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# Project Report - ECE 176

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## Abstract

Describe the overall picture of your project here. Give a short description about the different parts you are going to cover in the proposal, but do not include too many details here.

We do not have requirements for the code. The only requirement is that it should be from you, not copy paste from online repo.

## 1 Introduction

Finding a vacant parking space in a given lot is a tedious and costly task: a person must drive through the whole parking lot in order to find a vacant space. This ineffective process will waste gasoline and time while searching for a parking space. Furthermore, this will cause congestion in the parking lot. Therefore, by displaying the occupancy of spaces in a given parking lot will significantly reduce the time cost, traffic congestion, and gasoline consumption. YOLO-Parking will aid this wasteful process by displaying vacant and occupied parking spaces. Although there are existing methods to detect the occupancy of a parking space, such as car detector on every parking space and other object detector architectures that detects the occupancy, most of them are expensive or slow in detecting parking spots[1]. Furthermore, there are several traditional models like R-CNN and Faster R-CNN models to detect the instance segmentation of a vacant parking spot, but they are slow in detection for videos.

In this paper, we propose a new model to detect vacant parking spots: You Only Look Once (YOLO). YOLO architecture is one of the fastest architecture that accurately performs object detection [2]. Additionally, several cameras mounted in the parking lot to detect vacancy of a space is relatively cheaper than placing a car detector on every parking space in a parking lot [1].

## 2 Related Work

You can describe the works related to you method in this section. You should at least mention two to three papers that are related to your project and how they are related.

## 3 Method

In this section, you should describe your method (Do not need to be the exact method you describe in project proposal). Besides, You can include the following things(You do not have to cover all of them):

- the detailed structure of your method, including the formulations, network architecture figure.
- training algorithm, testing algorithm.
- what is the new proposed techniques compared to previous work, and the reason and strength of choosing the method.

## 4 Experiments

In this section, You should include the following things:

- the datasets you use:
  - the brief introduction of the dataset
  - the data format
  - other information related to your experiments
- your results
- ablation study on training your networks, how does the method work with more or less data, with/without some components (optional)

## 5 Supplementary Material

You should also include a video recording a presentation (with motivation, approach, results) for this project.

## References

- [1] Martin Marek. Image-based parking space occupancy classification: Dataset and baseline. *CoRR*, abs/2107.12207, 2021.
- [2] Joseph Redmon, Santosh Divvala, Ross Girshick, and Ali Farhadi. You only look once: Unified, real-time object detection, 2016.