DAIS2022: Assignment #5
Ensemble & Reinforcement Learning

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Introduction

In this assignment, we want to get familiar with classifier ensembles and training agents without explicitly telling them what to do.

The assignment has 100 points in total, distributed over the tasks. You need to get at least 50 points to pass this assignment.

1   Ensemble Learning: 20 points

The idea of ensemble learning is that perhaps a handful of classifiers perform better than a single one. We will have a look at two prominent techniques to apply this rational, *Bagging* and *AdaBoost*. Please do all the tasks specified in the attached Jupyter notebook *Ensembles.ipynb*.

2   SARSA: 40 points

In this task, we will have an in-depth look at the SARSA algorithm and how we can use it to train an agent that is able to learn to solve problems on its own. Please do all the tasks specified in the attached Jupyter notebook *SARSA.ipynb*.

3   Custom Environments: 40 points

Often you do not just want to solve toy problems or games provided by others, but actual problems that you encounter during your research. Therefore, we are going to design our own environment so that we can write an algorithm to solve it! Please do all the tasks specified in the attached Jupyter notebook *CustomEnvironment.ipynb*. For guidance you can follow the following documentation: `https://www.gymlibrary.ml/`

4   Next Assignment

Now that you have gained some insights into ensemble and reinforcement learning, we will proceed with another learning strategy: unsupervised learning. Therefore, refresh yourself with following topics:

- Self-Organized Maps (SOM)

- k-means clustering, DBScan, hierarchical clustering