

# iValet

## Intelligent Parking Lot Management System

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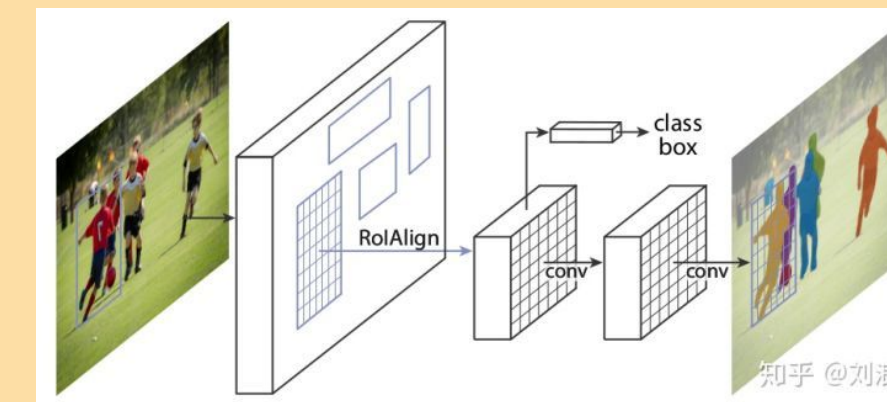
### Introduction

Drivers spend **17h per year** on average searching for parking. The estimated cost of the wasted time, fuel and emissions produced by these drivers amount to **\$345 a year**.

iValet aims to alleviate this problem by directing drivers to the nearest empty parking spot once they enter the parking lot.

### Segmentation

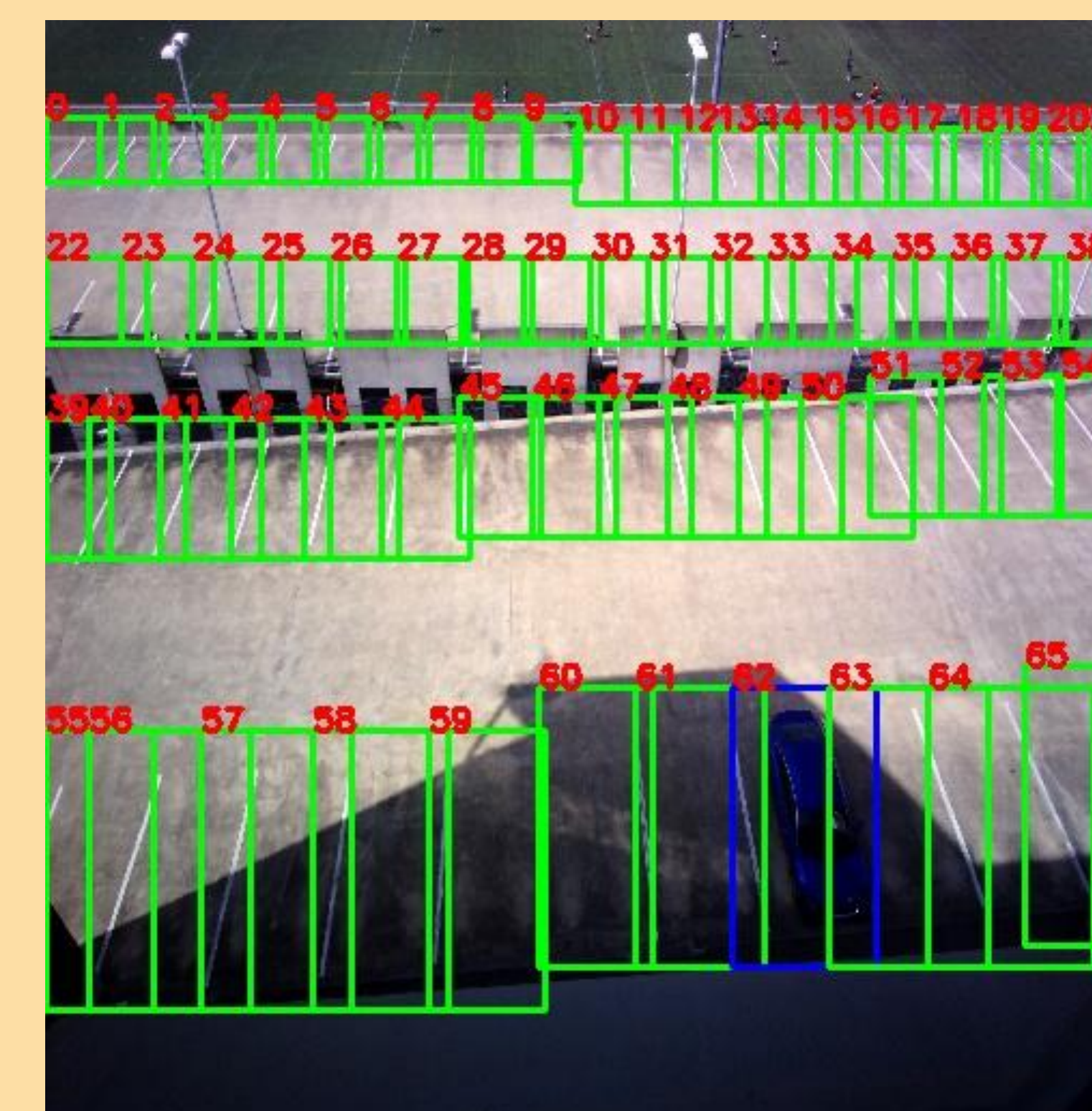
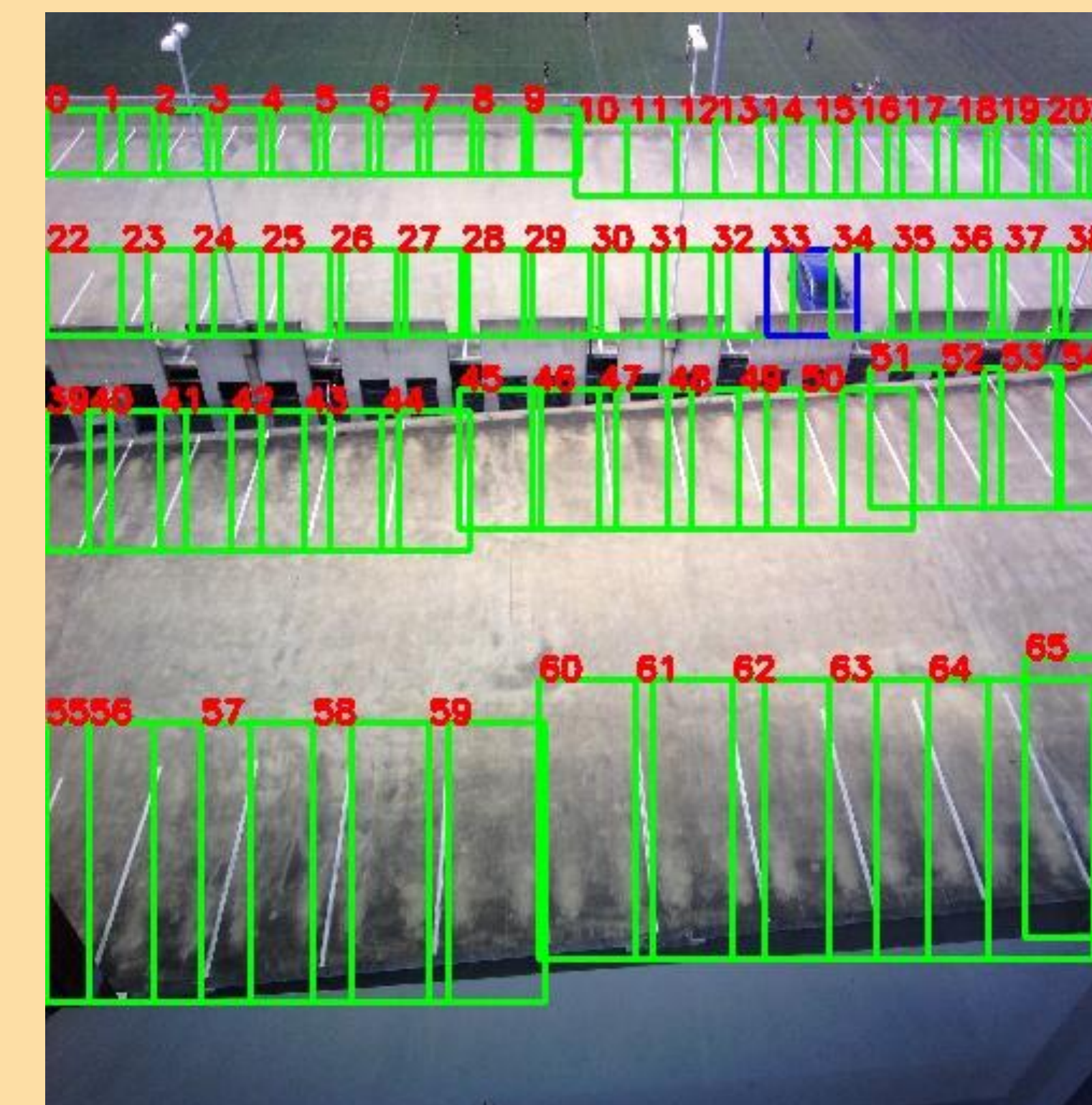
#### Mask R-CNN (bad performance)



#### Pre-define vertex for each parking lot

```
a=[]
a.append((45,75,0,35))
a.append((45,75,25,55))
a.append((45,75,50,80))
a.append((45,75,75,105))
a.append((45,75,100,130))
```

### Results

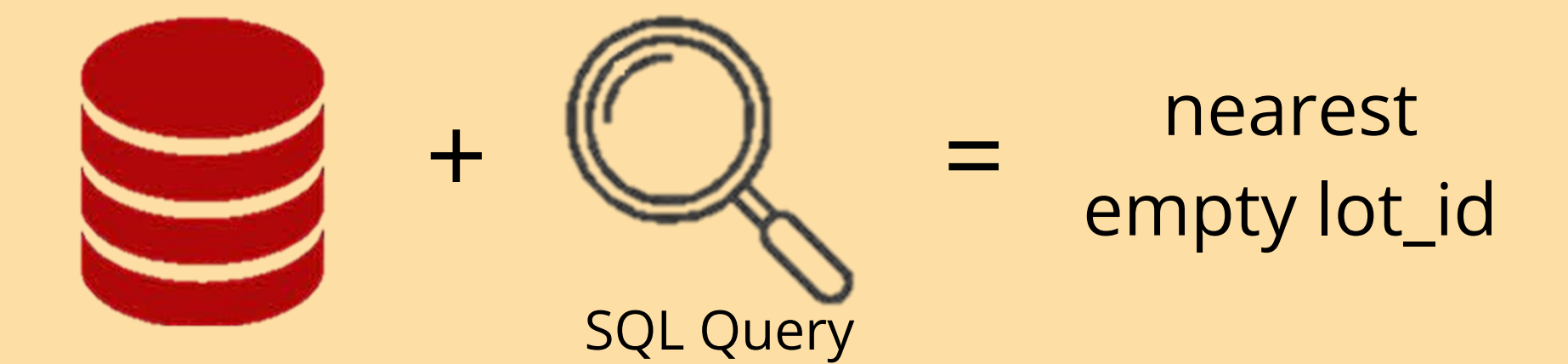


### SQL Database

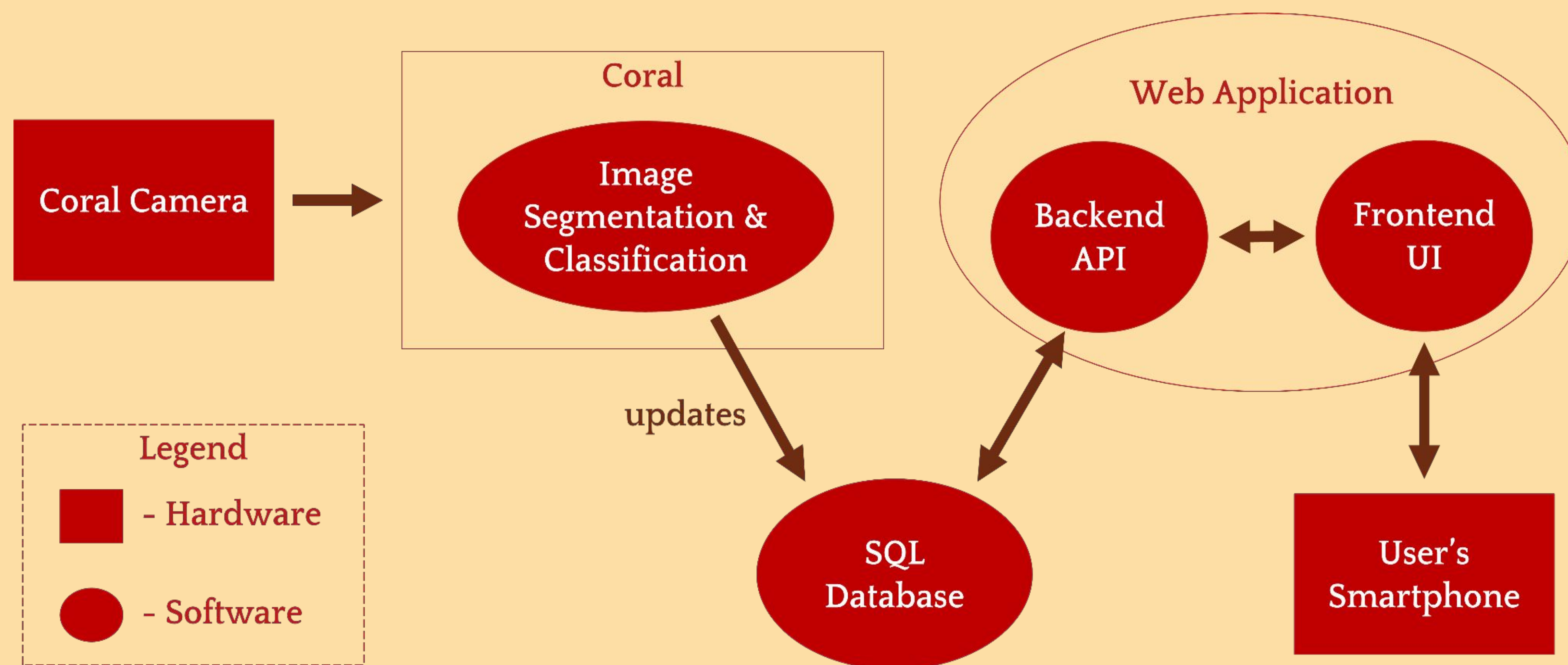
#### Database Schema

- lot\_id
- empty
- distance
- licence\_plate
- time\_parked
- handicap

Backend API (Express and Node.js) obtains closet lot\_id through SQL queries



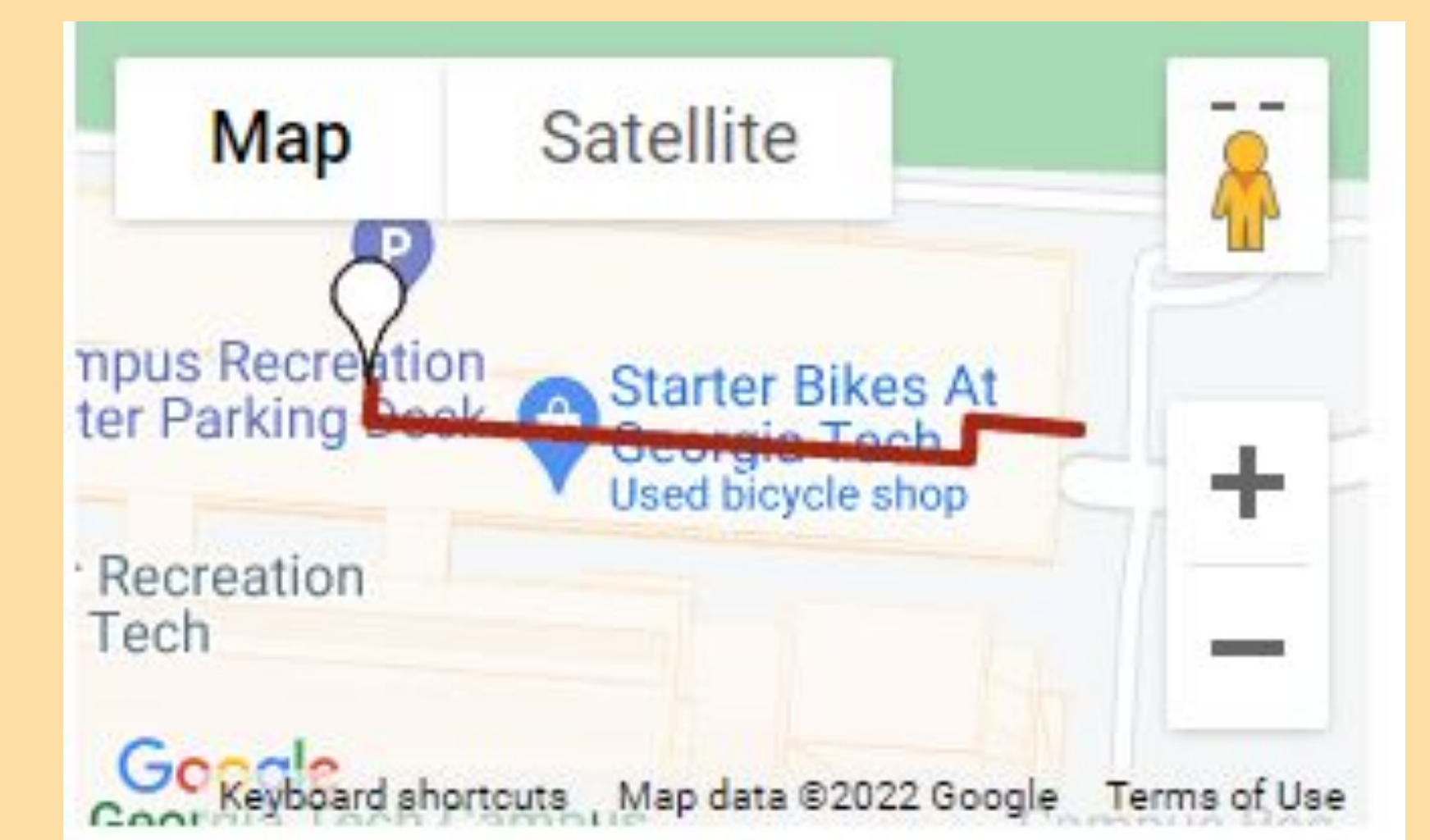
### System Diagram



#### Legend

- Hardware
- Software

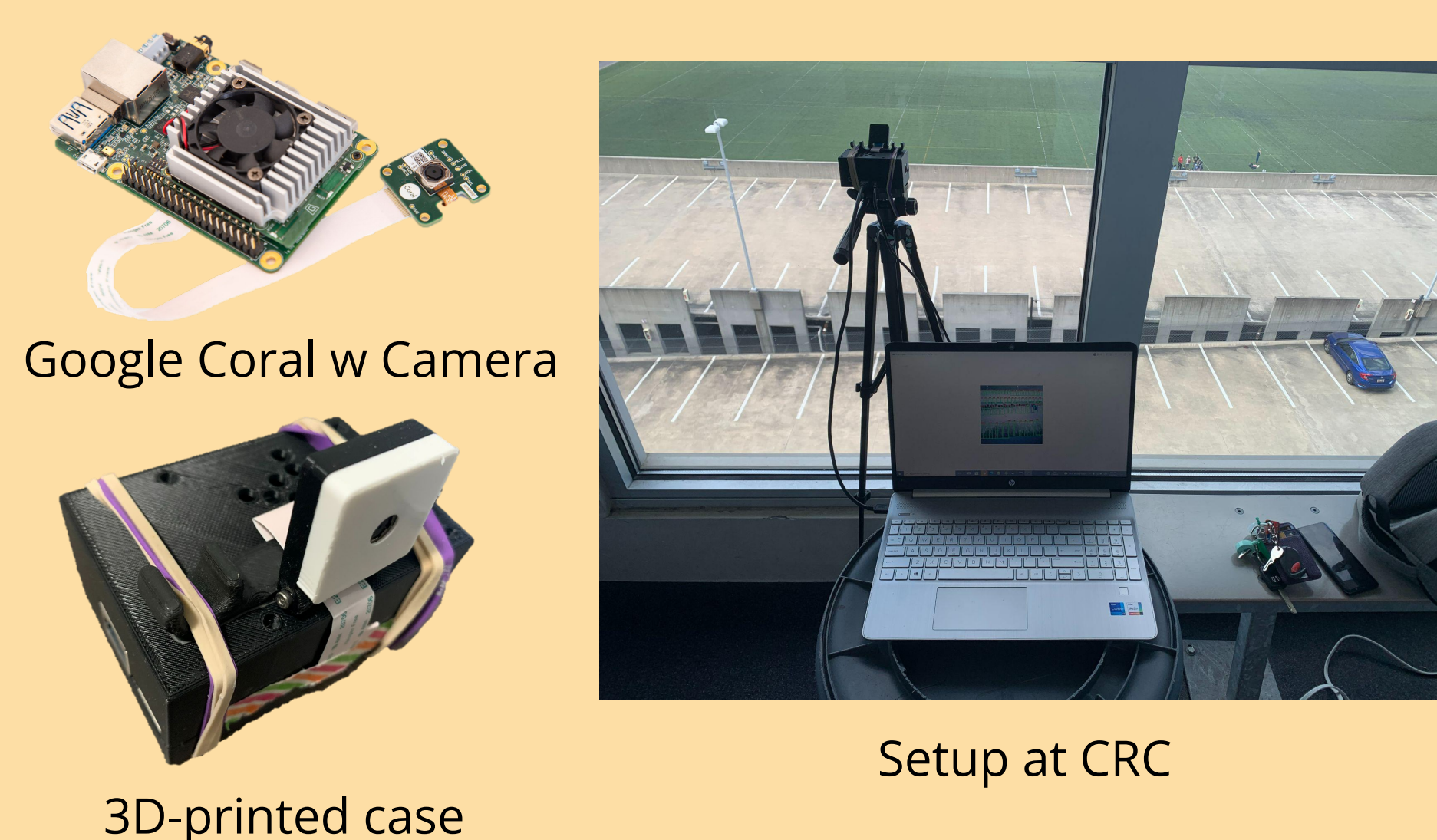
### Navigation



### Future Work & Current Drawbacks

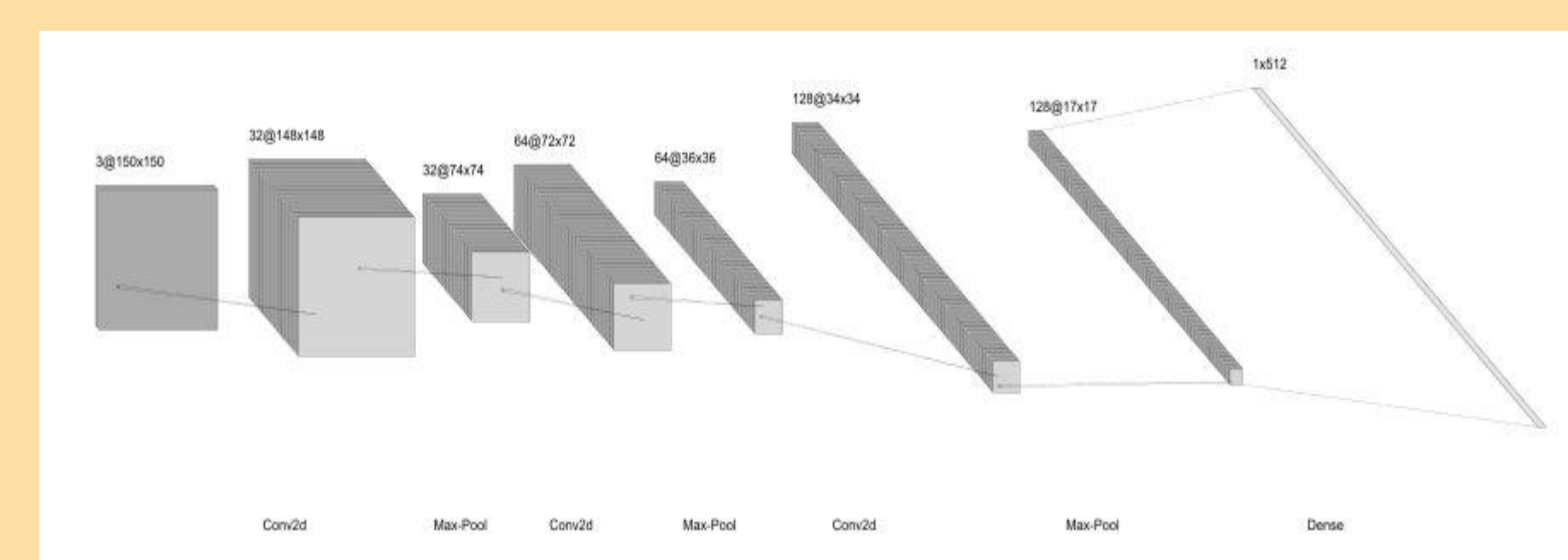
- The current design needs pre-defined images of parking spaces, so it cannot be used in unknown areas immediately.
- We attempted to use another segment-based algorithm, Mask R-CNN, which can work in different places, but it does not work well. We can retrain it with a larger dataset to get better performance.
- Classifier performance varies based on lighting conditions. An improved dataset comprising images taken from the Coral camera will be useful to ensure more accuracy.
- Implement a zoning system in the SQL database and UI form to allow users to select zones they prefer to park (e.g proximity to seats in a large stadium)
- Integrate images from multiple cameras for a larger field of view.
- Current geolocation method to help users on the navigation screen can be unreliable, need to research another method

### Hardware



### Classification

#### CNN Architecture



### User Interface

#### Web Application Landing Page

