Deep Learning

Deep Reinforcement Learning Beginners Tutorial

Computer Science and Microsystems Technology
Kaiserslautern University of Applied Sciences, Zweibrücken Site

Introduction

Deep Reinforcement Learning (also called DRL) is a huge step towards the creation of an universal artificial intelligence. In 2013 a company, owned by Google, called "Deep Mind", was able to create an astonishing implementation of RL, which was capable to play retro games of the console "Atari 2600". In many cases, the Artificial Intelligence was not only able to play the games successfully, but also exceeded human performances significantly. After these impressive results, it is definitly worth to take a closer look at Reinforcement Learning.

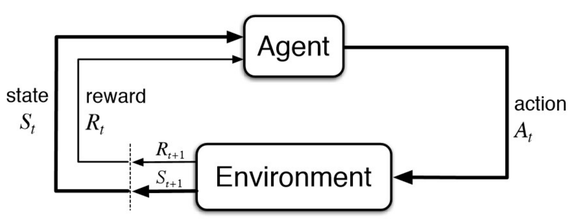

Figure 1: Concept of reinforcement learning

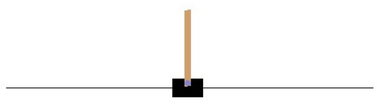

Figure 2: The cartpole game used in the notebooks

Targets of the Notebooks:

- Beginnerfriendly introduction to Reinforcement Learning and associated components
- Introduction of Q-learning in the context of RL
- Deep Learning in RL
- Introduction to the usage of games in RL
- Training visualization
- Implementation of a RL agent and its configuration and training
- Discussing further steps

Requirements:

- Basic knowledge about Python
- Basic knowledge about Artificial Intelligence
- Knowledge regarding neural networks
- Knowledge regarding deep learning

Methods and Materials

Libraries and Toolsets:

- Keras
- Numpy
- Matplotlib
- Pyvirtualdisplay
- Gym
- JSAnimation
- Ipython
- Jupyter Notebooks

Literature and Lecture Materials:

- Google Deep Mind lecture on RL https://www.youtube.com/watch?v=2pWv7GOvuf0
- Massachusetts Institute of Technology (MIT) online course materials http://introtodeeplearning.com
- Deep Q Learning Networks lecture by LiveLessons https://www.youtube.com/watch?v=OYhFoMySoVs
- The references to all sources in detail can be found in the notebooks

Results

Artifacts	Content
Deep Reinforcement Learning Beginners Tutorial (1) - Theory	· Theory behind the concept of Reinforcement Learning · Deep Learning Aspect · Q-Learning including the formulas required · Outlook
Deep Reinforcement Learning Beginners Tutorial (2) - Practice	· Implementation of a RL agent · Introduction to OpenAi Gym framework · Exercises · Outlook
Installation-guide	· Usage of Google Cloud · Deep Learning VM · Installing Software required for the Project · Usage of Jupyter Notebooks

Table 1: Artifacts

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Feel free to contact us for friendly exchange of experience, advice or course materials.