
A More Robust Way of Teaching Reinforcement Learning and Decision Making

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Abstract

We propose a new way of teaching reinforcement learning and decision making that is designed be an improvement to traditional academic teaching. We use a three step approach to deliver the most complete learning experience in a way that engages the student and allows them to grasp the concepts regardless of their skill level. We present a specific way of teaching the content, a new and fully configured coding platform, a set of hands-on exercises and a group of recommended next steps for deeper learning.

Keywords: teaching tutorials jupyter intuition hands-on

Repository: <https://www.github.com/mimoralea/applied-reinforcement-learning>

Short Presentation: <https://youtu.be/ltjS5ktziLQ>

Long Presentation: https://youtu.be/1WjNj_JmFaE

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1 Introduction

Reinforcement Learning and Decision Making is a complex subject. Being the focus of research of a variety of fields including artificial intelligence, psychology, machine learning, operations research, control theory, animal and human neuroscience, economics, and ethology, it is expected that the vast amount of available information could become counterproductive. Beginners often find themselves lost while trying to grasp the key concepts that are truly vital for understanding. Additionally, reinforcement learning and decision making, being a relatively new field, is often taught by world-class researchers that frequently unintentionally omit explaining core concepts that might seem too basic, but are as well fundamental. This creates a gap of knowledge that, if left unfilled, causes trouble for learning the more advanced topics. This present a challenge for sparking interest and keeping students engaged throughout their learning experience. If the content is not delivered correctly, the students can quickly feel confused, lost and disengaged, and when that happens learning stops.

2 Sparking Curiosity

Fortunately, as reinforcement learning and decision making is studied by fields like animal and human neuroscience, ethology, and psychology, often the concepts can be taught on an intuitive level. The notion of learning by interacting with the environment should be easy to understand to all of us as this is one of the ways we learn.

2.1 Using Simple And Direct Language

2.2 Keeping A Single Narrative

2.3 Showing Concepts And Their Complement

3 Removing Friction

Once the student's intuition is engaged and curiosity has been sparked, a convenient way to interact with the concepts should be presented. The friction of getting hands-on experience is one of the most difficult barriers to break, but once this is past, the student can better understand the concepts.

3.1 Setting Up A Convenient Environment

3.2 Providing With Boilerplate Code

3.3 Asking For Minimal Effort

4 Showing Options

Lastly, connecting to intuition and getting hands-on experience will be futile unless the students have a new interest of exploring the field by themselves. Therefore, showing the path for further learning is a final and very important step.

4.1 Assigning Relevant Readings

4.2 Watching Academic Lectures

4.3 Completing Homework and Projects

This document is an example of the `thebibliography` environment using in bibliography management. Three items are cited: *The L^AT_EX Companion* book [1], the Einstein journal paper [2], and the Donald Knuth's website [3]. The L^AT_EX related items are [1, 3].

References

- [1] Michel Goossens, Frank Mittelbach, and Alexander Samarin. *The L^AT_EX Companion*. Addison-Wesley, Reading, Massachusetts, 1993.
- [2] Albert Einstein. *Zur Elektrodynamik bewegter Körper*. (German) [*On the electrodynamics of moving bodies*]. *Annalen der Physik*, 322(10):891921, 1905.

- [3] Knuth: Computers and Typesetting,
<http://www-cs-faculty.stanford.edu/~uno/abcde.html>