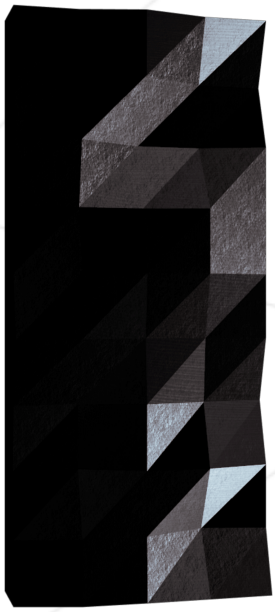

Walking Marvin

Teach little Marvin to walk!

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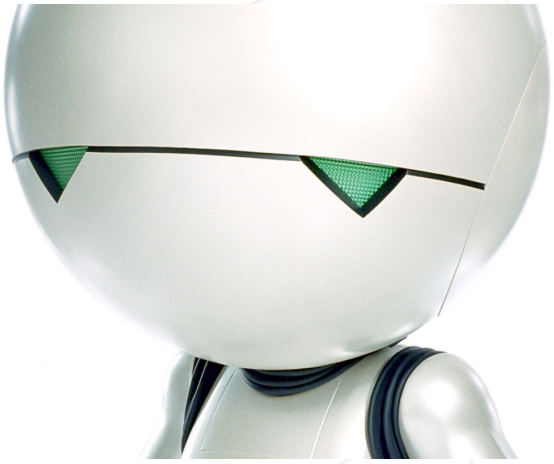
Summary:
The goal of this project is to understand neural networks and to get familiar with OpenAI Gym.

Contents

Chapter I

Foreword



In order to teach Marvin, you need to understand Marvin.

`Zaphod Beeblebrox`: Into the interior of the planet. That is where we have to go. Down into the very depths of time itself where no man has trod these five million years. We are not gonna be great. We are not gonna be amazing. We are gonna be amazingly amazing!

`Marvin`: Sounds awful.

`Zaphod Beeblebrox`: Can it, Marvin.

`Marvin`: Life. Loathe it or ignore it. You can't like it.

Chapter II

Introduction

During one of the operations Marvin lost his ability to walk! I heard you are one of the few people in the galaxy that can help him.

However, Marvin is too far from you. Fortunately, we have a device to communicate with him (don't listen to him much, he's kind of annoying). The name of this device is OpenAI Gym. OpenAI Gym is documented, you will figure how it's working by yourself. We will also provide you with some files in order to establish communication with Marvin.

Your goal is simple - Marvin needs to walk!

Chapter III

Goals

AI Gym is a very powerful environment. There you can find a lot of other robots, cars, sticks, blocks to talk to besides Marvin! We advise you to look into its documentation.

Throughout this project you will learn how to use neural networks to help Marvin get back on his feet!

As usual, you won't be using any libraries that do the goal of the project for you, like Evostra. We know you can do it by yourself.

Open AI Gym documentation

Chapter IV

General instructions

You will use Python in this project.

You must use OpenAI Gym with environment called Marvin that we provide.

Your program must train Marvin to walk.

The program must have training process and walking process.

The total reward for each episode after training must be bigger than 100.

Chapter V

Mandatory part

- You must use Python in this project.
- You must use Gym environment that we provide.
- Set up the environment:

  1. Install gym by following instructions from Open AI Gym documentation.
  2. Substitute your gym/envs folder with one attached to the project.
  3. In order to use the environment, use this lines:
     ```
     import gym
     env = gym.make('Marvin-v0')
     ```

- You have to create a program called `marvin.py`. You may have as many files as you like, but your program will be launched as follows:

```
$> python marvin.py
```

- It is the time to build your own neural network and create your learning strategy!

You can use NumPy for this project. But obviously, any library that will do the job for yourself (TensorFlow?) is forbidden.

Evolution strategy

- The program must have training and walking process.
- During training process, Marvin should learn how to walk. When Marvin gets on average more than 100 total reward points for episode, he is considered as trained. However, you may run training process longer for better score.
- During walking process, the total reward for each episode should be bigger than 100. The total reward is the sum of all rewards in the episode.
- Your program must accept several arguments:

  `--walk (-w)` Display only walking process.

  `--help (-h)` Display available commands.

  `--load (-l) file` Load weights for Marvin agent from a file.
  Skip training process if this option is specified.

  `--save (-s) file` Save weights to a file after running the program.

  If the program launches without arguments, display training process and walking process.
- Display log for each episode.

`You must submit your weights file to the repository, so you can launch your program without training process.`

Chapter VI

Bonus part

1. More arguments! `--detailed-log`, `--use-strategy1`, `--fancy-walking`, anything that comes to your mind. Of course, think about usefulness of what you do.

2. You have the fastest algorithm in the world (in terms of number of episodes).

3. Marvin can reach the end of the level.

4. Use your i m a g i n a t i o n :)

Chapter VII

Turn-in and peer-evaluation

Turn your work in using your `git` repository, as usual. Only work present on your repository will be graded in defense.