How it works?

We trained our model using the "Incidents du réseau du métro" dataset, which is published on the open data portal of Montreal. We calculated the delay time and discretized it into three "high", "medium", and "low" buckets. We defined disruption as any incident with a delay time of 3 minutes or more. Incidents with a delay of smaller than 3 minutes are considered regular variability instead. Association analysis, specifically the FP growth algorithm, is used for rule mining and finding the correlation between the downtime and main factors contributing to disruptions. Different classification methods such as Decision Tree, KNN and Naïve Bayes algorithms are used to develop the best machine learning model to predict the cause of disruptions. In order to predict the downtime based on the source of disruptions, we used regression algorithms.

What is new and distinctive about your project?

This study consists of looking at what the concept of mobility and vulnerability resembles in Montreal. We used the latest data available from STM open datasets to train a machine learning model. Our predictive model supports public transport authorities and operators to prioritize what type of disruptions at what location to focus on to potentially achieve the most significant reduction in disruption exposure.

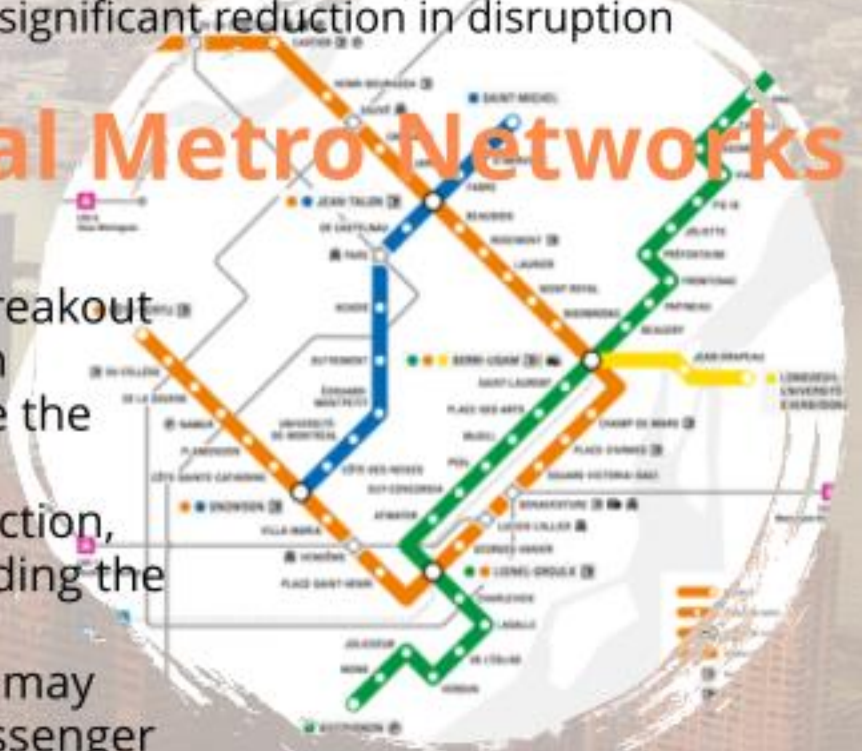
Prediction of Disruptions and Their Cause in Montreal Metro Networks

What is it?

The STM is one of the most commonly used rapid transit systems in North America. So, it is critical to improving the metro system's resilience by predicting the incidents and disruptions before they occur. For this purpose, we have created a machine learning model to predict the main cause of disruption in the Montreal metro network and the delay time after a breakout. Our model can explain the correlation between the downtime and incident's characteristics (including the symptoms, rolling stock type, station location, the calendar date of the incident and seasonal effect.)

Outcomes

Knowing the primary cause of disruption after a breakout will assist the inspectors in identifying the problem immediately. So, our predictive model can improve the metro network resilience by reducing downtime. Consequently, this can decrease the costs of inspection, and fewer human resources will be needed for finding the source of breakout. This can decrease passengers' nominal travel time due to lower waiting time and may lead to higher income if the ridership level and passenger satisfaction increase.



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