ParkFast: An all-in-one parking solution

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Finding parking can be a *disaster*

The impact of parking

730t

tonnes of CO_2 wasted each year in just one Los Angeles district [1]

$73b

economic impact on U.S. consumers annually [1]

85hrs

avg time spent looking for a parking spot in Los Angeles [1]

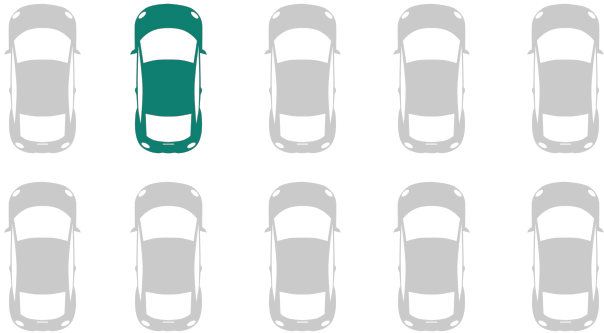
Most existing solutions require sensors

Physical sensors at each parking space lead to large up-front cost, continued maintenance, and constant power requirements.

Can data science provide a solution?

A two part, computer vision based approach

real-time off-street parking monitoring



drive-by on-street parking detection with predictive analytics

Finding parking is centralized in a user app

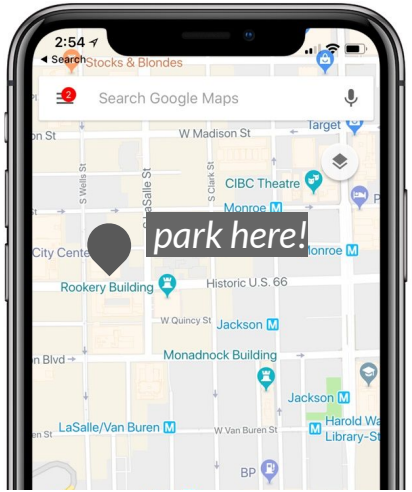


Image from Google Maps

The app will tell you where to park, given your destination.

Both on-street parking and nearby off-street parking are considered.

The app will gather data on your time spent parking to further improve prediction model.

Part 1: off-street parking detection

Off-street parking lots vacancies are monitored by analyzing the live surveillance video feed of the lot.

A pre-trained CNN model is adopted to determine if a parking space should be labelled *occupied* or *vacant*.

Parking app will know, in real-time, all the nearby off-street parking vacancies.

Part 2: on-street parking detection

On-street parking vacancies are found by analyzing dashcam and video footage from government vehicles as they drive by streets.

Image from Google StreetView

Cars detected using pre-trained Google Cloud Vision API

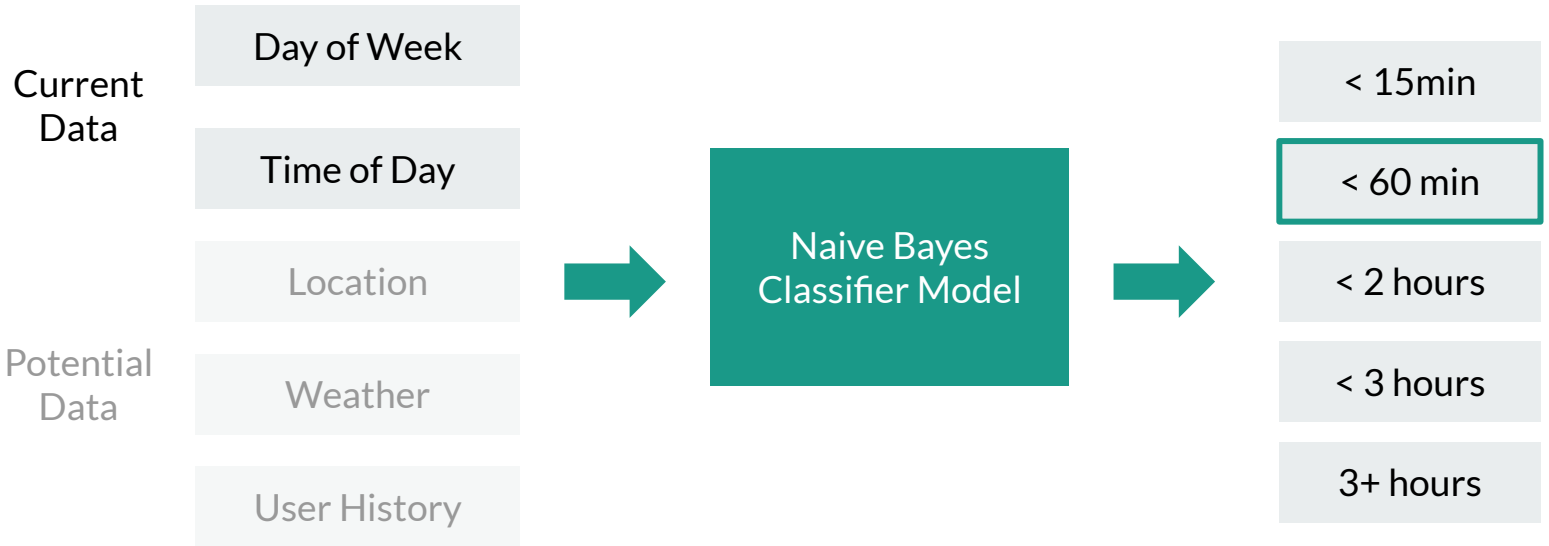
Training data from Google Street View images in Toronto

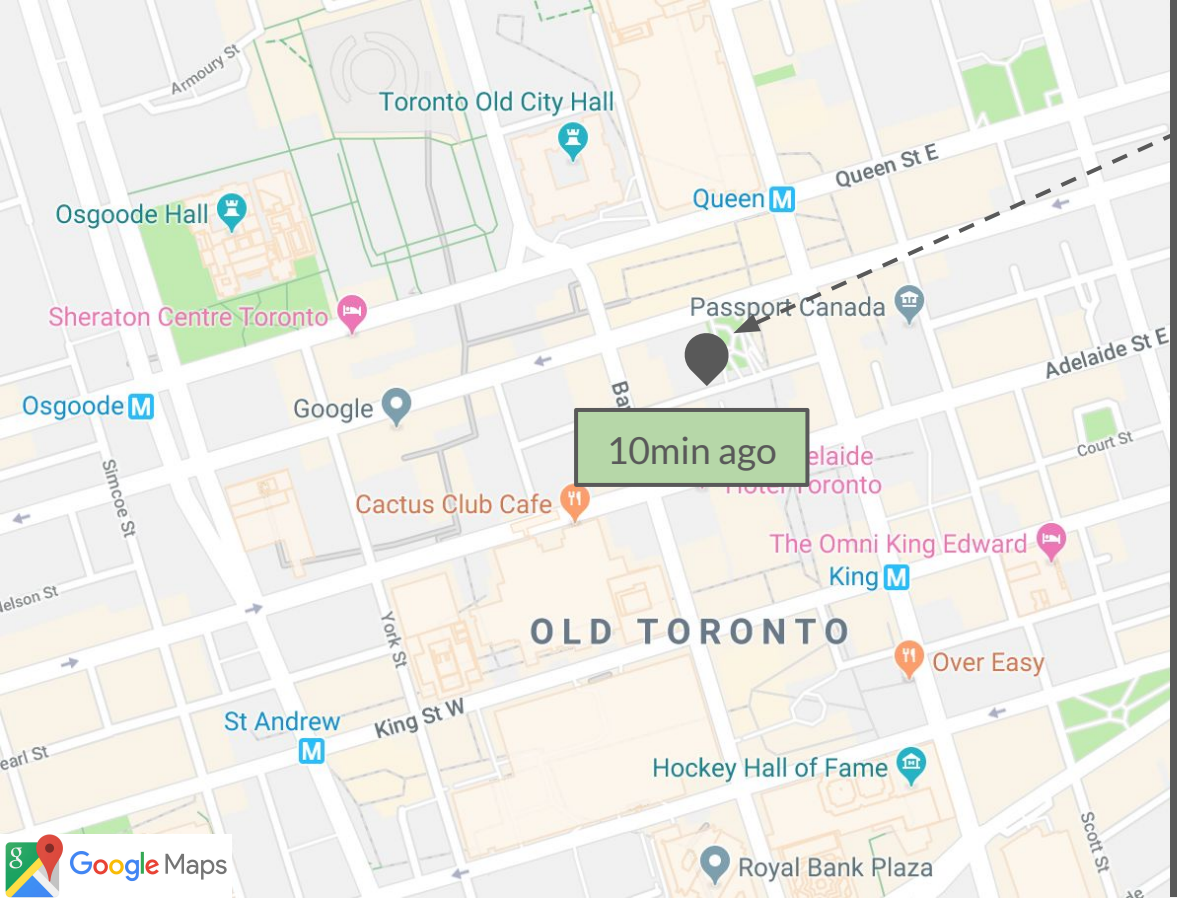
Predictive analytics after vacancy is found

Since on-street parking vacancies can't be continuously monitored by passing vehicles, a model is developed to determine likelihood that a spot is still open after a certain amount of time since vacancy was found.

Model will be further trained as more and more users use the app, and the time spent at each parking area is better known given time of day, day of week, weather, user history, etc.

Model predicts how long a parking spot will remain empty





✓ Very likely that the spot is available.
Predicted time empty duration is 15 minutes more than travel time to parking spot.

? There's a chance this spot is available.
Predicted time empty is close to travel time to parking spot.

✗ Don't count on it.
Predicted time empty is less than travel time to parking spot.

An example on-street parking vacancy prediction.

ParkFast: An all-in-one parking solution

ParkFast is a low-cost solution to monitor on-street and off-street parking across the city.

Users access the parking data using an app, and user data is collected to further improve parking predictions.

ParkFast saves city residents time and money, reduces the environmental impact of cars, and makes parking a little less frustrating.

Thank you!

Questions?

References

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