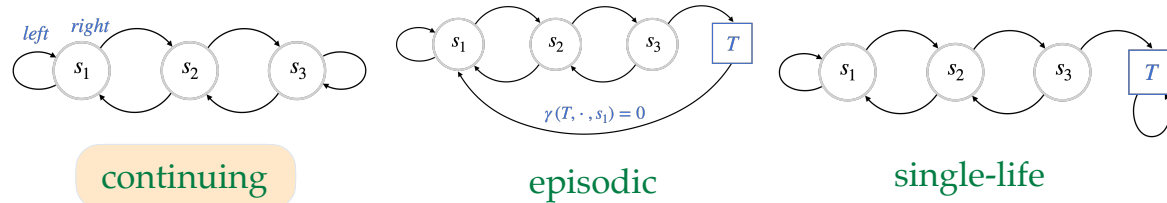


Problem Setting



Distinctions With Similar-Sounding Terms

Continual / never-ending / lifelong learning

continual need to adapt to a non-stationary world

Continuous problems

continuous state and/or action spaces

A continuing problem can be continual in nature and have continuous state/action spaces

The Continuing Setting Is Understudied

Popular domains are episodic, or have continuing problems made episodic via timeouts

OpenAI Gym, MuJoCo, bsuite, ALE, etc.

no continuing problems



Continuing Problems Are Important for AI

episodic

continuing

single-life

simpler

harder

Select References:

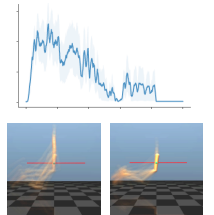
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Two Formulations for the Continuing Setting

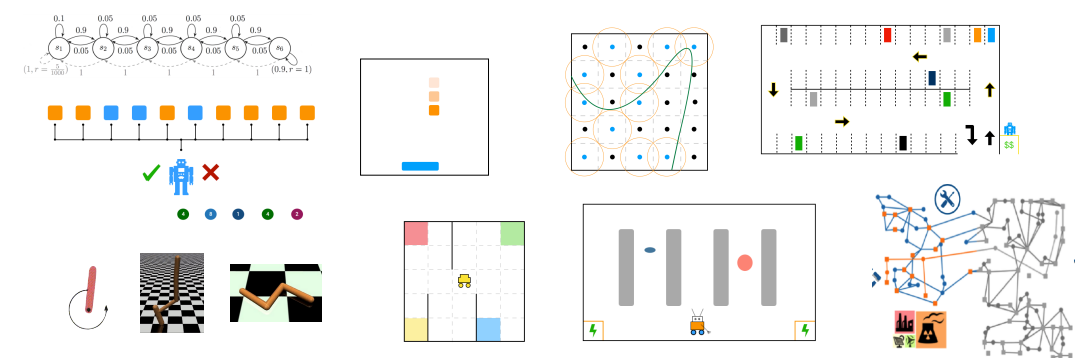
	Discounted	Average reward
Studied well in	DP and RL literature	Primarily DP literature
Common solution methods	SARSA, Q-learning	RVI Q-learning, Differential Q-learning
Extent of theoretical results	Linear FA (prediction and control)	Linear FA (only prediction)
Extent of empirical experience	Non-linear FA (in episodic problems)	Mostly tabular

Discounted Methods and Episodic Ideas Are Not Directly Applicable in Continuing Problems

- Platanios et al. (2020, Case Study #1) found common solution methods like DQN and PPO failed in the Jelly Bean World, a continuing domain.
- Machado et al.'s (2020) results showed resets might be sweeping challenges of exploration under the rug.
- Pardo et al. (2018) highlighted issues with artificial time limits.
- Sutton and Barto (2018, Ch 10) and Naik et al. (2019) claimed that discounting is incompatible in continuing problems with control and function approximation.



C-suite



Domains from existing literature

New domains inspired from the real world

Check out the paper

