Exercise 5: An Auctioning Agent for the Pickup and Delivery Problem

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1 Bidding strategy

1.1 General outline

We use these general assumptions to build our strategy:

- The costliest actions are when vehicles travel with empty trunks. Having parcels to deliver while going to a specific destination offsets the cost of travel.
- There are no time constraints to deliver tasks. As such there is no penalty in accepting a large number of tasks and delaying their deliveries and pickup times.
- Since there are only two agents playing the competition can be assimilated to a zero sum game; i.e. only the relative difference with the profit from the adversary counts, not the absolute value.
- There is a lower bound on the number of tasks that is equal to 10.

With these assumptions in mind we constructed our strategy as follows. Since there is going to be at least 10 tasks into play, a task that might seem disadvantageous at the beginning might become profitable if it is followed by other deliveries and pickups. As such it is advantageous to fill the trunks of the cars at the beginning. To ensure this our bidding strategy starts very aggressively, with the possibility of bidding lower than our own current marginal cost with the hope that this loss will be minimized when the number of accepted tasks reaches a certain threshold.This also has the effect of preventing the adversary agent from winning tasks early and ensures that we will keep a head start in the profit differences.

1.2 Implementation details

2 Results

2.1 Experiment 1: Comparisons with dummy agents

2.1.1 Setting

2.1.2 Observations

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2.2 Experiment n

2.2.1 Setting

2.2.2 Observations