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HIT THE 'BREAKS'
PREDICTING WATER MAIN BREAKS

What is it?
Water is the essence of life and distributing it to everyone is one of the most important tasks undertaken by any city's government. Water Main failures (breaks) have major consequences - can adversely impact many lives by interrupting water supply and require urgent and costly repairs. Our project aims to reduce these water main breaks by predicting the chance of failure so that necessary preventive actions can be taken before the watermain fails.

How does it work?
Using several datasets from Kitchener, Ontario, we investigated the attributes available in the dataset to find out the most critical ones. Multiple predictive algorithms were used considering features such as material, age, diameter, length and previous breaks data to predict the chance of failure. Four such algorithms were used and compared to find the most robust one. As the conditions in Kitchener resemble those in Montreal, suggestions to apply this model to the city of Montreal have been given.

What is new and distinctive about it?
Ever since water supply lines have existed, they have been manually inspected to check for faults. This however is a tedious and expensive process. With an accurate predictive model, the need for inspections would be reduced drastically which would lead to large monetary savings. While there have been many studies regarding the prediction of water main failures, our study includes some additional factors like Traffic Load, Pressure Zone and Criticality of the water main. Our project also includes multiple algorithms, their benefits and issues, and can be used to select any of those algorithms depending upon the dataset.

Outcomes
The major outcome of this project is the development of predictive models within the context of water main failures. This analysis should also provide insight into the effect of various factors on the chance of water main failures and about the handling of imbalanced datasets, as well as recommendations for further data collection and analyses. All of this should aid the City of Montréal and Cité Studio to develop a preventative maintenance strategy every year to minimize failures of water mains and avoid the problems associated with them.

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