

Autonomous Car Parking

CS7IS2 Project (2021/2022)

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Abstract. Motivation behind the work, high level description of the problem, how it was solved by the proposed algorithms.

Keywords: Soft-Actor-Critic (SAC), Behaviour Cloning, Evolutionary Algorithm, parking

1 Introduction

The Autonomous Vehicle (AV) industry is one of the most active and promising area in the recent years with many ongoing research to make it fully autonomous [5]. The International Society of Automotive Engineers (SAE) proposed a six-degree autonomy scale with level 0 as no automation and level 5 as full automation without any human interventions [4]. The current level of autonomy scale achieved today is between level 2 and 3 requiring some assistance from the driver and limited to ideal conditions. Car parking is challenging and disliked by most drivers due to time required searching for spaces, risk of scratching vehicle, safety of pedestrian, etc [1][3]. Most vehicles are parked 95% throughout the lifetime [2]. Parking is required by every driver and apply AV will greatly improve the quality of life and ease of drivers.

2 Related Work

In this section you will discuss possible approaches to solve the problem you are addressing, justifying your choice of the 3 you have selected to evaluate. Also, briefly introduce the approaches you are evaluating with a specific emphasis on differences and similarities to the proposed approach(es).

3 Problem Definition and Algorithm

This section formalises the problem you are addressing and the models used to solve it. This section should provide a technical discussion of the chosen/implemented algorithms. A pseudocode description of the algorithm(s) can also be beneficial to a clear explanation. It is also possible to provide one example that clarifies the way an algorithm works. It is important to highlight in this section the possible parameters involved in the model and their impact, as well as all the implementation choices that can impact the algorithm.

3.1 Subsection Title

4 Experimental Results

This section should provide the details of the evaluation. Specifically:

- Methodology: describe the evaluation criteria, the data used during the evaluation, and the methodology followed to perform the evaluation.
- Results: present the results of the experimental evaluation. Graphical data and tables are two common ways to present the results. Also, a comparison with a baseline should be provided.
- Discussion: discuss the implication of the results of the proposed algorithms/models. What are the weakness/strengths of the method(s) compared with the other methods/baseline?

5 Conclusions

Provide a final discussion of the main results and conclusions of the report. Comment on the lesson learnt and possible improvements.

A standard and well formatted bibliography of papers cited in the report. For example:

References

1. E Baburaj, BR Tapas Bapu, M Tamilselvi, and Bhasker Dappuri. Smart autonomous car parking for the modern vehicles. In *Journal of Physics: Conference Series*, volume 1964, page 042070. IOP Publishing, 2021.
2. Ch Q Choi. How self-driving cars might transform city parking. *IEEE Spectrum*. *Febrero*, 20, 2019.
3. Bosch Global. Autonomous parking in parking garages, Mar 2022.
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5. Edgar Talavera, Alberto Díaz-Álvarez, José Eugenio Naranjo, and Cristina Olaverri-Monreal. Autonomous vehicles technological trends, 2021.