

USING MACHINE LEARNING TO ANALYSE SERIOUS ACCIDENTS IN TORONTO

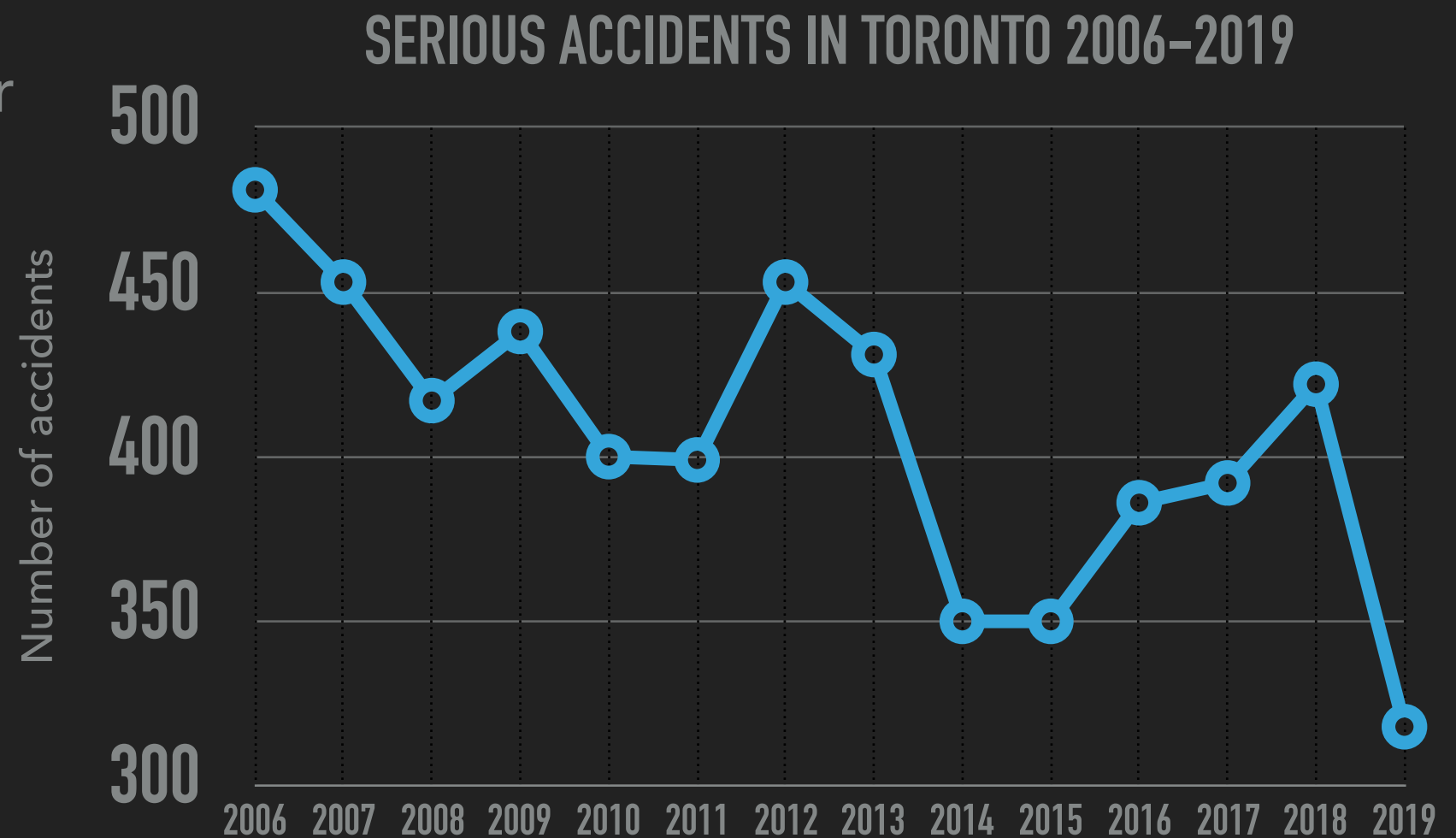
PREDICTING THE FATALITY OF A PERSON
INVOLVED IN A SERIOUS ACCIDENTS IN
TORONTO – 2008–2019

PURPOSE OF MODELLING

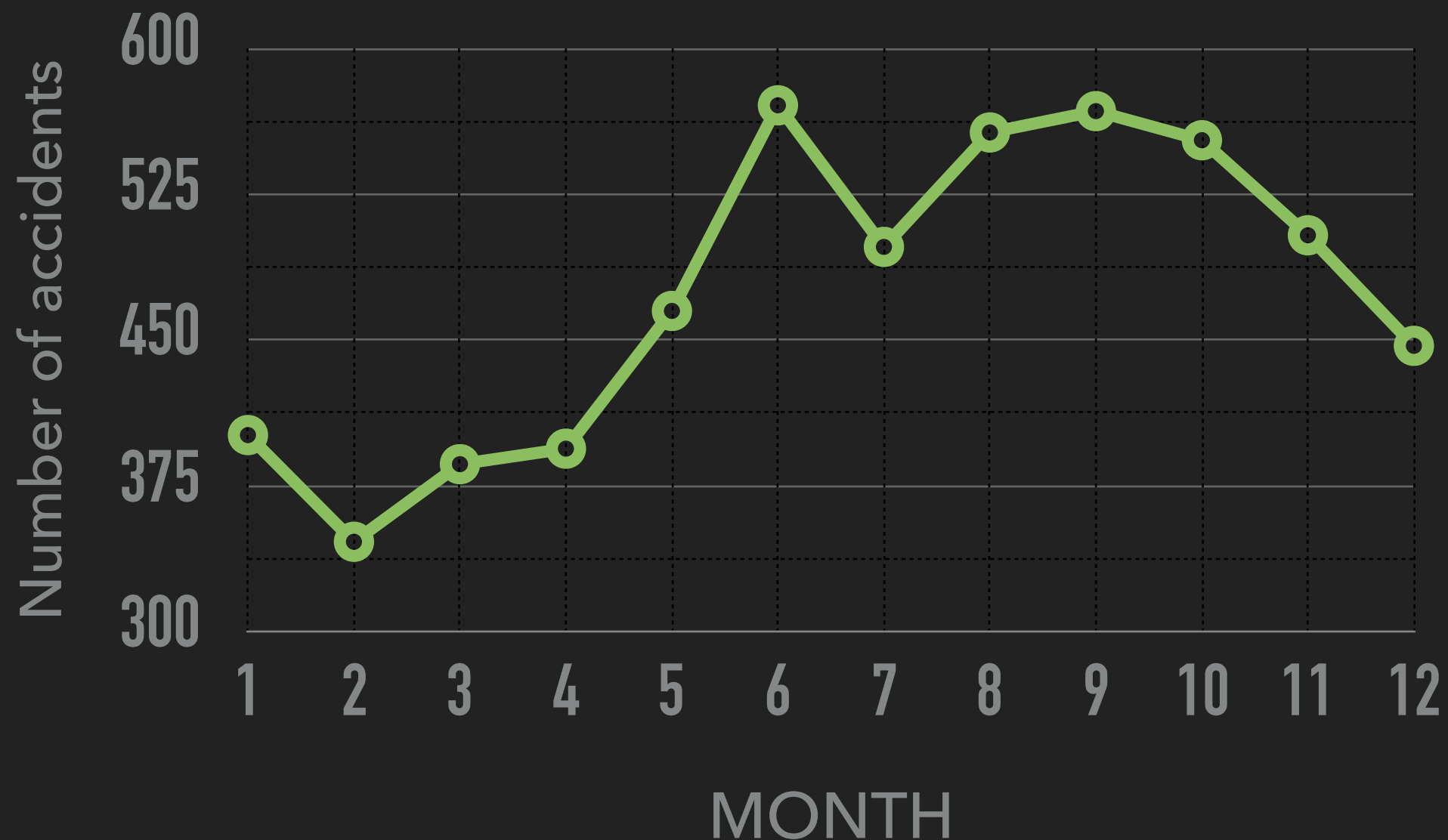
- ▶ Toronto's commute considered one of the worst in the world.
- ▶ The city's public transport system faces various criticisms as it has a much smaller subway network system compared to cities with similar size.
- ▶ Most of people in Toronto commute using cars as a result leading to frequent traffics and potential accidents.
- ▶ This project aims to identify the potential variables leading to a serious/fatal accident in Toronto.

THE NUMBER OF ACCIDENTS OVER THE YEAR

- ▶ Overall there is a decrease in the number of accidents
- ▶ Big drop in 2014 and 2015 and a sharp decrease from 2018 to 2019

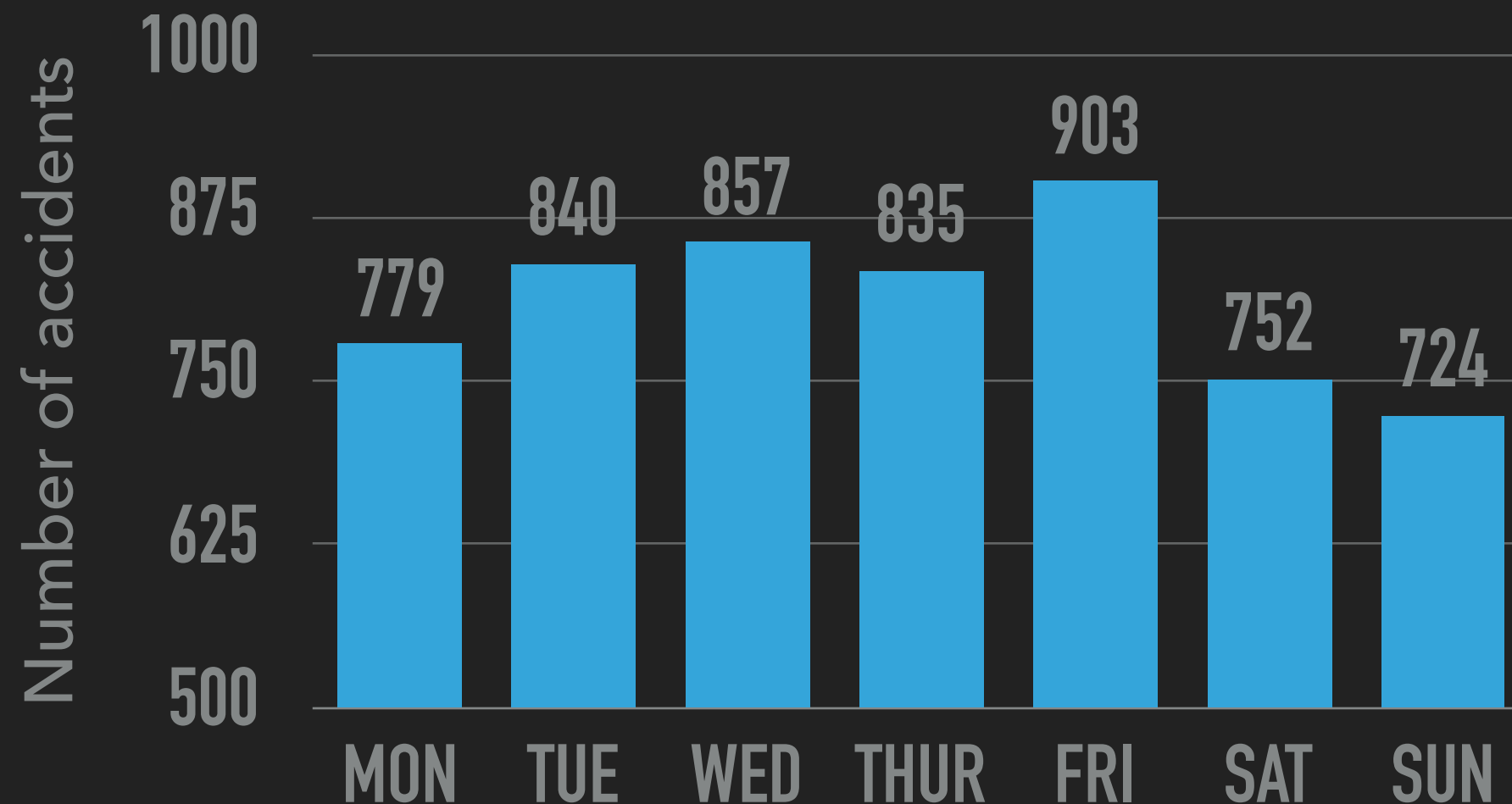


THE NUMBER OF ACCIDENTS IN DIFFERENT MONTHS



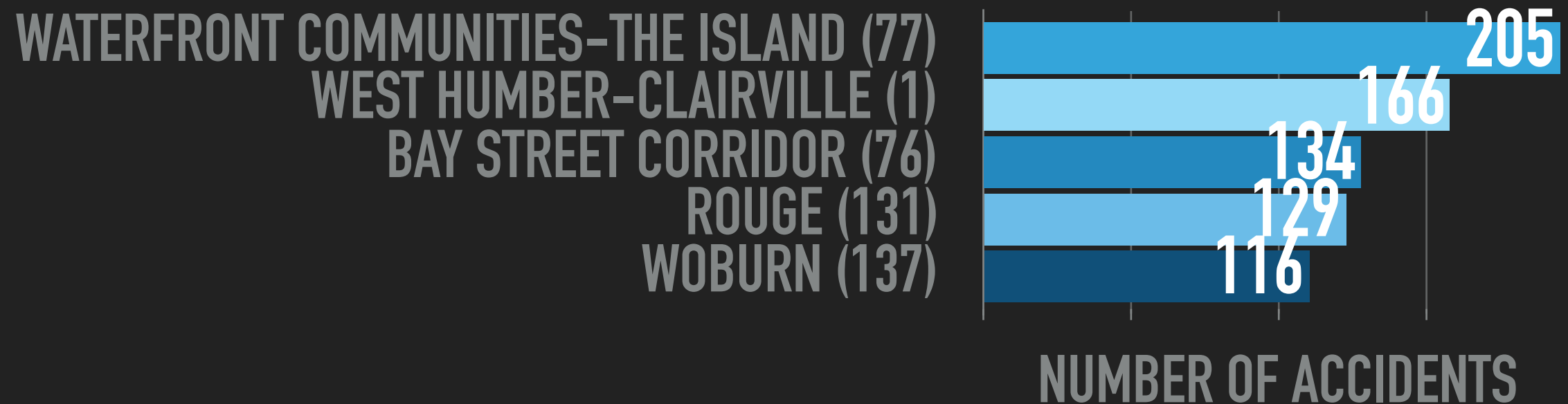
- ▶ There is a high number of accident in the summer and fall months from June to October.
- ▶ The number of accidents is low when the weather start to get cold from November onwards until May

THE NUMBER OF ACCIDENTS IN DIFFERENT DAYS OF THE WEEK



- ▶ The number of accidents peaks on Friday (at 903).

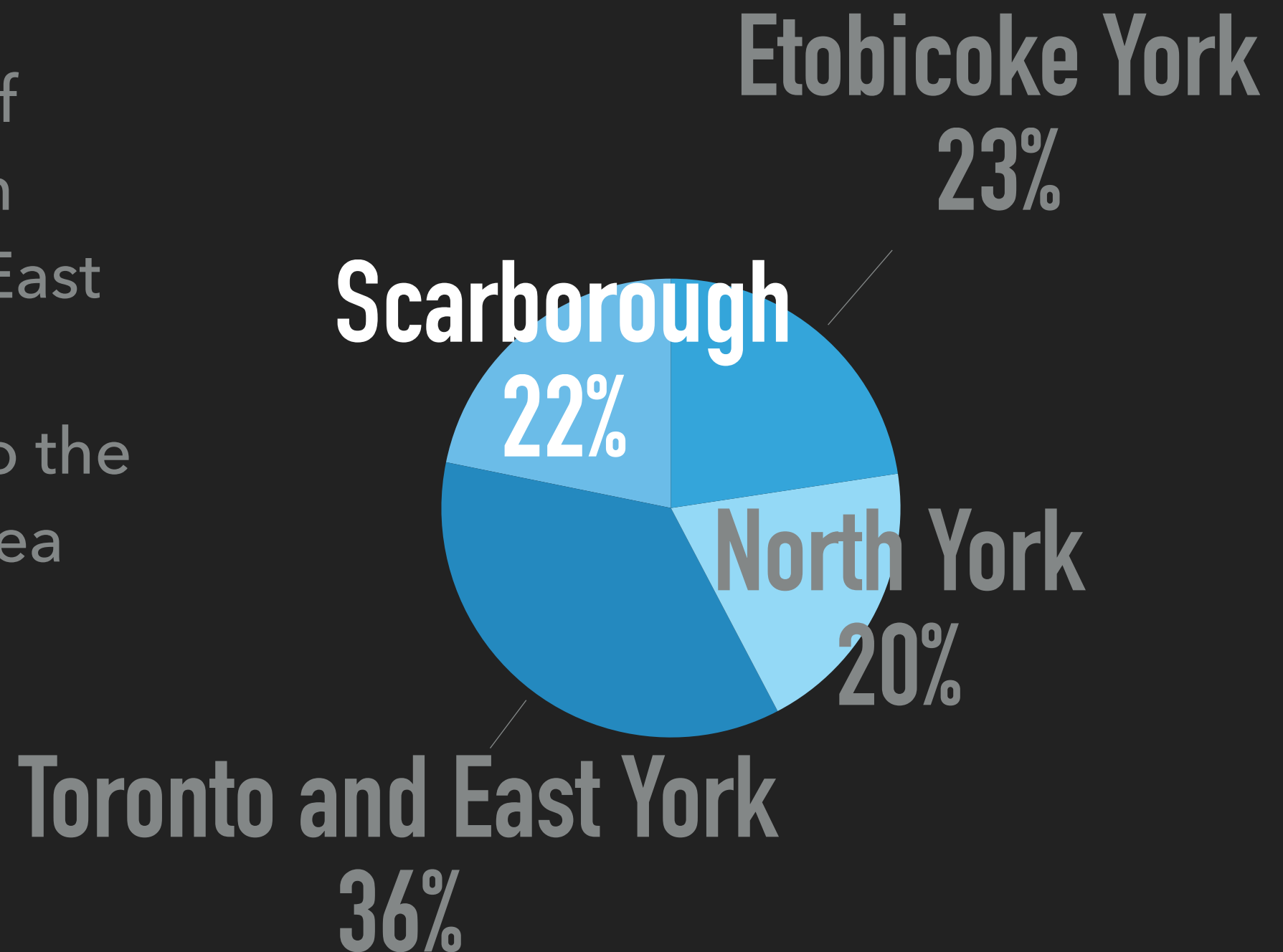
NEIGHBOURHOODS WITH THE HIGHEST NUMBER OF ACCIDENTS



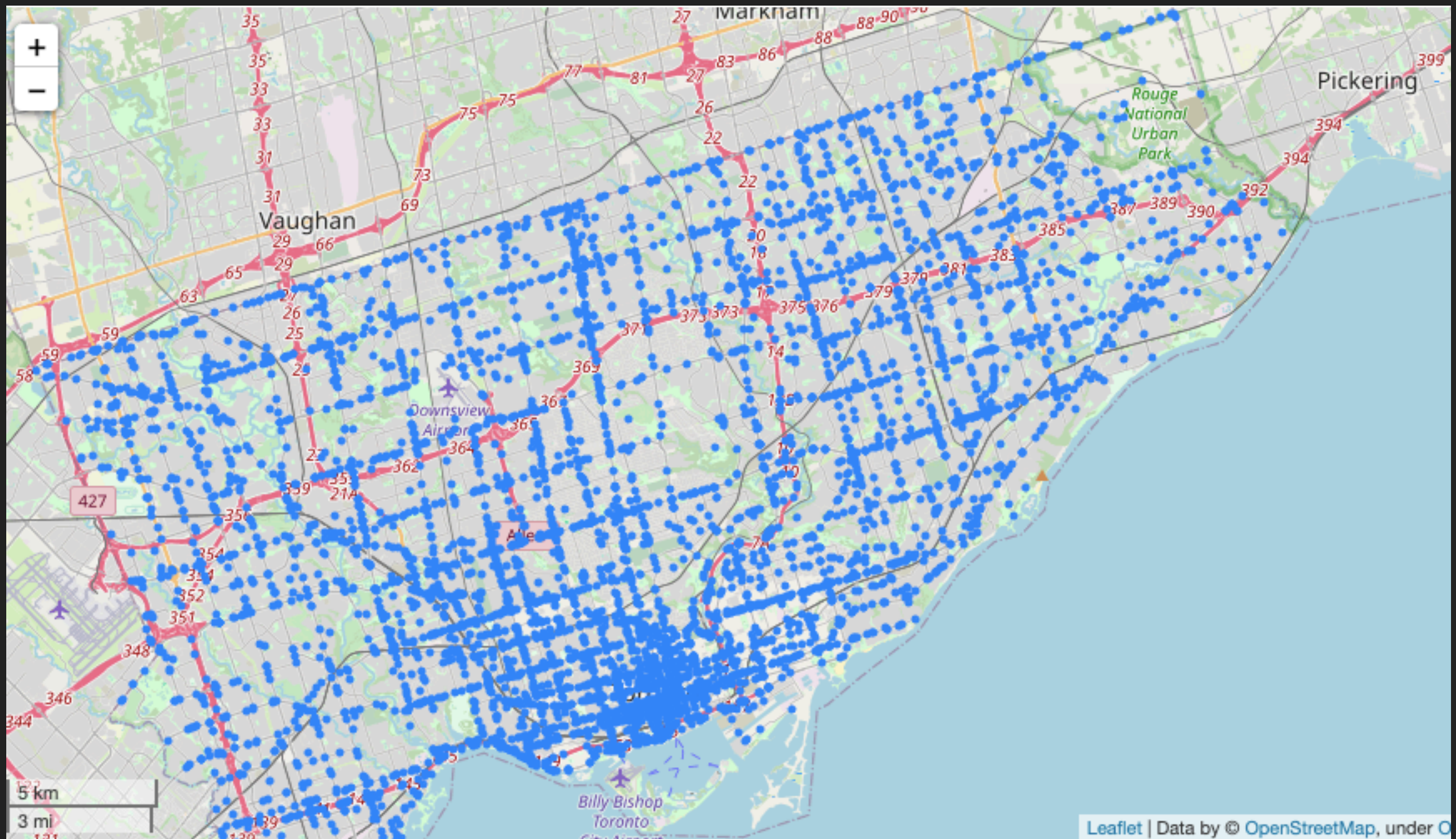
- ▶ The area with the highest number of accident is in Waterfront area with 205 accidents over the year.

NUMBER OF ACCIDENTS IN DIFFERENT DISTRICTS

- ▶ The highest percentage of accidents is in Toronto and East York which correspond to the Waterfront area



TORONTO SERIOUS ACCIDENTS



ACCIDENTS NUMBER AND FATAL RATE BY ROAD CLASS

	Total Accidents	Fatal	Rate of Fatal Accidents
Collector	354	49.0	0.138418
Expressway	6	1.0	0.166667
Laneway	4	3.0	0.750000
Local	289	44.0	0.152249
Major Arterial	3981	538.0	0.135142
Major Arterial Ramp	1	0.0	0.000000
Minor Arterial	931	107.0	0.114930

IMPACT TYPES LEADING TO ACCIDENTS (FOR ADDRESSES WITH HIGH ACCIDENT FREQUENCY)

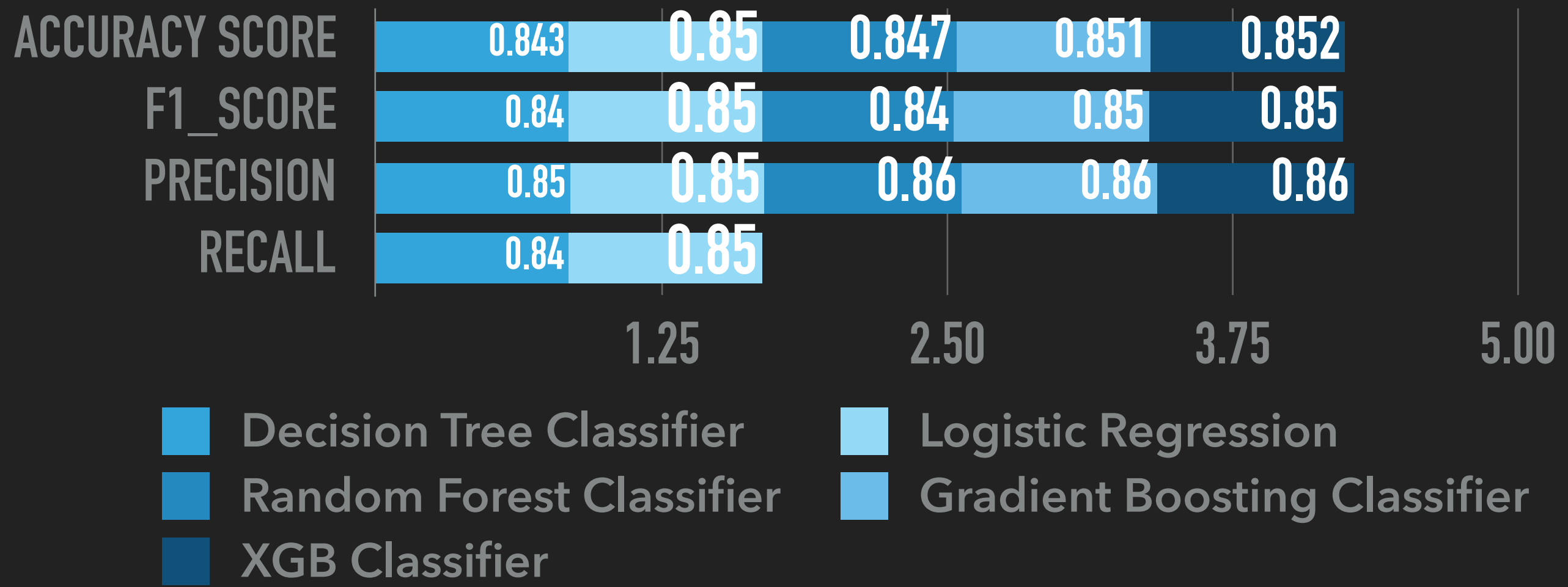
	Number of accidents
Angle	41
Approaching	10
Cyclist Collisions	28
Other	7
Pedestrian	205
Rear End	32
SMV Other	37
SMV Unattended	1
Sideswipe	7
Turning Movement	82

We can see from the table above that the almost half (205 out of 451) of the location with high frequency of accidents are with pedestrian collisions.

MODELLING RESULTS

Based on all the results from the modelling, we find that most of the modelling seem to have similar accuracy rate (from 84%-86%). We can hence conclude the followings:

- The feature variables of each person involved in the accident are good predictor of whether this person will suffer from a major injury or not.



MEANINGS FROM MODELLING

- Better policy can be implemented based on the findings such as:
- (1) ALCOHOL use can determine whether a person will suffer from major or final injury and hence should be properly controlled by the authority.
- (2) Certain locations tend to attract accident (waterfront or downtown area) during certain day of the week (Friday with the highest number of accidents) and therefore this areas should be more carefully monitored to avoid serious accidents.
- (3) Certain road classed such as Major Arterial and Collector attracts a high number of serious accidents as well as high rate of fatal accidents, it is therefore essential to focus on having officers monitoring these areas more effectively.