Automatic Street Parking Space Detection Using Visual Information and Convolutional Neural Networks

Tala Bazzaza, Master of Applied Science in Electrical and Computer Engineering

Supervisor: Dr. Panos Nasiopoulos

So, parking. The issue with parking is not only in Vancouver but there are many other cities around the world that are suffering with congestion. Personally, the amount of time I would spend driving around from one block to another is huge and it can eventually make you lose your mind. So all of this not only adds to traffic, we're wasting time, we're wasting fuel so typically we're harming the environment and a solution is needed. So, what I'm doing in my research is a system that is capable of finding empty parking spots on the street.

The reason I'm emphasizing on the street is because in a parking lot you have light, you have sensors, you have cars parked properly, there isn't any double parking, and the parking lines are quite visible. So, what I'm working on is more complex and ideally, the way this works is using car cameras, I use object detection and the deep learning model to identify empty parking spots.

Now, when I say object detection, I mean I take those car camera videos, I split them into frames which are still images and I label them to be able to train my model to identify vacant spots in the future. Now, when I say labeling, there are a few questions that come in mind. So for example:
1) Is the spot big enough? Would it fit the driver's car in there? Is it a real parking spot or is it just some sort of space at an intersection that my model can misclassify as an empty parking spot?
2) Another question is am I allowed to park there? So, in some cases it's a vacant spot but it's for handicapped people, or for example, at that time of the day, you're not allowed to park there.
3) Another question is, Is the speed of the driver while driving, would that affect the ability of my model to identify the spot.

So keeping that in mind, ideally the way this works is, as cars are driving through the city, they're sort of keeping an eye out for parking for you and once a parking spot is detected this information is shared through a navigation map such as google maps using 5G. So, this is great because as you're driving, not only can you see where you're going, you can also see empty parking spots along the way which is great. So, it's a complex project but at the same time, it is amazing because not only would we reduce time, we would reduce fuel. It's definitely better for our mental health and it's actually very convenient because a lot of people would love to use this. I know I would! Thank you!