# Notes on Proximal Policy Optimization Algorithms

Notes on discussion and derivations from Sutton’s book and John Schulman’s articles

D. Gueorguiev 12/13/23

## A bit of theory on Policy Gradient Reinforcement Learning Methods

Assumptions:

The environment can be represented by a finite MDP

This is equivalent of saying that its state , action and reward sets are finite, and its dynamics is given by a set of probabilities , for all and ( is plus a terminal state if the problem is episodic).

We would like to compute value functions to organize and search for good policies.

The optimal value functions satisfying the Bellman’s optimality equations were derived and discussed in (Gueorguiev, 2023) (see Eq. (22) and (23)).

(1)

(2)

## Policy evaluation (Prediction)

**Definition**: *policy evaluation* - computation of the state-value function for a given policy . This is also known as the *prediction problem*.

Question: How to compute the state-value function for an arbitrary policy .

From (11) and (12) in (Gueorguiev, 2023) we can write:

where is the probability of taking action in state under policy ,

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