

JOINT TRANSPORTATION RESEARCH PROGRAM

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Evaluating the Robustness of MDSS Forecast and Compliance with Recommendations

Introduction

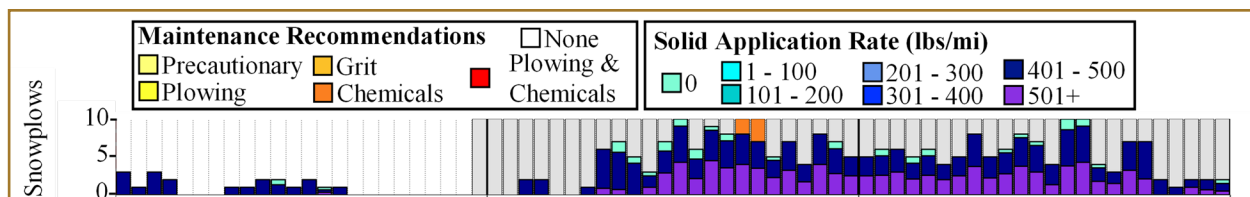
The Indiana Department of Transportation (INDOT) uses many data sources to plan and manage winter weather maintenance activities on their 29,000 miles of roadways. This management is typically done at a sub-district level and can have a high level of variability. To reduce uncertainty and variability, the Maintenance Decision Support System (MDSS) software ingests various weather models and generates a maintenance suggestion for a user-defined plowing segment. Each plowing segment, once added into the system, can be programmed with different treatment methods and connected to nearby Automatic Vehicle Location (AVL) truck data devices. This data feeds into the MDSS software and is considered when making maintenance recommendations. To get a better understanding of

the robustness of the software, this study assembled both MDSS and external independent data sources characterizing roadway mobility and prevailing weather conditions to create after-action reports that help visualize the robustness of MDSS recommendations during a winter storm.

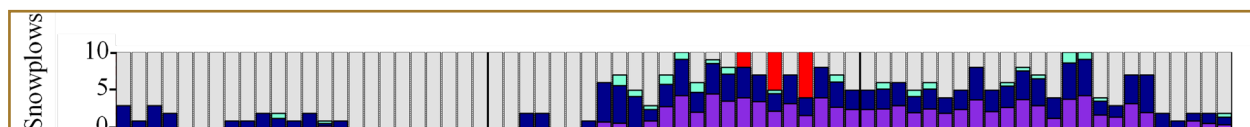
Findings

This study developed novel visualizations to compare MDSS forecasts to multiple other independent data sources, including connected vehicle data speeds, National Oceanic and Atmospheric Administration (NOAA) weather data, connected vehicle road friction data, and snowplow AVL location information.

MDSS uses truck position AVL data to provide agile adjustments to the forecast. It is important to understand



February 16, 2024, winter storm, I-465 MM 30-46 MDSS maintenance recommendation forecast at 23 hours.



February 16, 2024, winter storm, I-465 MM 30-46 MDSS maintenance recommendation at current hour.

that if AVL shows a plow/salt truck in a segment, it assumes it is complying with the MDSS recommendation. However, very few trucks are currently equipped with plow up/down sensors or application rate feedback to the MDSS system.

Implementation

Incorporating a variety of visualizations into winter weather after-action reports increases the robustness of post-storm performance analysis and allows road weather stakeholders to better understand the capabilities of MDSS. The results of this analysis provide a framework for future MDSS evaluations and training tools for winter operation professionals in Indiana and beyond. This data and the associated visualizations can be adapted for performing after-action analysis on any type of storm, including ice, hail, snow, and even rain. If agencies can actively utilize the software provided and feed input into the models, it will help to develop a more accurate maintenance recommendation forecast and ultimately a better winter weather maintenance program. The framework presented in this study could serve as a reference for evaluating and fine-tuning future MDSS

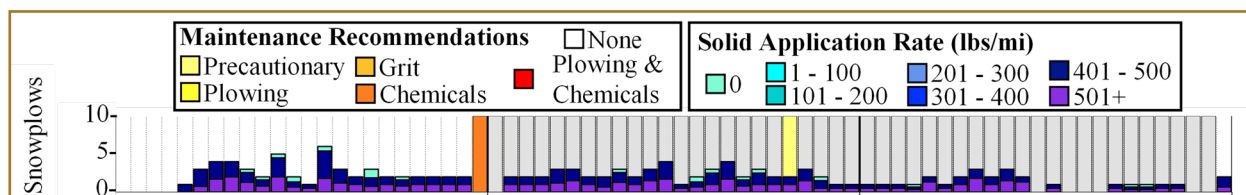
forecasts, which will ultimately aid in data-driven decision making for effective winter weather maintenance operations and resource allocation. Future studies should document a broader set of inputs into the forecast model and analyze each provided input's impact on the eventual MDSS forecast and alignment with conditions observed on roadways.

Recommended Citation for Report

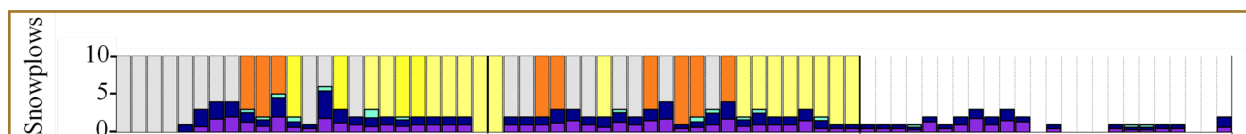
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January 13, 2024, winter storm, I-94 MM 22.36–45.77 MDSS maintenance recommendation forecast at 23 hours.



January 13, 2024, winter storm, I-94 MM 22.36–45.77 MDSS maintenance recommendation at current hour.

