ANR ExTra-Learn

Extraction and Transfer of Knowledge in Reinforcement Learning

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Reinforcement Learning

Environment

Critic

Agent

action

observation

reward
Reinforcement Learning

Learning of a behavior strategy (a policy) which maximizes the long term sum of rewards (delayed reward) by a direct interaction (trial-and-error) with an unknown and uncertain environment.
Reinforcement Learning
Transfer of knowledge across tasks to improve the performance of the learning process
Objectives

**Objective 1**
Reduce sample complexity

**Objective 2**
Improve accuracy

**Objective 3**
Solve problems with complex structure

Tasks

ExTra-Learn

Objective 1
Reduce sample complexity

Task 1
Transfer of Exploration-Exploitation Strategies

Objective 2
Improve accuracy

Task 2
Transfer Solutions for Approximated RL

Objective 3
Solve problems with complex structure

Task 3
Hierarchical Transfer RL
Expected Results

Objective 1
Reduce sample complexity
Task 1
Transfer of Exploration-Exploitation Strategies
Algorithms with provable smaller regret

Objective 2
Improve accuracy
Task 2
Transfer Solutions for Approximated RL
Algorithms with provable smaller prediction error

Objective 3
Solve problems with complex structure
Task 3
Hierarchical Transfer RL
Models and algorithms for automatic hierarchical decomposition
Expected Impact

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Objective 1

Reduce sample complexity

Task 1
Transfer of Exploration-Exploitation Strategies

Algorithms with provable smaller regret

Objective 2

Improve accuracy

Task 2
Transfer Solutions for Approximated RL

Algorithms with provable smaller prediction error

Objective 3

Solve problems with complex structure

Task 3
Hierarchical Transfer RL

Models and algorithms for automatic hierarchical decomposition

Novel learning algorithms with potential application to

recommendation systems, games, education

online trading, autonomous robotics, online advertising, energy management...
ExTra-Learn

https://project.inria.fr/ExTra-Learn/
(under construction)