FTML practical session 15

15 juin 2025
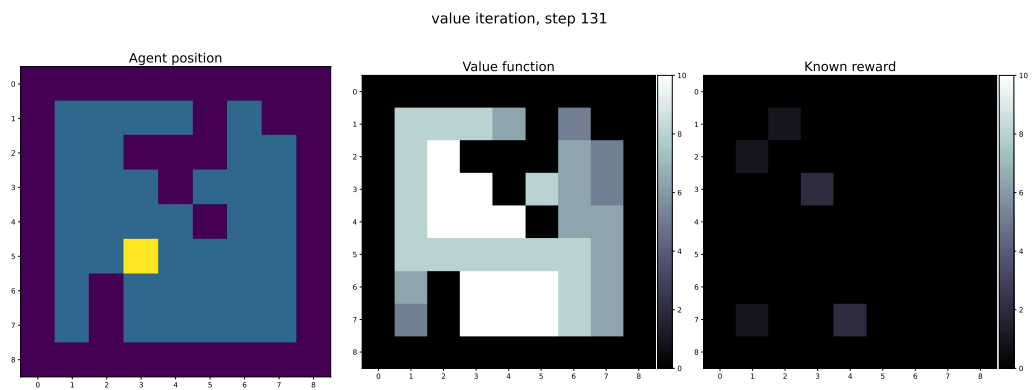
value iteration, step 131

TABLE DES MATIÈRES

1   REINFORCEMENT LEARNING : VALUE ITERATION

Implement the simplified version of the **value iteration** algorithm presented in the "lecture 8" slides.

The agent lives in a 2-dimensional world represented in Figure 1. It moves in it, as represented in figure 3, and obtains rewards, depending on its position. The agent position is perdiodically reset to the origin. The reward available is fixed, and represented in figure 2. The reward and the world configuration are contained in the **data/** folder inside **exercice_1_value_iteration/**.

You need to

— fix the **move_agent()** function

— fix the **update_value_function()** function

— You may move the agent randomly at each time step.

The estimation of the value function results from an iterative process, as displayed in figure 4, figure 5 and figure 6.
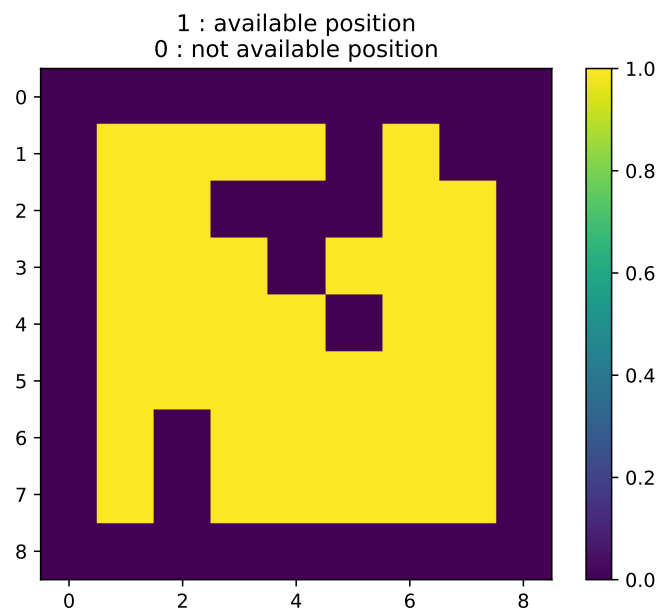

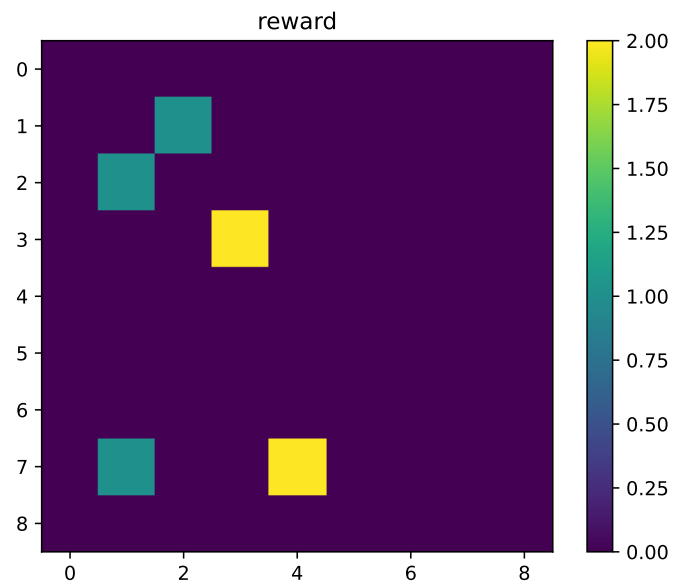**FIGURE 1** – Only the yellow positions are available in this world

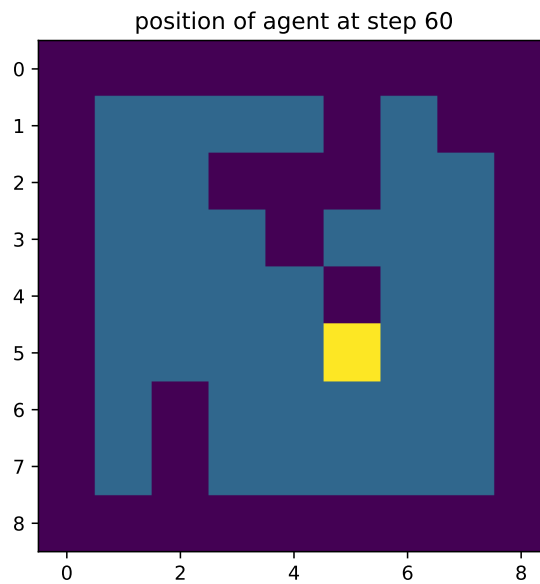**FIGURE 2** – Available reward in the world (fixed)
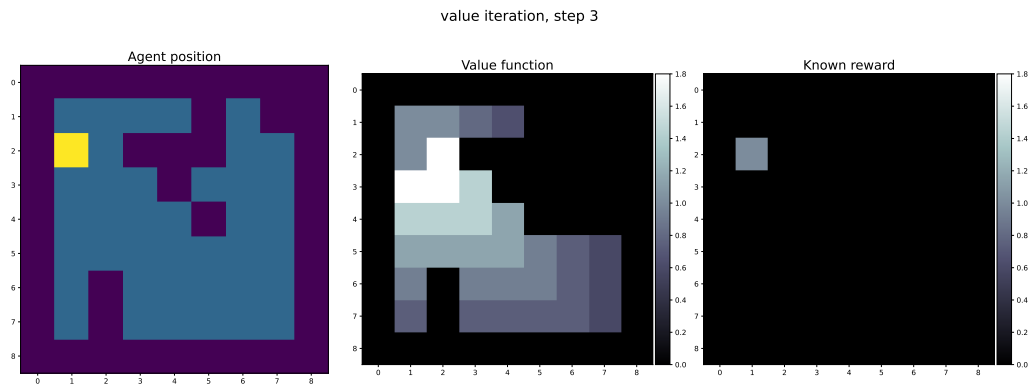

FIGURE 3 – Agent position

Figure 4 – Estimation of the value function after 3 exploration steps.
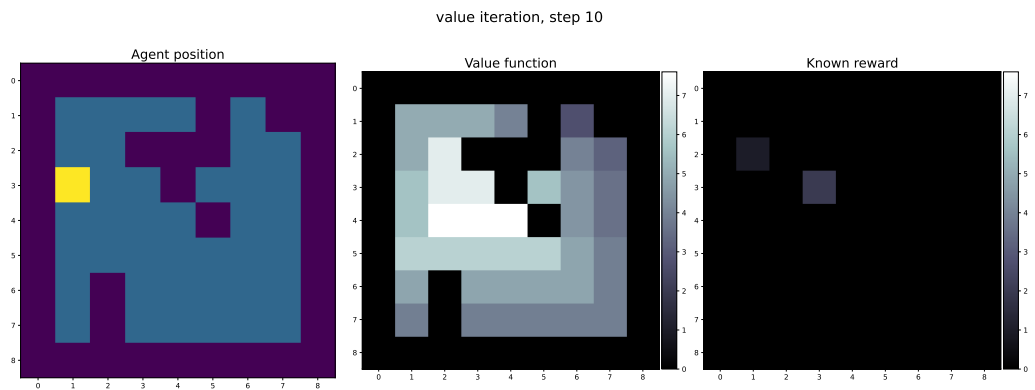

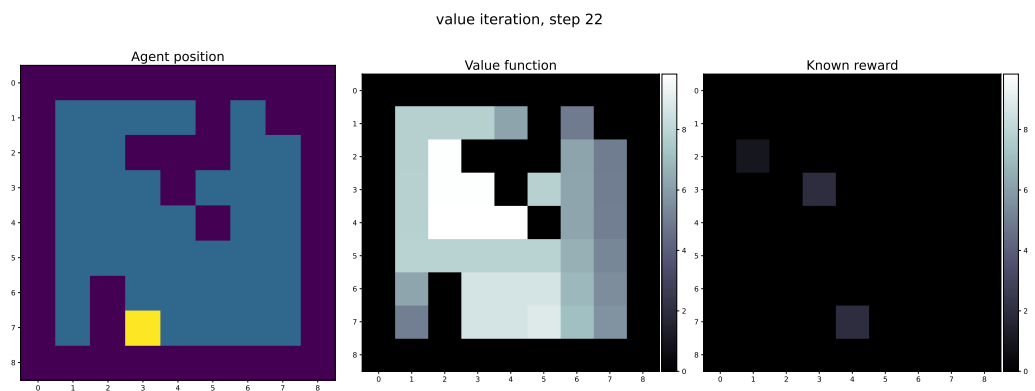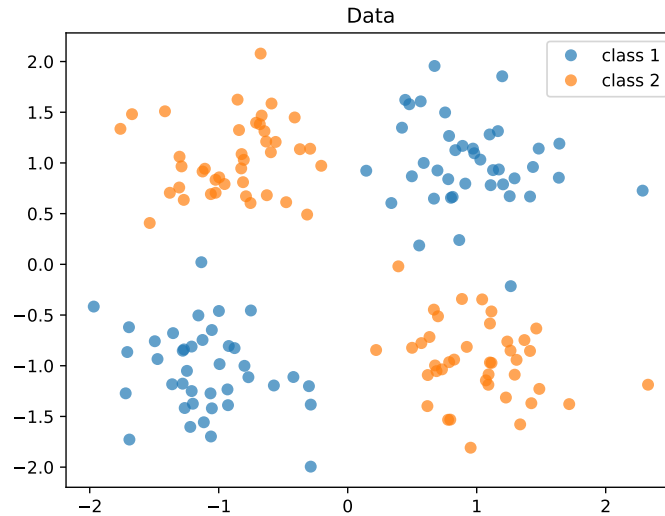**Figure 5** – Estimation of the value function after 10 exploration steps.

Figure 6 – Estimation of the value function after 22 exploration steps.

2   KERNELS FOR SUPPORT VECTOR MACHINES

We would like to classify these data with a Support vector classifier (SVC).

Data

We note that a linear separator can not work to separate these two classes. Hence, we would like to explore kernels and feature maps in order to classify them.

Explore the documentation from scikit-learn and read about the definition of the most commonly used kernels. Try to guess which kernel(s) might work or not in order to classify these data. After this stage, test your assumptions by using the library to train a Support vector classifier using different types of kernels and by monitoring the decision function values and a test error.

The data are stored in **exercice_2_svm_kernels/data/**