

Titolo

Marco Favorito

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# Chapter 1

## Introduction

## Chapter 2

# Preliminaries

In this chapter we describe the background knowledge required for this work. We introduce Markov Decision Process (MDP) and Non-Markovian Reward Decision Process (NMRDP), common formalisms in the context of Reinforcement Learning. We describe Linear Temporal Logic over finite traces ( $LTL_f$ ) and Linear Dynamic Logic over finite traces ( $LDL_f$ ), that we use for define temporal goal in a RL setting. Then, we describe an important result about RL for NMRDP with  $LTL_f/ LDL_f$  rewards, that is the basis for this work.

### 2.1 Reinforcement Learning

#### 2.1.1 MDP

#### 2.1.2 NMRDP

### 2.2 $LTL_f$ and $LDL_f$

#### 2.2.1 Linear Temporal Logic for finite traces: $LTL_f$

#### 2.2.2 Linear Dynamic Logic for finite traces: $LDL_f$

#### 2.2.3 $LTL_f$ and $LDL_f$ translation to automata

### 2.3 RL for NMRDP with $LTL_f/ LDL_f$ rewards

## Chapter 3

# RL for $\text{LTL}_f/\text{LDL}_f$ Goals

## Chapter 4

# Automata-based Reward shaping

## Chapter 5

# Experiments

## Chapter 6

# Conclusions



## Appendix A

# FLLOAT

## Appendix B

### RLTG

# Bibliography

- [1] Ronen I. Brafman, Giuseppe De Giacomo, and Fabio Patrizi. Specifying non-markovian rewards in mdps using ldl on finite traces (preliminary version). *CoRR*, abs/1706.08100, 2017.