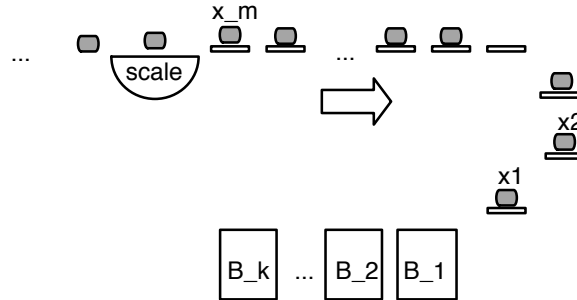# Informed Search Methods in AI
Fall 2023 Assignment 2

In this assignment, you will implement a real-time search algorithm for aiding with packing food items into boxes. It will be used in a packing machine to control the assignment of food items to boxes.

New food items are fed into the machine automatically, where they are weighted. The machine has a conveyor belt with *cars* that hold items that have already been weighted but not put into a box yet and *gates* where the boxes are placed. When an item on the conveyor belt reaches the gate area, it is automatically dispensed into a box at one of the gates. Your software is responsible for deciding which gate. When a box fills up, it is instantly replaced with an empty box. Each box has a given *capacity*, i.e., *a minimum weight* it should hold.

The task is to pack the food items into boxes, such that each box holds at least its *capacity*, but in doing so, trying to minimize the *giveaway weight*, that is, the weight that each box exceeds its capacity.

A simulator and a skeleton of an assignment class are provided, and your task is to augment the assignment class with both an informed lookahead search and a good heuristic function.

Run your algorithms on the provided file (*weight.txt*) to measure its efficiency. Do it in several steps and report the result for each:
- Run the simulation with the default parameters.
- Run the simulation using 3 gates and 1 car, using your improved heuristic.
- Run the simulation using 3 gates and 10 cars, using your improved heuristic.
- Any other experiments you want to report on (e.g., the effects of adjusting the number of cars, gates, and capacity).

Hand in the two Python programs you modified (*assign.py* and *estimate.py*) as well as your report (as a PDF file called *report.pdf*, 3-5 pages long).