

GRUNDLAGEN DER KÜNSTLICHEN INTELLIGENZ

Programming Exercise 4: Probability

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Programing Exercise 4: Hidden Markov Model

Problem 1: Viterbi Algorithm

You have a sweeping robot vacuum cleaner at home to help you keep the floor clean. Since you have a wildly colored floor, the robot uses a color sensor and a map of the tiles' colors to localize itself on the floor. Due to sensor uncertainties, the measured colors might deviate from the actual colors. Based on the observed colors, the task is to compute the most likely path using the Viterbi algorithm.

Please note: since the Viterbi algorithm will also be part of Exercise 10, it is recommended to wait until this exercise (planned on Jan 22nd) if you have problems.

*For more detailed information, see the provided jupyter notebook **HMM.ipynb**.*

Problem 2: Particle Filtering

In this exercise, we learn how to use particle filtering to track a moving robot's position over time. The available sensor data are steering and velocity control inputs, as well as the distances to visible landmarks, both with uncertainties.

*For more detailed information, see the provided jupyter notebook **Particle_Filter.ipynb**.*

Installation

This exercise doesn't depend on the AIMA code, only installing the dependencies from the requirements.txt file from the exercise repository is sufficient:

```
pip install -r requirements.txt
```

Passing criteria

Detailed information on the passing criteria of this programming exercise are given on Artemis in the respective jupyter notebooks.

In short: the exercise is passed if the evaluation on Artemis of both problems is passed.

A pass will be awarded only if:

1. you submitted the **correct file** with the **correct name**.
2. you **did not change** the **variable names** provided by us within the template.

3. your submitted files can be run in an Anaconda environment (Python 3.7) with the packages provided by the *requirements.txt* **within a reasonable time (under 5 minutes)**.
4. like the rest of the programming exercises, this is an individual project and work **must** be your own. (We will use a plagiarism detection tool and any copied code will annul all bonus exercises from both the copier and the copied person!)