TITLE: A Machine Learning Approach to Automated Road-Surface Condition Predictions in Collaboration with the New York State Department of Transportation

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ABSTRACT:
Severe winter weather can create hazardous road conditions, and transportation agencies monitor conditions and mitigate risks through methods like salting and plowing. This presentation will discuss a machine learning model and tool being developed for the New York State Department of Transportation (NYSDOT) to provide automated predictions of current (nowcast) and future (forecast) road surface conditions. A hand-labeled dataset from 17,717 camera images provides the ground truth labels for training classification models. A multi-model process is used to incorporate multiple types of data, including image data and HRRR forecast data, and various algorithms, such as convolutional neural networks, support vector machines, and random forests. Ensuring model generalizability across new locations is crucial because a main objective of this work is to provide a tool that can be effectively used by the NYSDOT in operations. Ongoing co-development with the NYSDOT has been essential for this work; social science interviews have been conducted with NYSDOT employees to understand their operational needs, and perceptions of the tool and underlying machine learning. This presentation will cover the data, model design, and algorithms used in this project, while also highlighting how collaboration with NYSDOT has driven this project and continues to shape ongoing and future work.