CS 7638 Robotics:AI Techniques - Environment Setup

Introduction

This document will walk through setting up your local development environment or a virtual machine. Setting up your environment will ensure that you have an appropriate version of python installed along with the necessary libraries used in this course. If you are totally new to Python, you can refer to https://docs.python.org/3/tutorial/index.html to understand the basics of Python. All the problem sets and projects in this course are designed to use Python 3, and we recommend Python 3.9. The autograder tool, Gradescope, uses at least version 3.9.6. If you are comfortable setting up your environment on your own, feel free to reference the yaml file for the necessary packages to install.

Download Setup files

On Canvas, click on `Files` in the left side menu, select `Environment Setup`, and download `cs7638_env_setup.pdf` (this file), `rait_env.yml`, and `test_env_setup.py`.

Environment setup

These steps will create an environment that you can use specifically for this course. This will isolate the libraries and versions used inside the `rait_env` so as to not conflict with any other installations you may have now or in the future.

1. Conda: Conda is an open source package and environment management system. We recommend using Conda since it makes it easy to install and manage different versions of libraries without messing up other environments. Install Miniconda https://docs.conda.io/en/latest/miniconda.html. Download the latest python version available. You are welcome to use Anaconda instead of Miniconda, see **this page** for more details on the differences:
2. On Windows, open the installed "Conda prompt" to run this command. On MacOS and Linux, you can just use a terminal window. Change directory (using `cd`) to the location of the directory `student_env_setup` (the directory that contains the files `rait_env.yml`, `test_env_setup.py`, `cs7638_env_setup.pdf` you may have downloaded from Canvas).
3. Create a conda environment by running the following command in the "Conda Prompt" (Windows) or Terminal (MacOS/Linux):

```
conda env create -f rait_env.yml
```

4. This should create an environment named 'rait_env'. Activate it using the following Windows command: `activate rait_env` or the following MacOS / Linux command: `conda activate rait_env`

Since you may have multiple environments installed on your computer, you will need to remember to activate this specific one (`rait_env`) any time you wish to work on code related to this course.

Check your installation

You can run the script `test_env_setup.py` to verify that you have everything installed correctly. It is a simple script that checks the following:

- installed python version
- installed necessary libraries
- unicode characters display correctly (arrows helpful for debugging later in the course)
- GUI library tkinter properly working

You can run it by: `python test_env_setup.py`

Installation Troubleshooting

- Arrows not displaying

- Windows users should first try to explicitly select a font that can display the characters by: `click icon in the top left of the command window` > `Properties` > `Font` [tab] > Select `MS Gothic` > `OK`
- Mac & Linux: it is likely the case that you do not have a font on your machine that is able to display these specific unicode characters. You can install the `symbola` font which is able to display these characters. (Mac: You can download the font **here** or find it through a google search).

Linux: `sudo apt install fonts-symbola`

Mac: **How to install a font on Mac**

Windows: **How to install a font on Windows**

- Tkinter not working correctly on Mac

  Mac: `brew install python-tk@3.9`

RAIT Virtual Machine Image

If you are not able to get python successfully installed using the steps listed above then you may choose to use the optional VM image located in Canvas->Files->Optional Class VM Image. Instructions to help you install it are included in a pdf document along with the .ova image file. Note that this image has everything you need already pre-installed. You will not need to go through the conda set up above nor activate any environment as the installation was done system wide. It is recommended that you perform the `check your installation` step above in the VM once you have it set up.

PyCharm Setup

You may choose to use any Python IDE including PyCharm, Visual Studio Code, Sublime, etc, or you may also use just a plain editor and a command line. Below are the steps to setup PyCharm and use the conda environment that we created above.

Please note that the instructions below are for high-level guidance specific to Linux for PyCharm Professional 2020.2. The exact paths or options may differ for you based on your system. You may refer to the provided PyCharm links in the steps if your operating system or PyCharm version is different.

1. Download and setup PyCharm https://www.jetbrains.com/pycharm/download.
2. Open the directory `student_env_setup` in PyCharm https://www.jetbrains.com/help/pycharm/opening-reopening-and-closing-projects.html#opening_projects.
3. Configure PyCharm to use the conda environment created above https://www.jetbrains.com/help/pycharm/conda-support-creating-conda-virtual-environment.html.

   a: Press Ctrl+Alt+S to open the project Settings/Preferences.

   b. In the Settings/Preferences dialog, select `Project <project name> | Python Interpreter`. Click the icon next to the Python Interpreter dropdown and select Add.

   c. In the left-hand pane of the Add Python Interpreter dialog, select Conda Environment.

   d. Select Existing Environment.

   e. Click Select an interpreter and specify a path to the Conda executable in your file system. To see the path of the conda environment in your system, run the command `conda info --envs` and note the path of the `rait_env`. In the Interpreter path on PyCharm, add that path to the rait_env environment, followed by `bin/python`. An example path would be `/home/user/anaconda3/envs/rait_env/bin/python`.

   f. Select the checkbox Make available to all projects

   g. Apply the changes.

4. Now, to run the file test_env_setup.py, right click on it in the Project window in the left and select Run.

Windows users may refer to `https://www.youtube.com/watch?v=1gtHso20YMQ` for installing Miniconda and PyCharm if you face issues.

MacOS users may refer to `https://www.youtube.com/watch?v=yQo1kb0_8EI` for installing Miniconda and PyCharm if you face issues.