**Installing Soft Q-Learning with Sawyer Model: Time for installation: ~ 1 hour**

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**1. Install Ubuntu 16.04.4 LTS or 18.04 LTS**

<http://releases.ubuntu.com/16.04/>. Install the 64-bit PC (AMD) Version of

Ubuntu 16.04 LTS Desktop, even if you have an Intel CPU. The complete installation has also

Been performed successfully on Ubuntu 18.04 LTS 64-bit PC (AMD64):

<http://releases.ubuntu.com/18.04/>

It is fine to install Ubuntu as a virtual machine in VMware Workstation Player 14.

30 GB of hard drive memory are recommended.

**2. Update all:**

sudo apt-get update

sudo apt-get upgrade

sudo apt-get dist-upgrade

**3. Get a Mujoco License** from <https://www.roboti.us/license.html> . Download the Computer-id file for Linux, then:

cd Downloads

chmod +x getit\_linux

./getid\_linux

**4. Install git** (sudo apt install git) and **pip** (sudo apt install python-pip) and **miniconda** (Python 3.6, 64-bit <https://conda.io/docs/user-guide/install/linux.html>). Close terminal after installing miniconda.

**5. Install Sublime**

<http://tipsonubuntu.com/2017/05/30/install-sublime-text-3-ubuntu-16-04-official-way/>

sudo apt-get update

sudo apt-get install sublime-text

**6. Start installation of Soft Q-Learning**

<https://github.com/haarnoja/softqlearning>

Choose local installation, follow instructions, starting with cloning rllab.

Choose “<installation\_path\_of\_your\_choice>” = “~/projectThesis”.

after creating conda environment: % ignore numpy update message

**Test example experiments:**

cd ~/projectThesis/rllab

export PYTHONPATH=$(pwd):${PYTHONPATH}

cd ..

cd softqlearning

source activate sql

Run swimmer example for 1 minute to test installation (edit log\_dir):

**python ./examples/mujoco\_all\_sql.py --env=swimmer --log\_dir="/home/gerrit/projectThesis/data/swimmer-experiment"**

Execute this command twice if the reinforcement learning does not start at the first time.

To visualize swimmer example (edit log\_dir):

**python ./scripts/sim\_policy.py --max-path-length 1000 --speedup 100 /home/gerrit/projectThesis/data/swimmer-experiment/params.pkl**

**7. Implemenation of Sawyer model:**

Download and save all files from *rllab/vendor/mujoco\_models*. These files are named “mesh”, “sawyer\_gripper\_mocap.xml” and “sawyer\_gripper\_mocap\_unedited.xml”.

Copy “mesh” and “sawyer\_gripper\_mocap.xml” to /home/gerrit/projectThesis/rllab/vendor/mujoco\_models

(edit path if project path is not /home/gerrit/projectThesis/)

**8. Include Sawyer environment:**

Download and save the file from *rllab/rllab/envs/mujoco.* This file is named “**sawyer\_test\_env\_new.py**”.

Copy the file to **~/gerrit/projectThesis/rllab/rllab/envs/mujoco**

Download and save all files from *softqlearning/examples.* These files are named “**mujoco\_all\_sql.py**” and “**reuse\_qf\_policy\_sawyer.py**”.

Copy both files to **~/gerrit/projectThesis/softqlearning/examples** and replace the old version of it. Just the SawyerTestEnv got added, no other changes were made.

(edit path if project path is not /home/gerrit/projectThesis/)

**9. Run Sawyer experiment:**

cd ~/projectThesis/rllab

export PYTHONPATH=$(pwd):${PYTHONPATH}

cd ..

cd softqlearning

source activate sql

**python ./examples/mujoco\_all\_sql.py --env=sawyer --log\_dir="/home/gerrit/projectThesis/data/sawyer-experiment"**

(Keep running for some iterations)

Visualize Sawyer:

**python ./scripts/sim\_policy.py --max-path-length 1000 --speedup 100 /home/gerrit/projectThesis/data/sawyer-experiment/itr\_0.pkl**

(edit path if project path is not /home/gerrit/projectThesis/)

Reuse existing policy:

**python ./examples/reuse\_qf\_policy\_sawyer.py /home/gerrit/projectThesis/data/sawyer-experiment/itr\_0.pkl**

Files get saved in the data folder of softqlearning. From there we can copy them over to our saved files and rename to keep the order of iterations. This way we can keep learning after an interruption.

To record a mp4 video:

**python ./record\_video.py**

Video saved to /home/gerrit/projectThesis/rllab/data/video/sawyer

**10. This update included:**

- Big changes in the sawyer model 🡪 Disc on peg task with a squared disc on a round peg,

- Changes in the sawyer environment 🡪 changes in the reward function (1-norm and rewarding correct orientation)

**11. The next update will include:**

- Inclusion of the SAC algorithm (<https://github.com/haarnoja/sac>) 🡪 this was difficult to install because it required changes in the environment.yml file (of SAC) before building the conda environment.

Contact Gerrit Schoettler for previews this update.