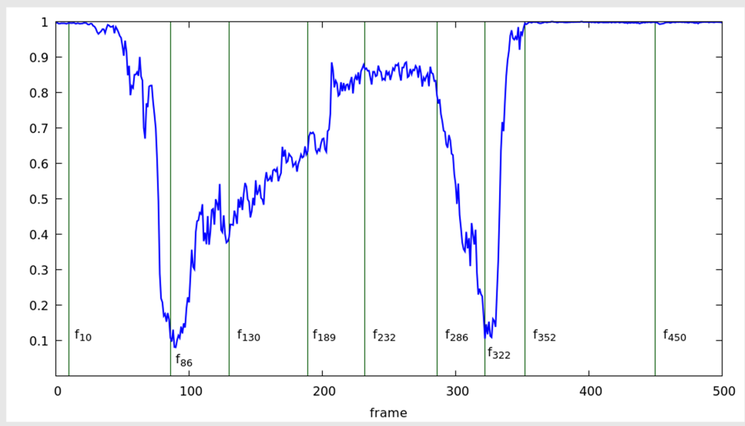
RCE Dataset

- Road surfaces, wetness, snow
- Download:

Evaluation RoadSC^{15}



Classification



Confidence Estimation

f_{10} f_{86} f_{130} f_{189} f_{232} f_{286} f_{322} f_{352} f_{450}

[1] K. Cordes, C. Reinders, P. Hindricks, J. Lammers, B. Rosenhahn, H. Broszio:
RoadSaW: A Large-Scale Dataset for Camera-Based Road Surface and Wetness Estimation, CVPR Workshop on Autonomous Driving, 2022
[2] J. van Amersfoort, L. Smith, Y.W. Teh, Y. Gal: *Uncertainty estimation using a single deep deterministic neural network*, ICML 2020
[3] M. Sandler, et al. *MobileNetV2: Inverted residuals and linear bottlenecks*, CVPR 2018

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