

A decorative graphic on the left side of the slide. It consists of a blue parallelogram and a light green parallelogram, both tilted at an angle. The blue shape is in the foreground, and the green shape is partially behind it. They are set against a dark blue background with subtle diagonal lines.

Predicting High Fire Risk Areas in Montreal

Key Concepts

Census Tract Areas (CTA)

Montreal Island is sub-divided into **540 areas known as CTA's**

These areas are used by the government to gather and summarize data

Fire Density

Fire Density: No. of fires per km²

Allows comparison between areas of different sizes

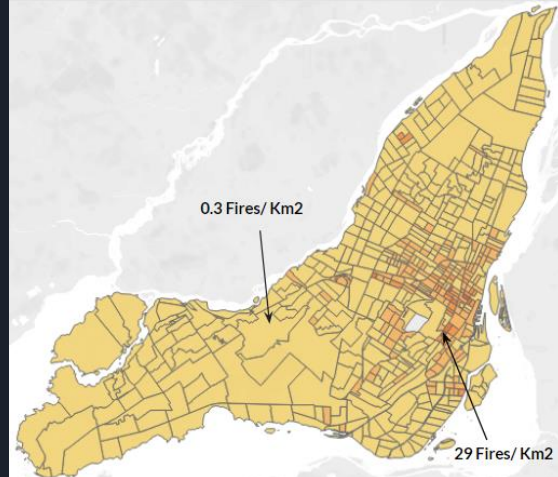
High / Low Classification






High Fire Risk Area:
Fire Density > 8 fires/km²



Low Fire Risk Area:
Fire Density < 8 fires/km²






Data Sources and Features

Features Considered		
Montreal Fire Incidents Data		<ul style="list-style-type: none">• Fires Past [12 Months]• Fires Past [6 Months]• Fires Past [3 Months]• Lags [1 to 12]• Month• Season
Montreal Census Tract Data		<ul style="list-style-type: none">• Population Density• Average Population Age• Average Home Value• Median Income• % Homes Needing Major Repair• % Homeownership• % Pop aged 65+
Montreal Property Assessment Data		<ul style="list-style-type: none">• No of units [Homes]• No of units [Condos]• No of units [Others]• Avg Constr Yr [Homes]• Avg Constr Yr [Condos]• Avg Constr Yr [Others]• Buildings Area [Homes]• Buildings Area [Condos]• Buildings Area [Others]

Note: Features are per km²



Features Selected*		
Incidents Features		<ul style="list-style-type: none">• Fires Past [12 Months]• Fires Past [6 Months]
Census Features		<ul style="list-style-type: none">• Population Density• % Homeownership• % Pop aged 65+
Property Features		<ul style="list-style-type: none">• No of units [Condos]• Avg Constr Yr [Homes]• Avg Constr Yr [Condos]• Buildings Area [Homes]

*Selection based on feature importance scoring and hyperparameter tuning

Model Details

- Model Used:



Random Forest and Logistic Regression

- Baseline:



- Training vs Testing:

2015-2021	2021-present
Training Period	Testing Period

Model Results

Our model highlights a subset of the 540 census tract areas, each month, capturing the high fire risk areas with the following success rate

Random Forest

85% TPR

18% FPR

VS

Baseline

59% TPR

18% FPR

- Metrics Definitions:

- **True Positive Rate (TPR):** % of actual high fire risk areas predicted
- **False Positive Rate (FPR):** % of false high fire risk areas predicted
- Results based on the testing data

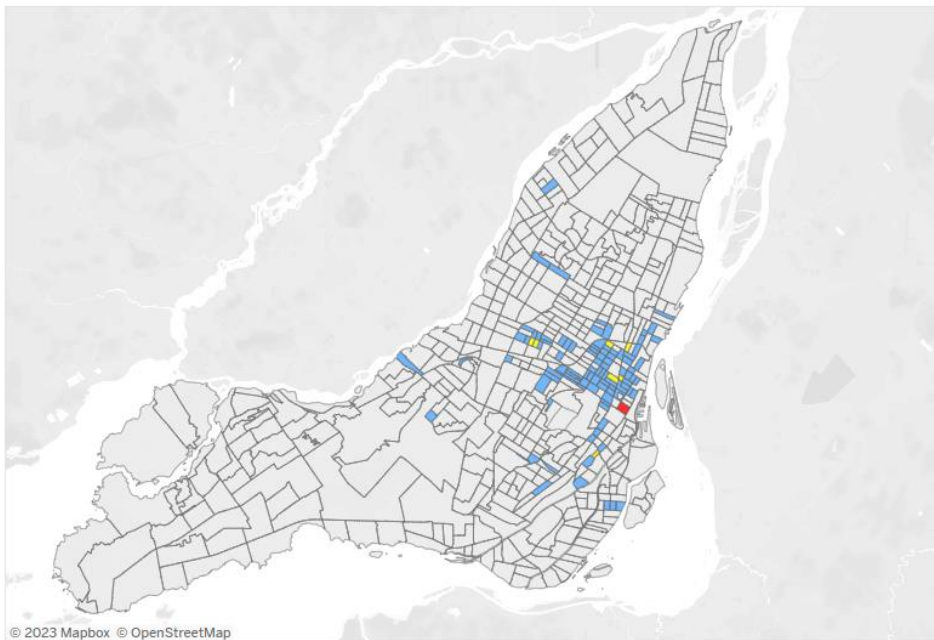
Prediction for July 2021



Results on Interactive Dashboard

Model Results - High Risk Fire Areas Montreal by [Erdem Demirli](#)

Final Model Predictions vs Actuals



Date (Month-Year)

June 2022

Colour Legend

Occured and Captured

Occured but Missed

Prediction

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