A Short Instruction for nnbarrier

Hengjun Zhao

School of Computer and Information Science
Southwest University, Chongqing, 400715, P. R. China
zhaohj2016@swu.edu.cn

1 Introduction

In our paper *Synthesizing Barrier Certificates Using Neural Networks* accepted by HSCC'20, we developed a tool named nnbarrier that can automatically learn a barrier ceritificate represented by a neural network for the safety verification of a continuous dynamical system. Here we give a short instruction to the use of nnbarrier, covering the system requirements, installation process, the structure of source codes, sample inputs, and user-defined inputs. We will emphasize what parts that were presented in the submitted paper will be covered in the instruction, for the purpose of repeatability evaluation. If there is any problem in using nnbarrier, please contact zhaohj2016@swu.edu.cn.

2 Installation

- What elements of the paper are included in the REP (e.g.: specific figures, tables, etc.).
- The system requirements for running the REP (e.g.: OS, compilers, environments, etc.).
- Instructions for installing and running the software and extracting the corresponding results.

- hscc2020 hscc20:111111
- ubuntu: 18.04.02 LTS https://ubuntu.com/download/desktop
- gcc: sudo apt update; sudo apt install build-essential; gcc –version
- python: 3.6.7 python3 –version __init__
- pip3: sudo apt install python3-pip
- git: sudo apt install git
- pytorch 1.3.1 cpu, torchvision 0.4.2 cpu: https://pytorch.org/

```
pip3 install torch==1.3.1+cpu torchvision==0.4.2+cpu -f
    https://download.pytorch.org/whl/torch_stable.html
```

- python package: numpy, matplotlib https://matplotlib.org/ https://matplotlib.org/users/installing.html
- mayavi http://docs.enthought.com/mayavi/mayavi/ http://docs.enthought.com/mayavi/mayavi/installation.html#installing-with-pip

```
if i==0:
    abc
else:
    def
```

3 Sample Input

```
import torch.nn as nn
import numpy as np
import superp
import prob
```

4 Cases in the Paper

5 Define Your Own Problem

6 Fine-Tuning

6.1 A Subsection Sample

Please [2] try [1] avoid rasterized images for line-art diagrams and schemas. Whenever possible, use vector graphics instead (see Fig. 1).

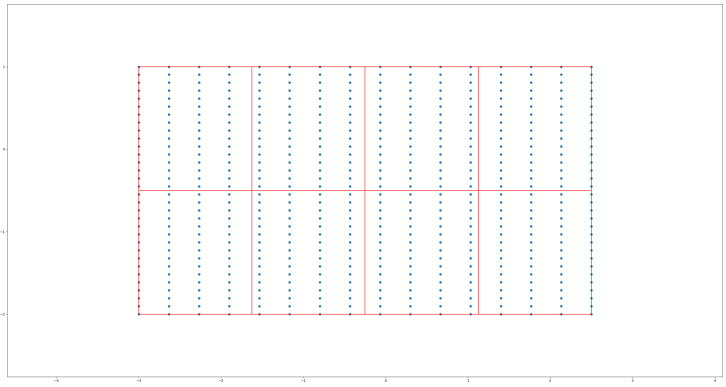

Fig. 1. A figure caption is always placed below the illustration. Please note that short captions are centered, while long ones are justified by the macro package automatically.

References

1. Barry, A., Majumdar, A., Tedrake, R.: Safety verification of reactive controllers for uav flight in cluttered environments using barrier certificates. In: 2012 IEEE International Conference on Robotics and Automation, ICRA 2012. pp. 484–490. nstitute of Electrical and Electronics Engineers Inc. (2012)
2. Prajna, S., Jadbabaie, A.: Safety verification of hybrid systems using barrier certificates. In: Proceedings of the 7th International Workshop on Hybrid Systems: Computation and Control HSCC. pp. 477–492 (2004)