Lab3: Defining Environment in MATLAB

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Define Observation Vector

```
obsDim = [6, 1];                    % Define the observation dimension
obsInfo = rlNumericSpec(obsDim);    % Create the observation info
```

obsDim

- The first element, 6, specifies the number of features or dimensions in the observation.
- The second element, 1, indicates that the observation is a single data point (not a sequence of data points).

obsInfo

- The rlNumericSpec object is designed for use with RL agents in MATLAB.
- By passing obsDim as input, it specifies the dimension

```
>> obsDim = [6,1]

obsDim =

     6     1

>> obsInfo = rlNumericSpec(obsDim)

obsInfo =

  rlNumericSpec with properties:

     LowerLimit: -Inf
     UpperLimit: Inf
           Name: [0×0 string]
    Description: [0×0 string]
      Dimension: [6 1]
       DataType: "double"
```

Define Action Vector

```
actDim = [2, 1];                    % Define the action dimension
actInfo = rlNumericSpec(actDim, "LowerLimit", -1, "UpperLimit", 1);    % Create the action info
```

actDim

- The first element, 2, specifies the number of features or dimensions in the action.
- The second element, 1, indicates that the action is a single data point (not a sequence of data points).

actInfo

- The rlNumericSpec object is designed for use with RL agents in MATLAB.
- By passing actDim as input, it specifies the dimension
- The "LowerLimit" and "UpperLimit" name-value pairs specify the lower and upper limits of the action space, respectively.

```
>> actDim = [2,1]

actDim =

     2     1

>> actInfo = rlNumericSpec(actDim, "LowerLimit", -1, "UpperLimit", 1)

actInfo =

  rlNumericSpec with properties:

     LowerLimit: -1
     UpperLimit: 1
           Name: [0×0 string]
    Description: [0×0 string]
      Dimension: [2 1]
       DataType: "double"
```

Define Simulation Environment

```
env = rlSimulinkEnv("whrobot", "whrobot/controller", obsInfo, actInfo);     % Create the environment
env.ResetFcn = @randomstart;     % Set the reset function
```

env

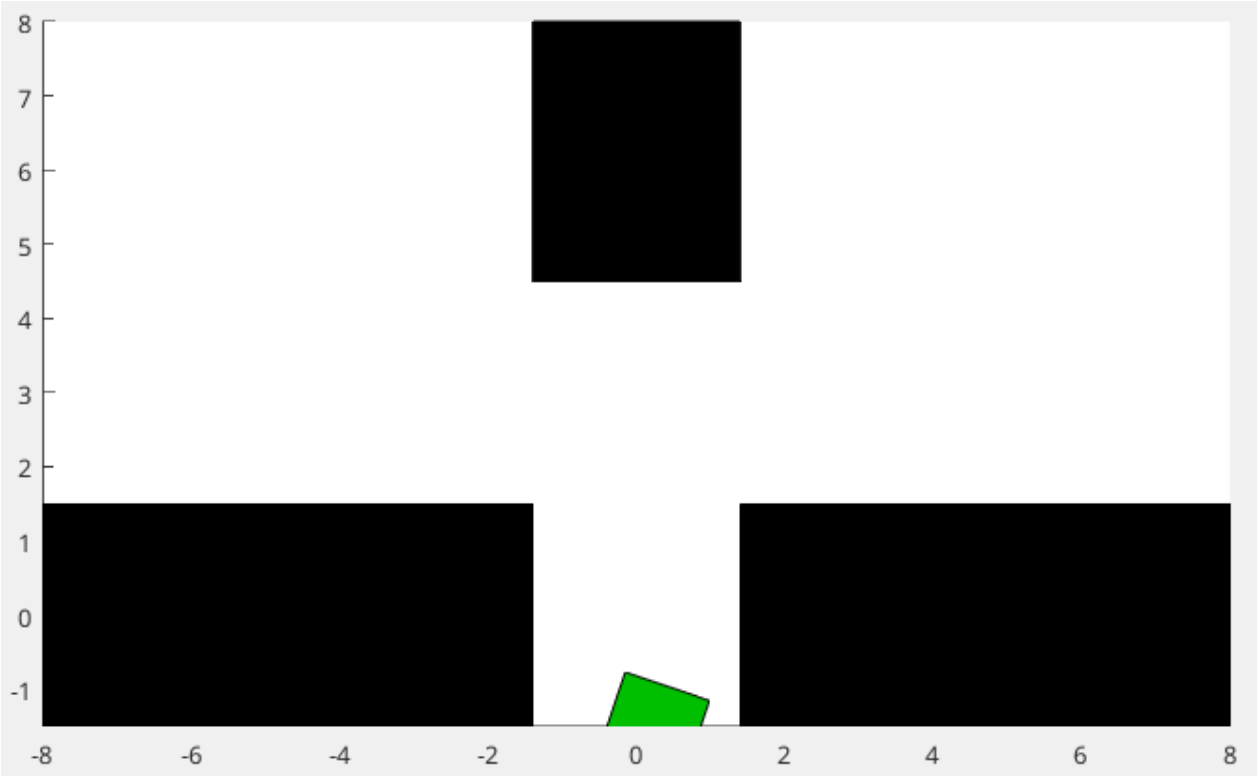
- The rlSimulinkEnv creates a simulation environment object (env) using the rlSimulinkEnv function, specifically designed for integrating Simulink models with RL agents in MATLAB.
- By passing "whrobot" and "whrobot/controller" as input, it specifies the Simulink model and the controller block within the model.
- The obsInfo and actInfo objects specify the observation and action information, respectively.
- The ResetFcn property specifies the reset function for the environment.
- The @randomstart function handle specifies the reset function.

```
>> env = rlSimulinkEnv("whrobot", "whrobot/controller", obsInfo, actInfo)

env =

SimulinkEnvWithAgent with properties:

           Model : whrobot
      AgentBlock : whrobot/controller
        ResetFcn : []
  UseFastRestart : on

>> env.ResetFcn = @randomstart

env =

SimulinkEnvWithAgent with properties:

           Model : whrobot
      AgentBlock : whrobot/controller
        ResetFcn : randomstart
  UseFastRestart : on
```

Load and Simulate the Environment

```
rng(123)              % Set random seed for reproducibility
load robotmodel agent    % Load the robot model and agent
sim(agent, env)          % Simulate the environment
```

- The rng function sets the random seed to 123 for reproducibility.
- The load function loads the robot model and agent from the robotmodel.mat file.
- The sim function simulates the environment using the loaded agent and environment.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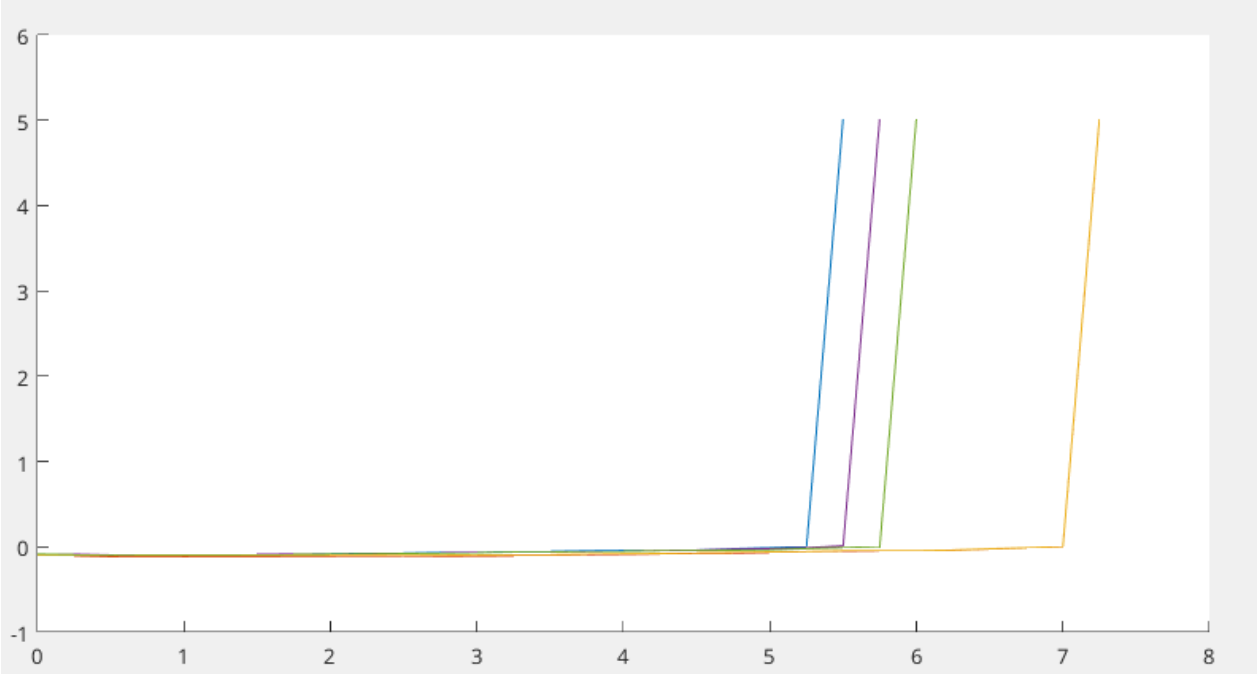
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