Imperial College London

IMPERIAL COLLEGE LONDON

DEPARTMENT OF COMPUTING

Data Efficient Deep Reinforcement Learning using Inductive Logic Programming

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Abstract

Your abstract.

Acknowledgments

Comment this out if not needed.

Contents

Chapter 1

Introduction

Problem setting
Two most studied approach for using previous learning exprience is meta-learning and transfer learning
Artificial General Intelligence
Definision of AGI

Chapter 2

Background

The history of data-efficient learning What other people have done in this.
The advance of statistical machine learning methods, especially deeep reinforcement learning
AlphaGo, and AlphaGo Zero
Also business success.
History of Relational Reinforcement Learning
Baysian Optimisation
RNN approach
Symbolic Deep reinforcement learning
Some implementation: German paper

Chapter 3

Motivation

Why symbolic reinforcement learning is good attempt

Reason 1: Complehensive by humans -¿ Explanable rather than black-box Reason 2: Similar to the human, it uses reasoning

Use of previous experience (background knowledge)

Not much explored yet.

However there is a room for exploration on this field.

TODO Explain how reinforcement learning works

Reason 3: Recent advance of ILASP is promising

Because of the recent advancement of logic-based learning and deep reinforcement learning, combination of both approach would be a next explonation toward artificial general intelligence.

3.1 Objectives

combining the two novel approaches to overcome the problems of the QND

3.2 Project outline

The probject outline

Implement baseline performance (DQN)

Pipeline Implement the CNN side that is able to extract features of the game and convert into ASP syntax.

Apply ILASP to the ASP, which involves development of the pipeline of ILASP in Python

Finally use Q-learning that allow

which measurement would you use? (grid word, something else? GVGAL games)

Summarise different types of knowledge representations (Objects ?? relationship?)

Common sense

Implement based on Ïowards Deep Symbolic Reinforcement Learning

3.3   Contribution

Chapter 4

Background

ASP
What is ILP?
ILASP
ILASP task containing a contex-dependent example
TODO Explain how symbolic learning works
TODO What would you learn in my context? Relashinship of the objects? Objects, types, locations and interactions.

4.1   Reinforcement Learning

4.2   Symbolic reinforcement Learning

Explain the paper

4.3   GVGAI framework

4.4   Legal and Ethical Issues

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