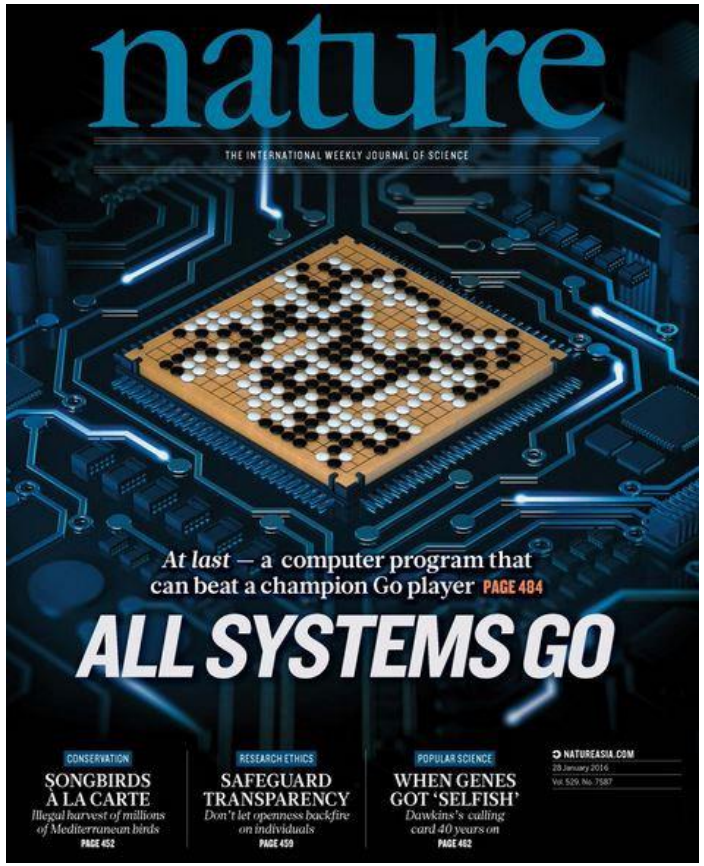
Bayesian Reinforcement Learning

Aman Taxali, Yung-Chun Lee

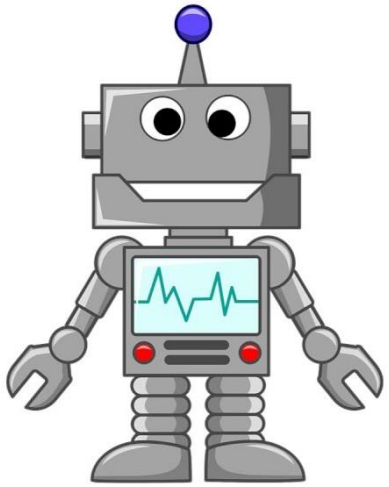
Motivation

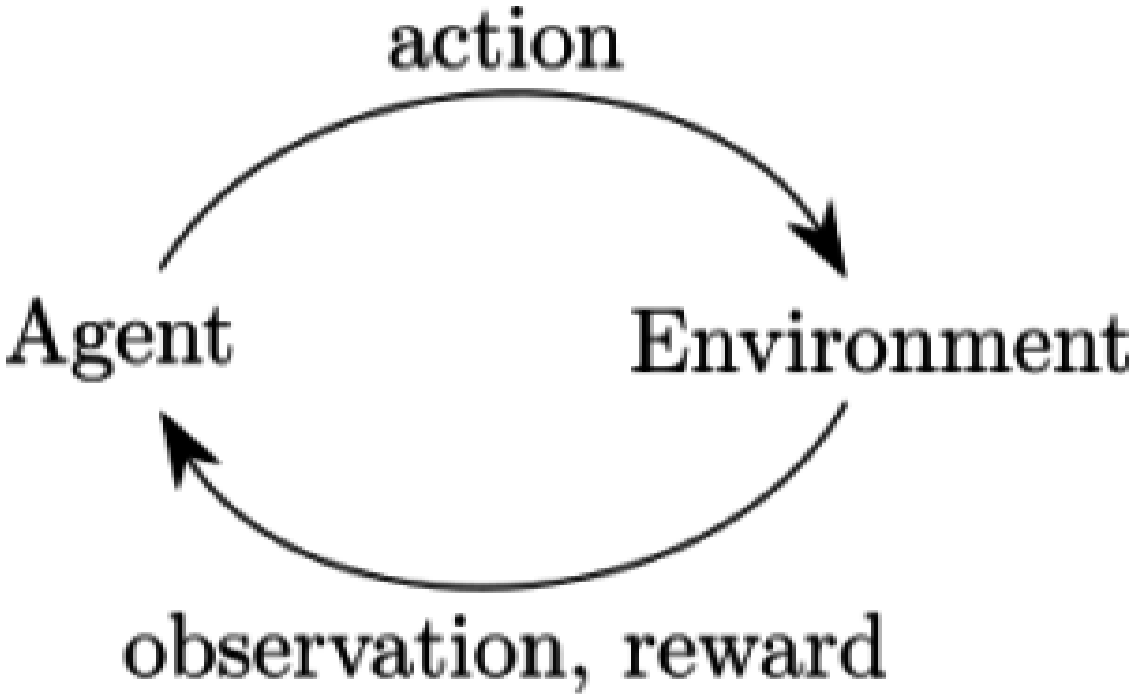
2013

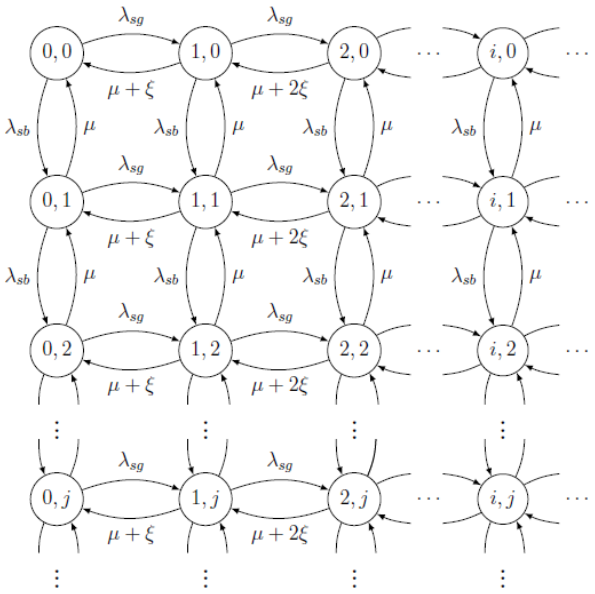
2016



DeepMind's Problem



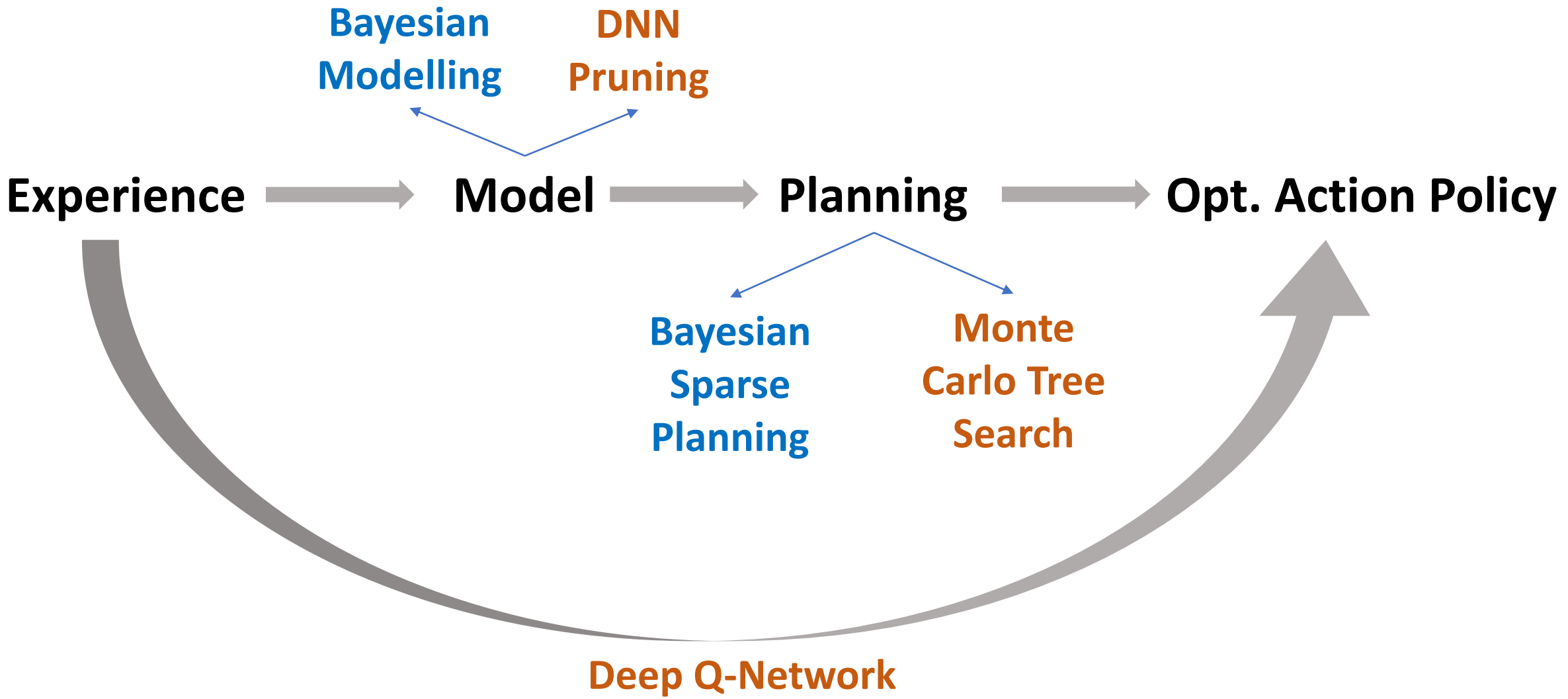




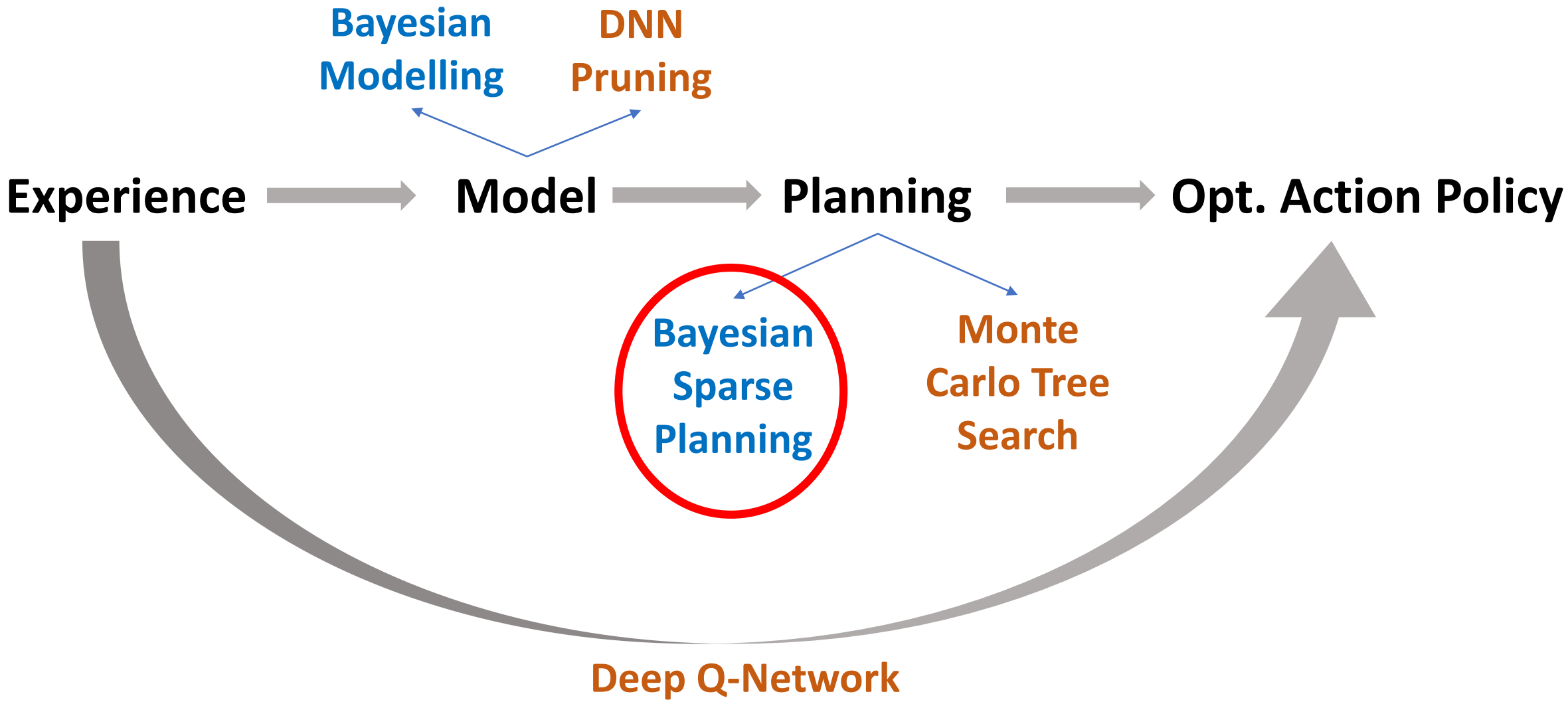
Reinforcement Learning

Exploration versus Exploitation

Reinforcement Learning Models

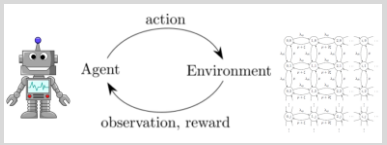


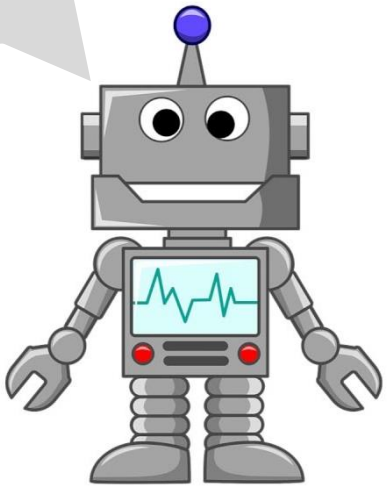
Reinforcement Learning Models

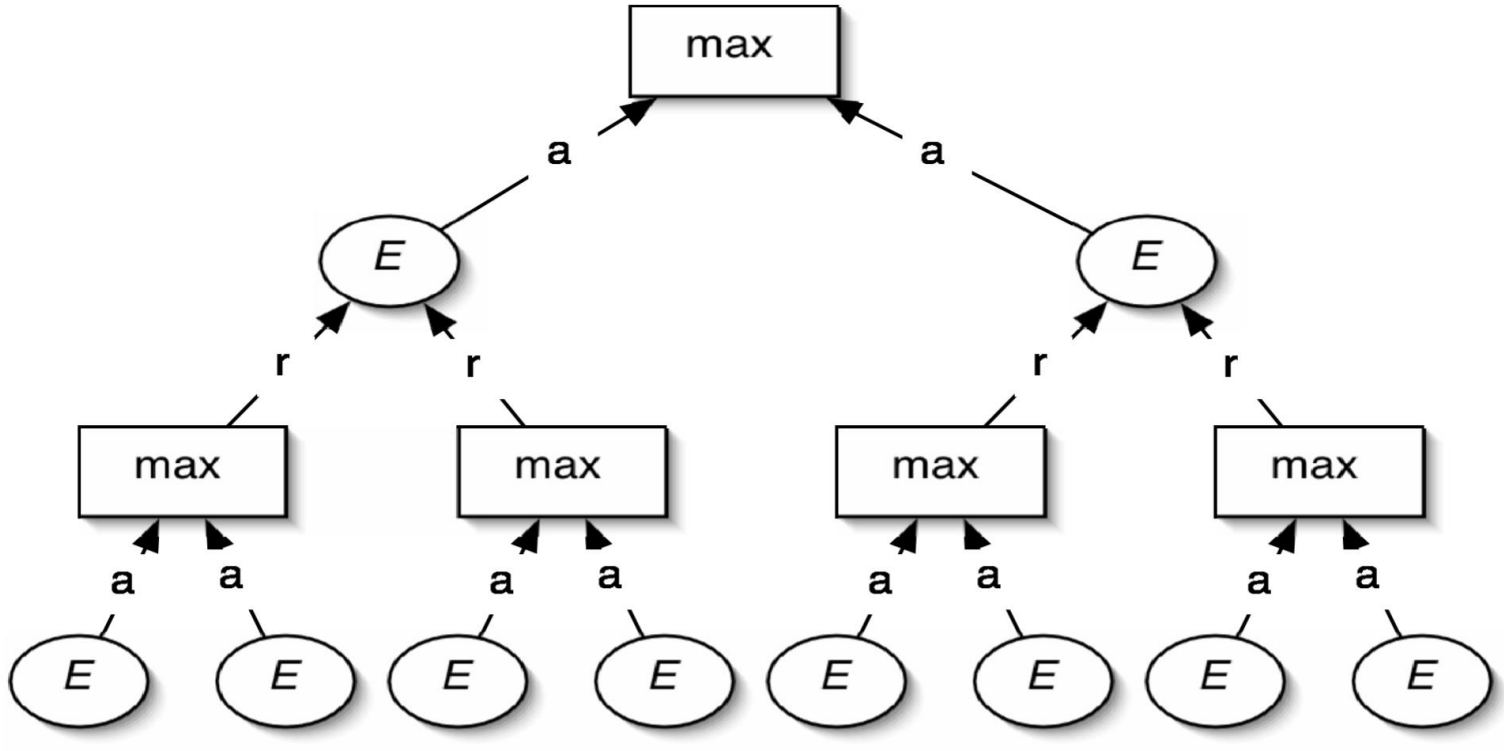


Bayesian Sparse Planning

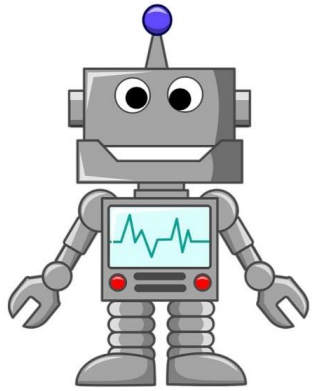
Belief World

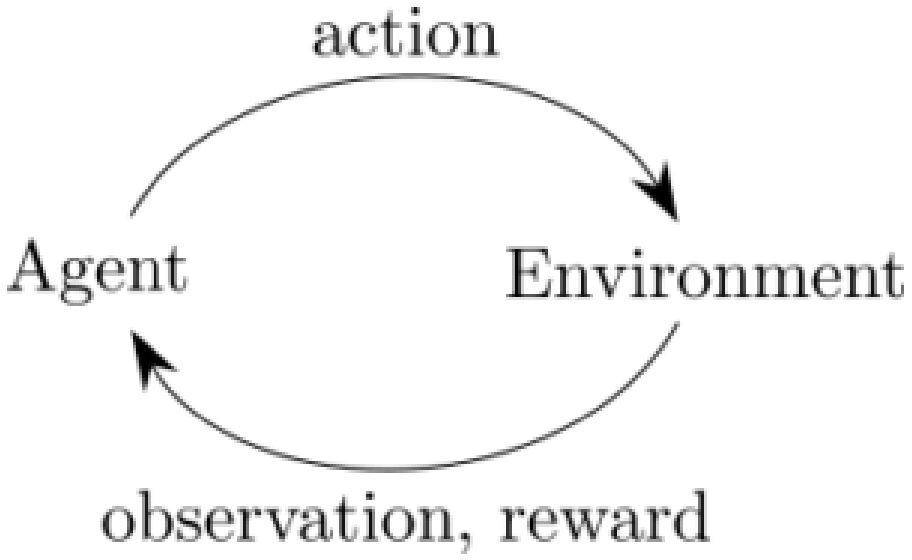


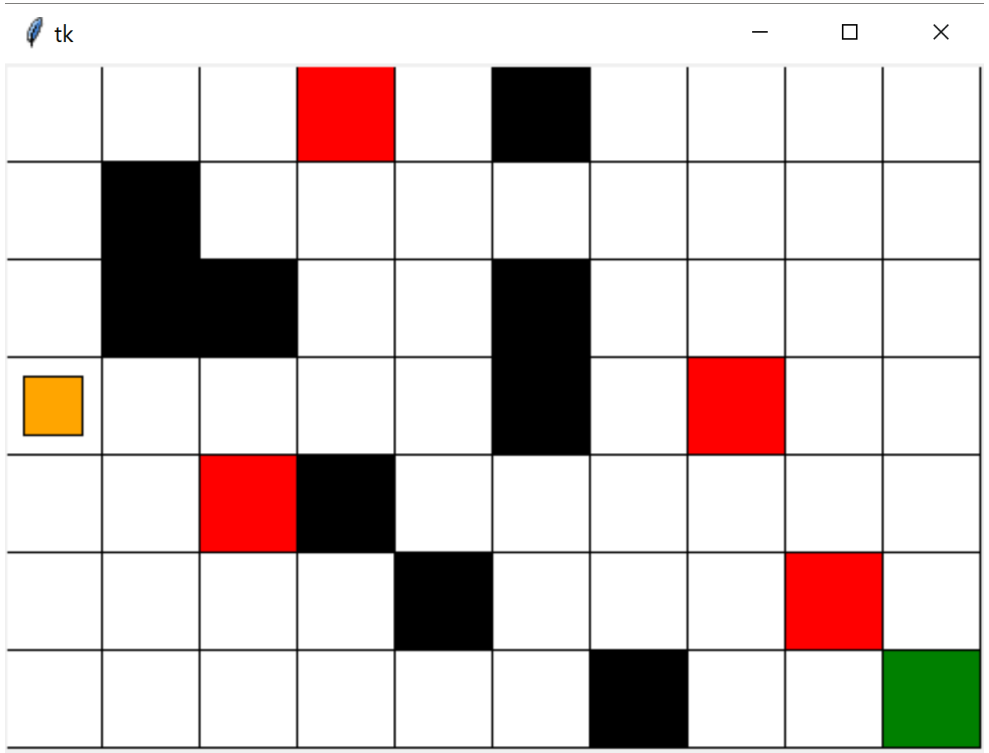




MDP Environment

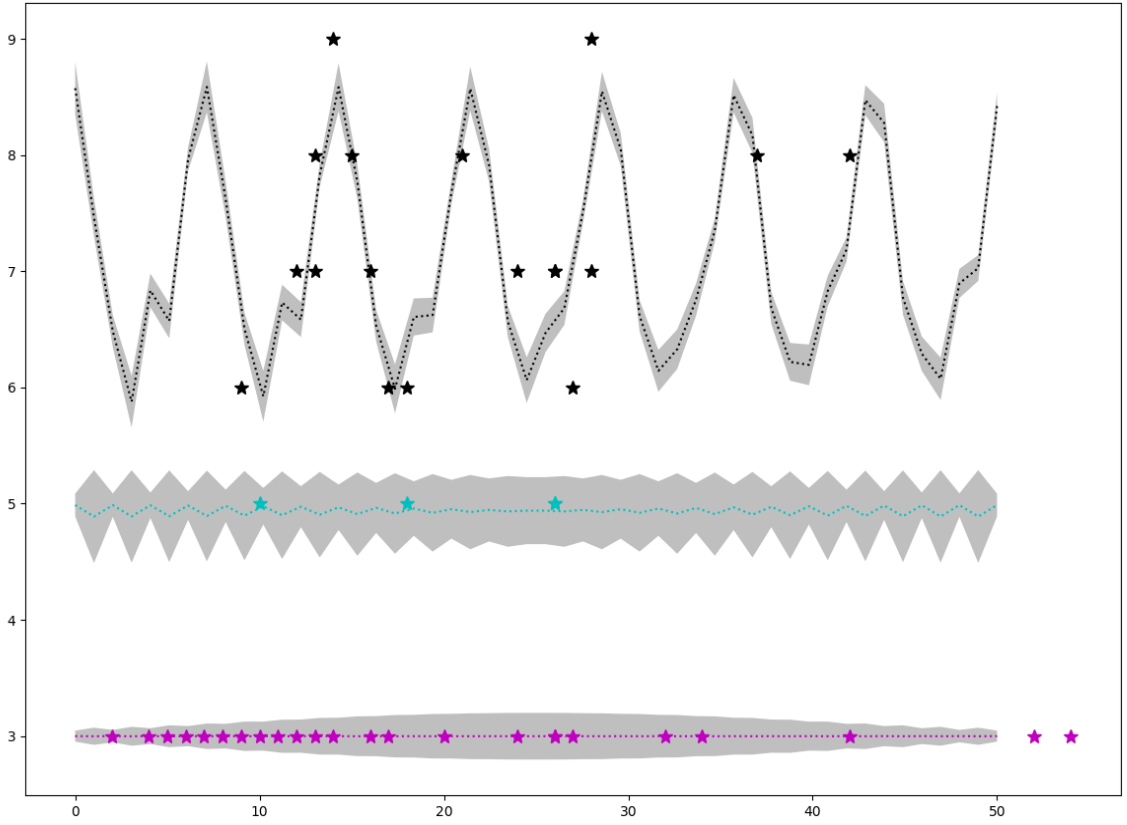




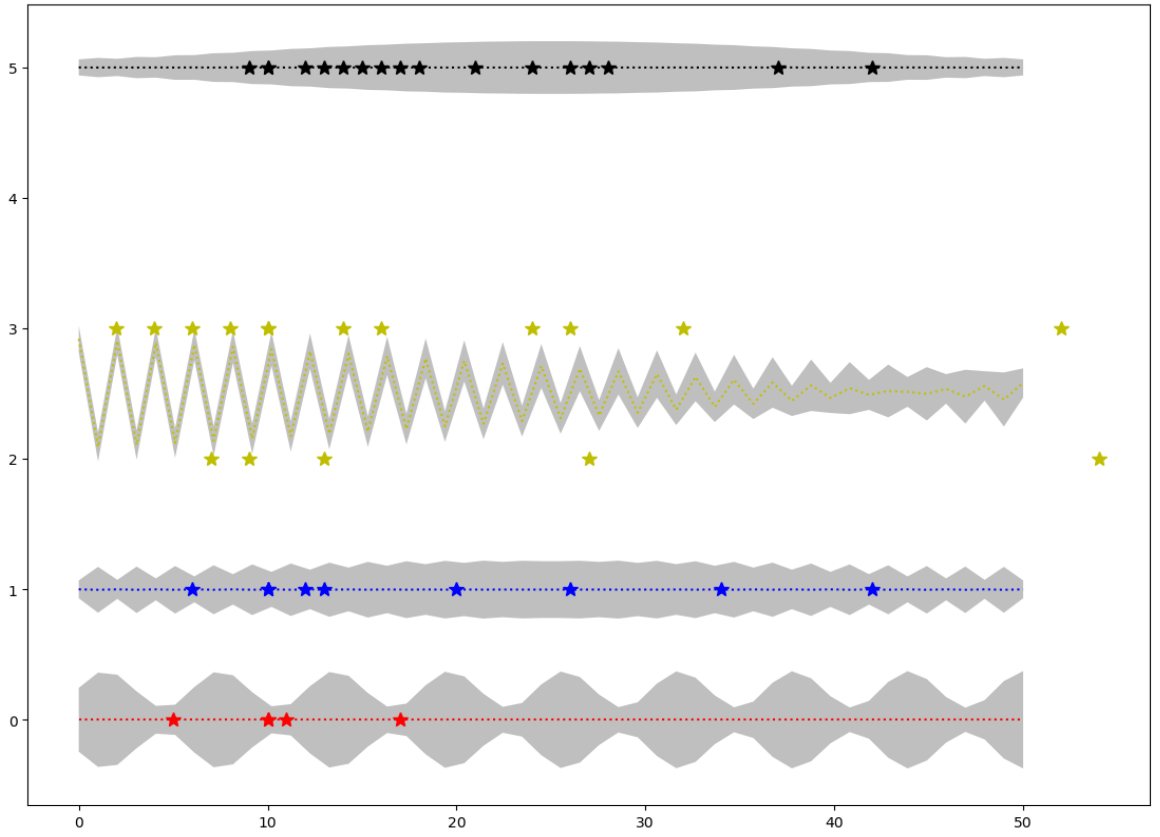


Gaussian Process' for Cat Tracking

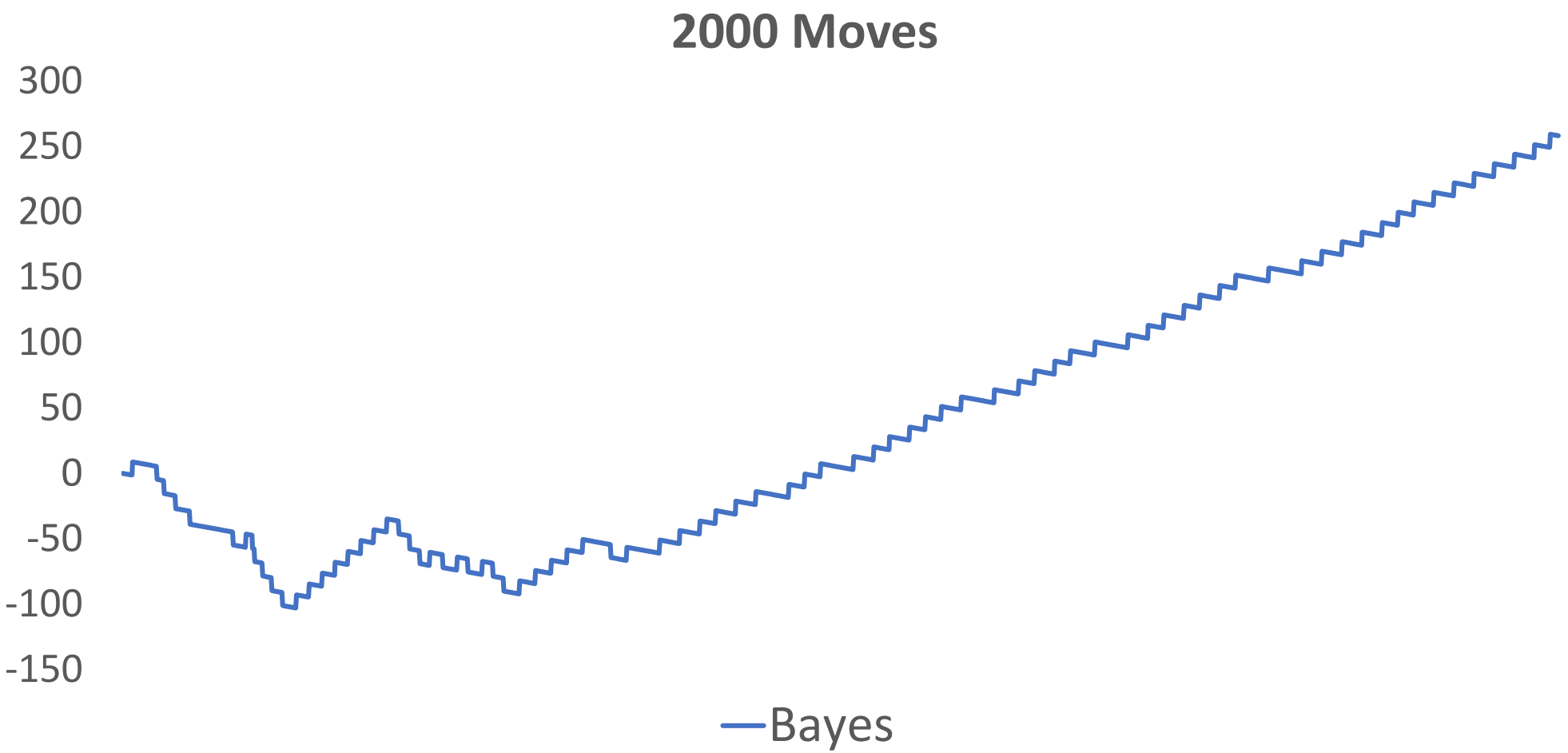
Observed Cat X-coordinates



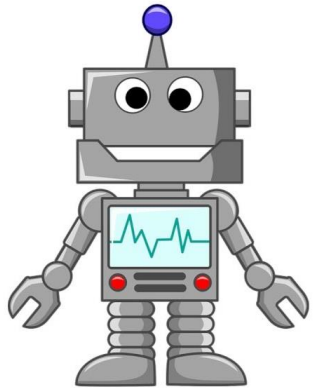
Observed Cat Y-coordinates

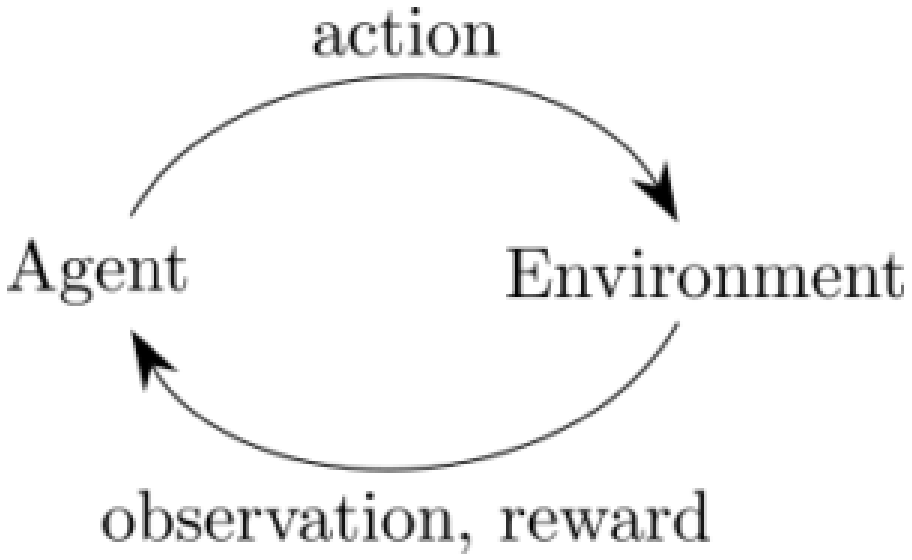


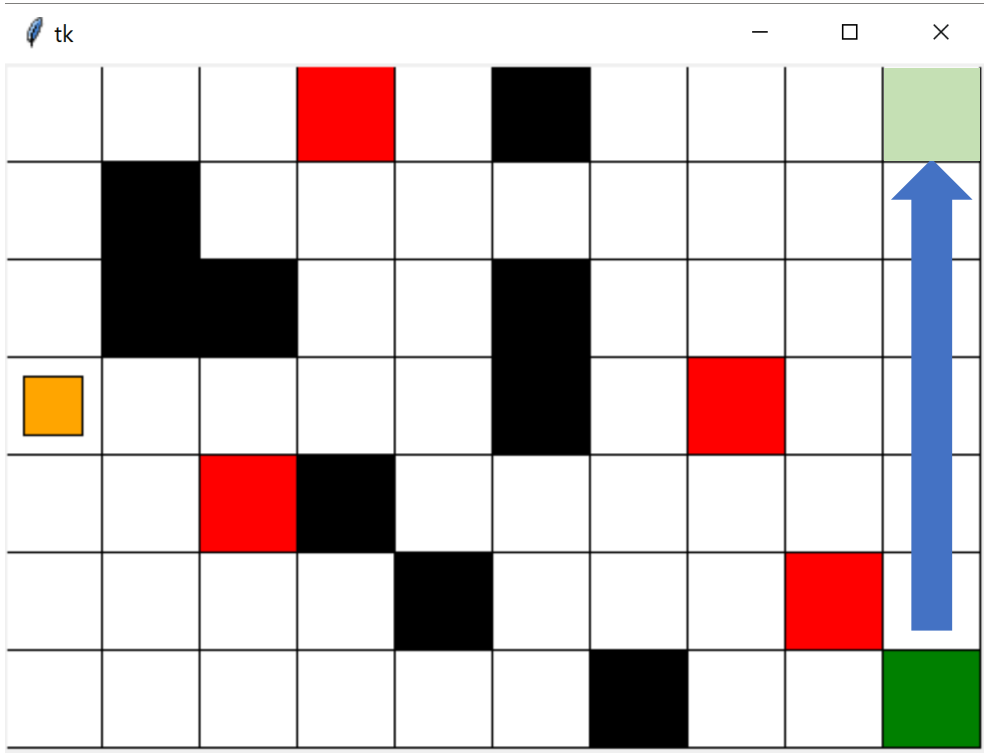
Training Performance



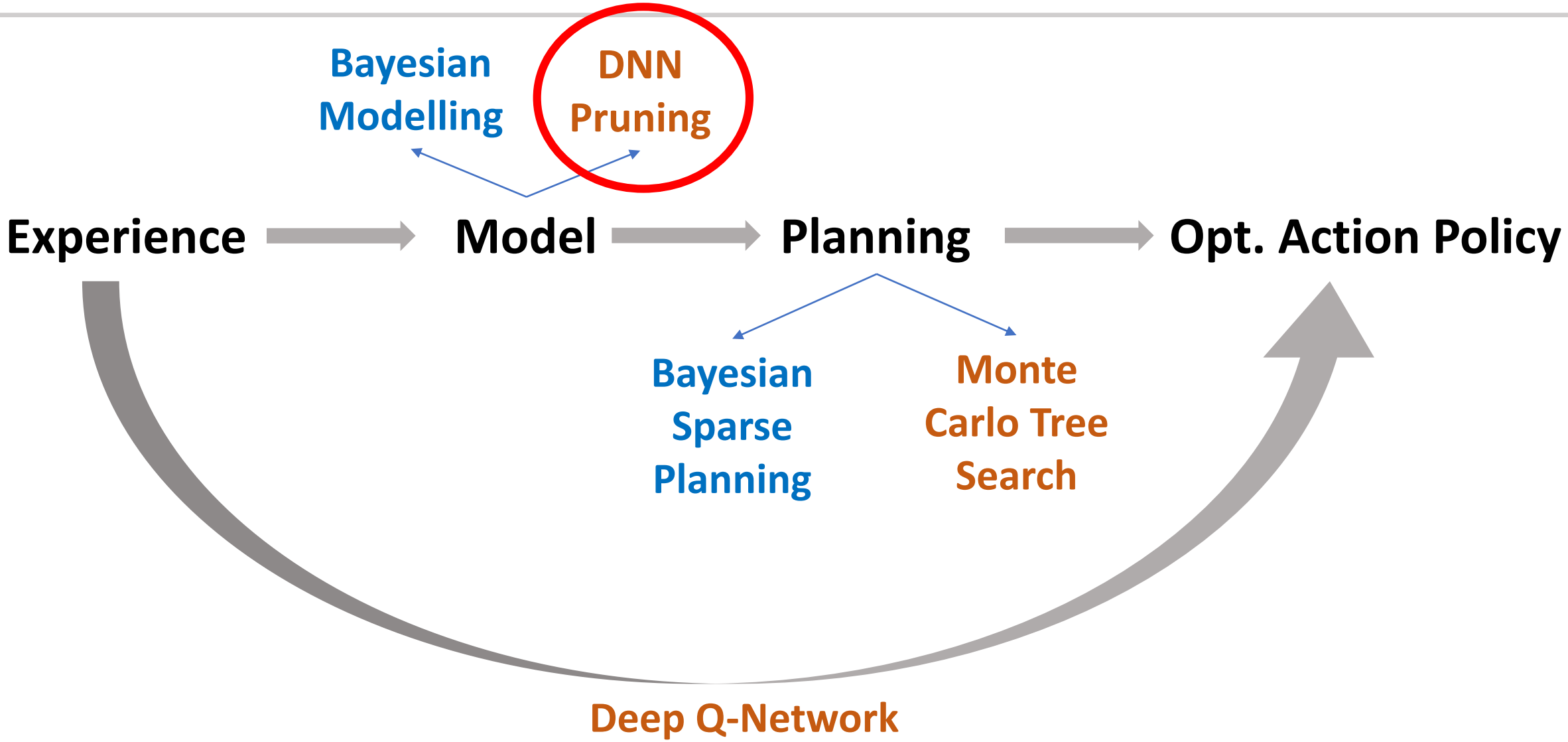
Test MDP Environment



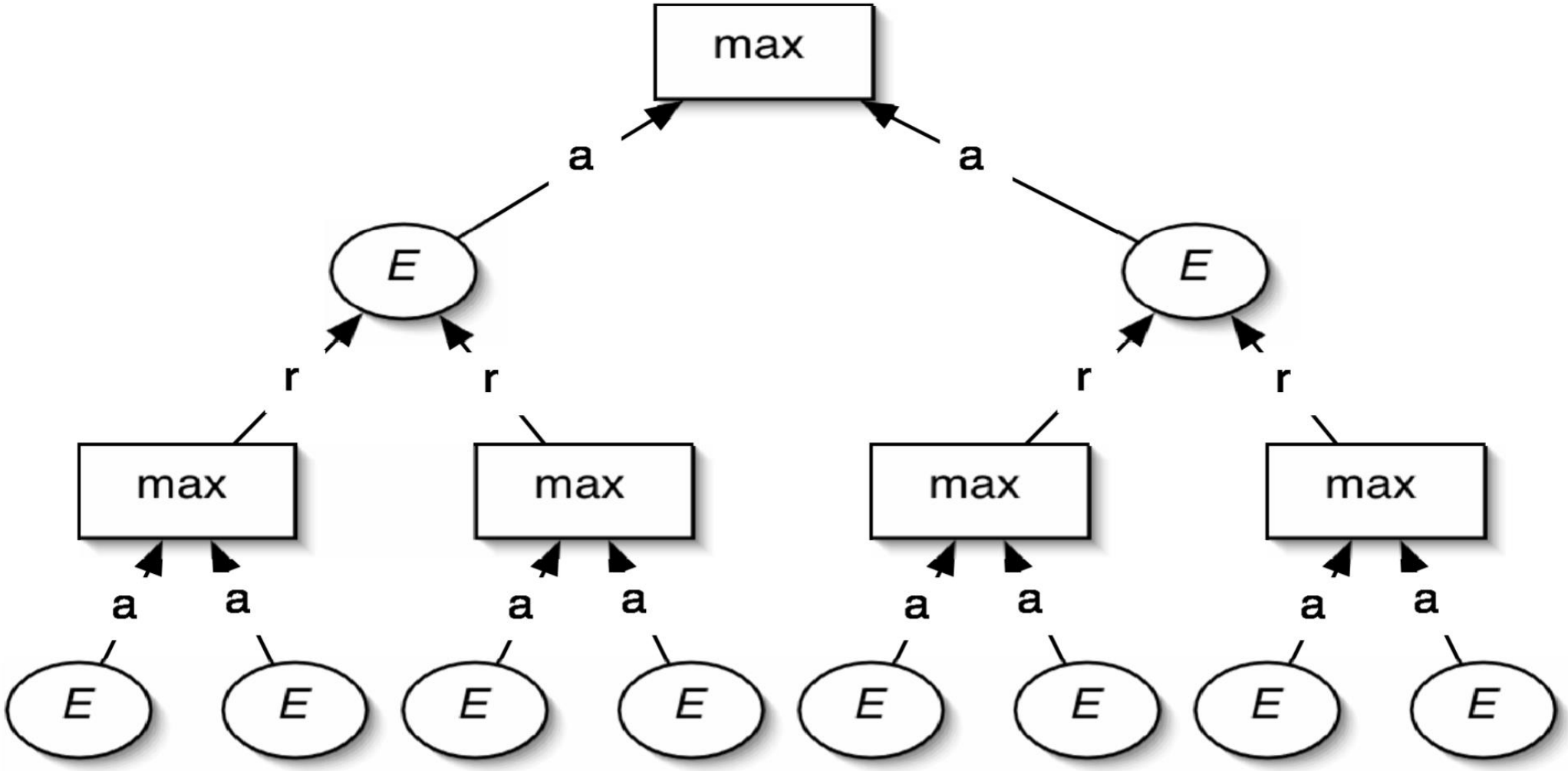




Reinforcement Learning Models



Pruning - Bayesian Planning



Pruning - Bayesian Planning

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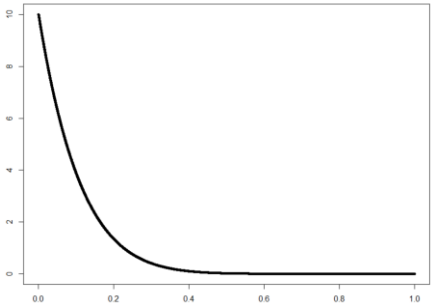
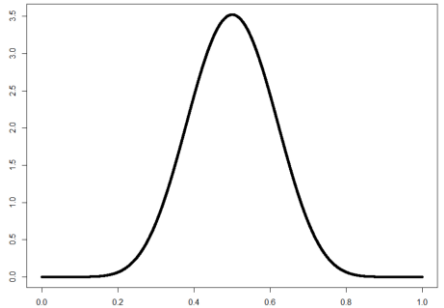
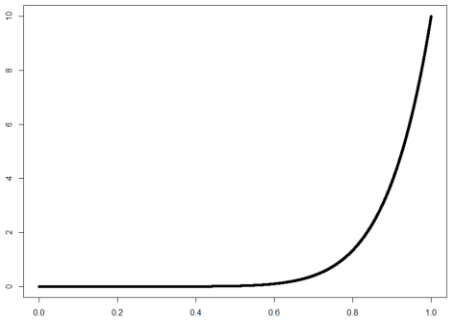
Training time





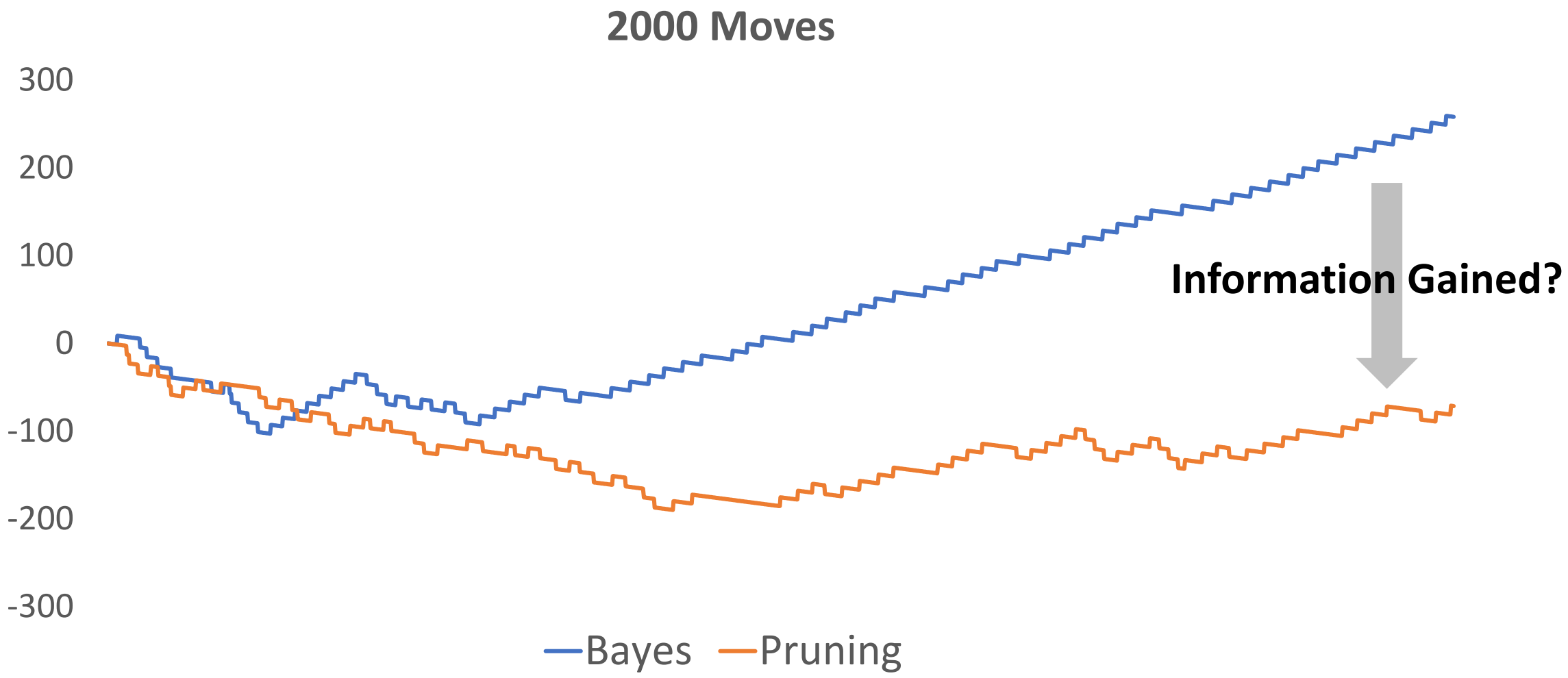


Explore

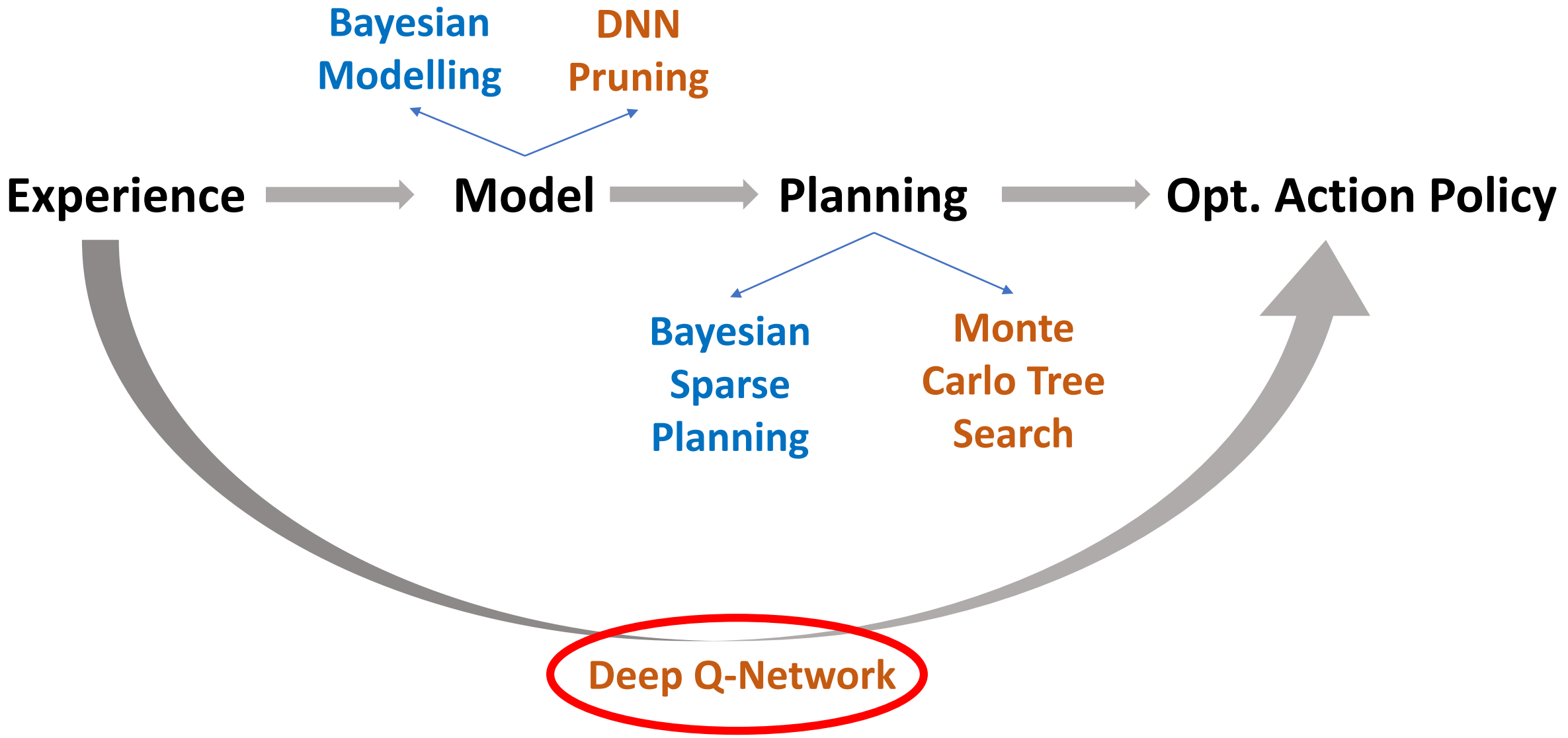
Exploit

$$p_1, ..., p_K \sim \text{Dir}(\alpha_1, ..., \alpha_K)$$
$$y_1, ...y_K \sim \text{Mult}(p_1, ..., p_K)$$

Training Performance



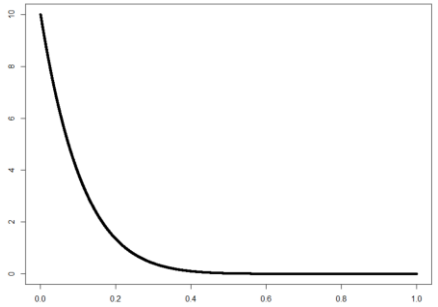
Reinforcement Learning Models

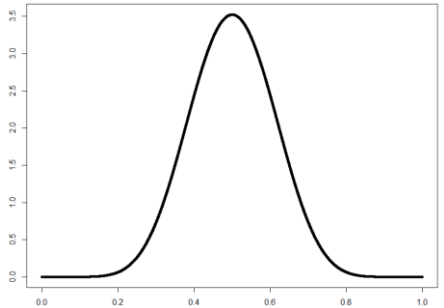


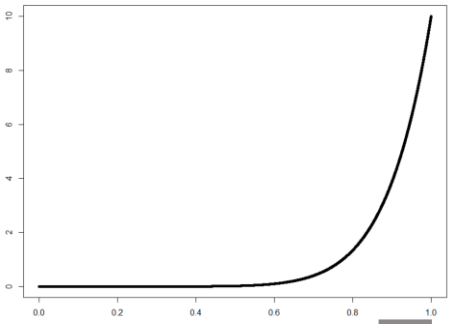
Pruning + Episodic Reset

$\hat{\theta}$

Training time





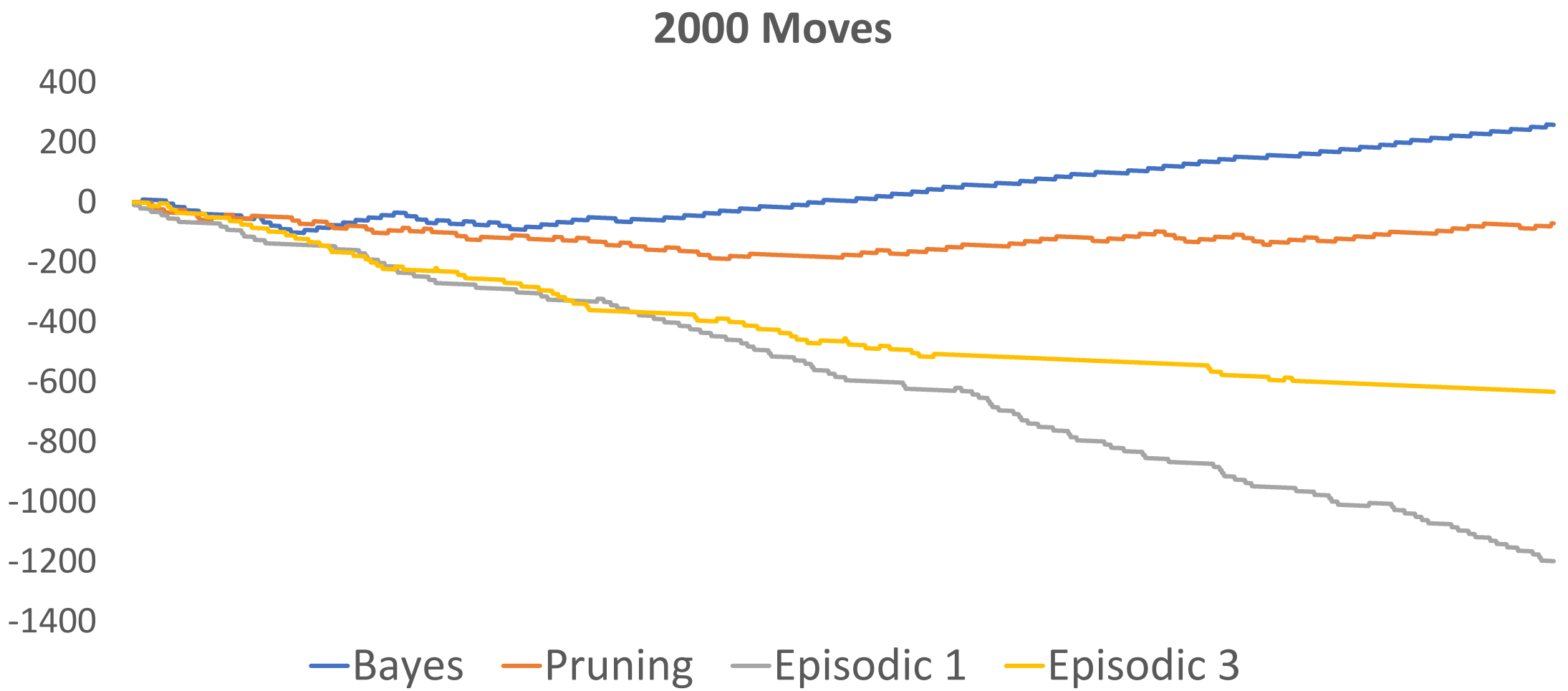


Explore

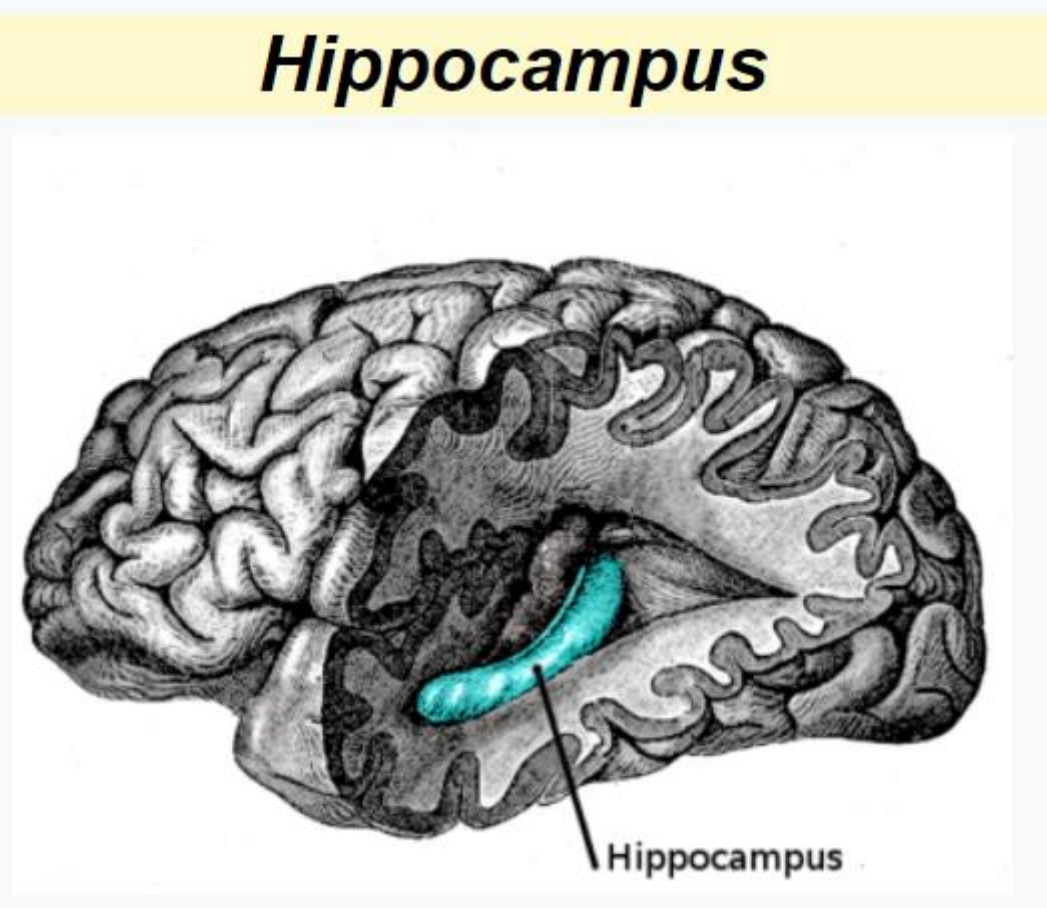
Exploit

Periodic Posterior Reset?

Training Performance



Memory Replay

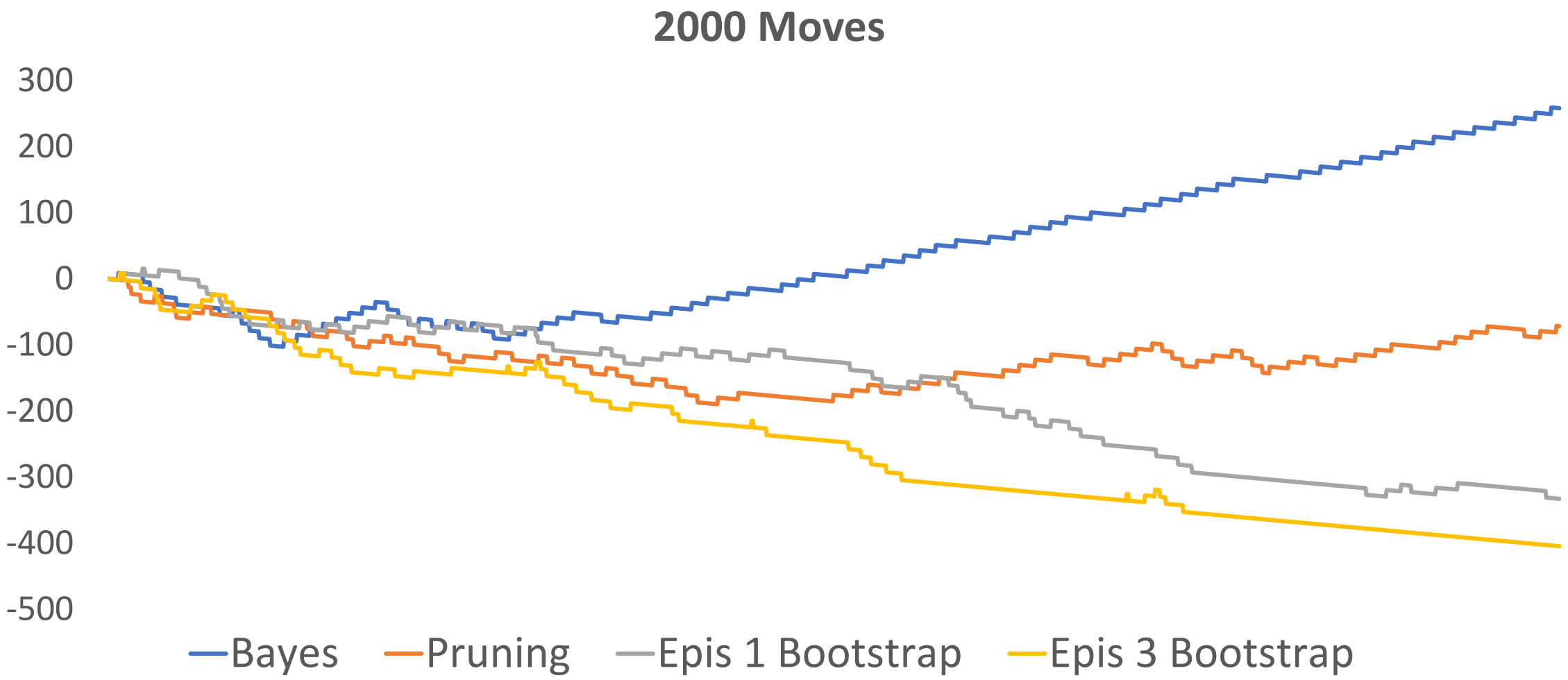


Hippocampal replay

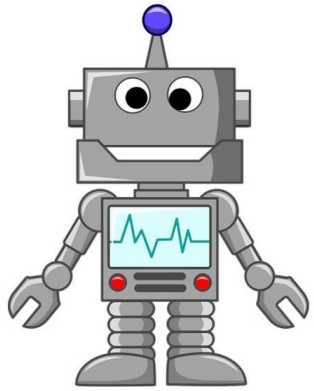
From Wikipedia, the free encyclopedia

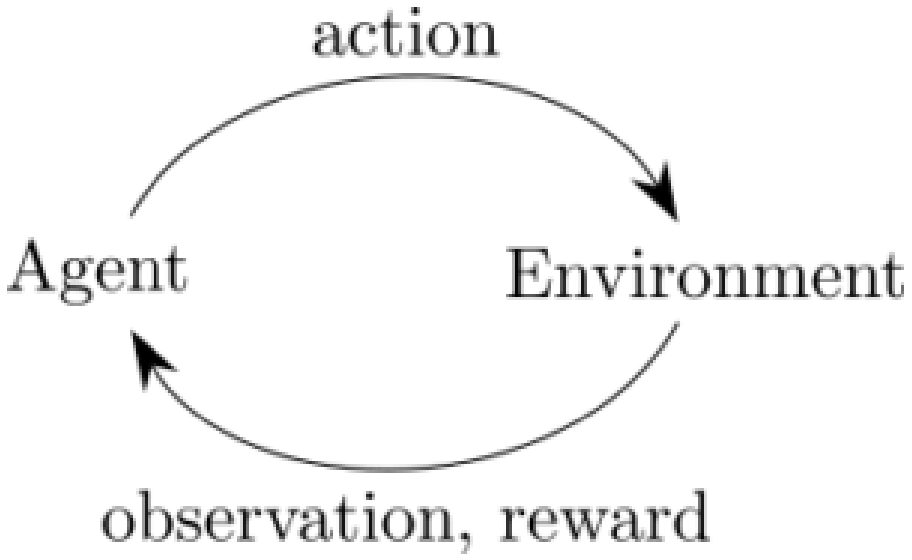
Hippocampal replay is a phenomenon observed in rats, mice,[1] cats, rabbits,[2] songbirds[3] and monkeys.[4] During sleep or awake rest, replay refers to the re-occurrence of a sequence of cell activations that also occurred during activity, but the replay has a much faster time scale. It may be in the same order, or in reverse. Cases were also found where a sequence of activations occurs before the actual activity, but it is still the same sequence. This is called **preplay**.

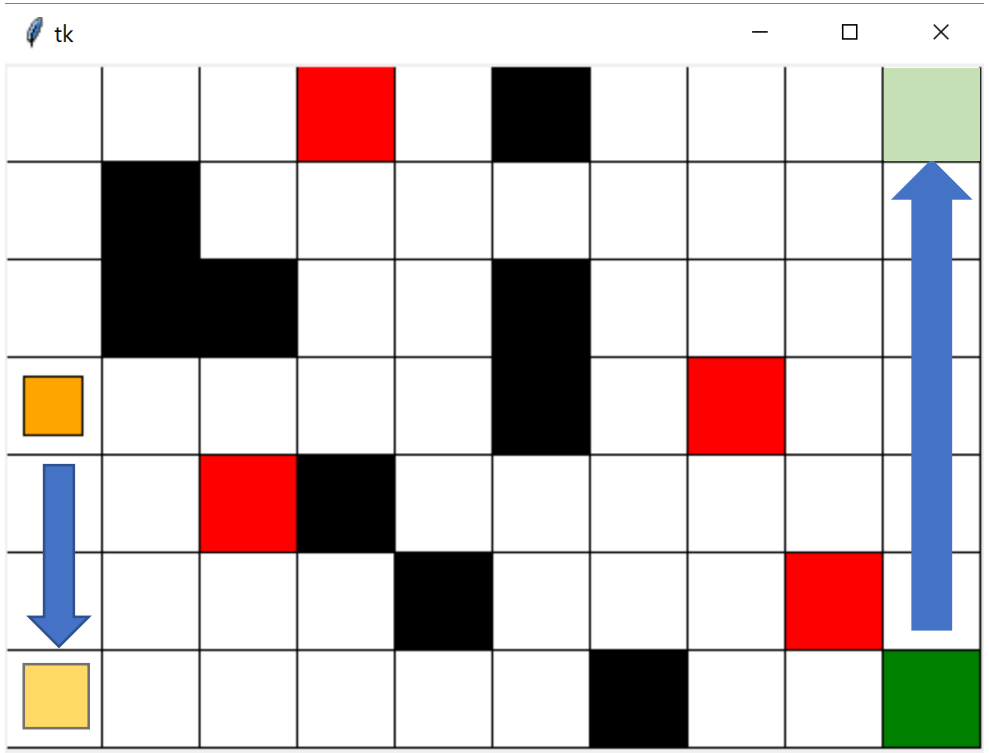
Training Performance



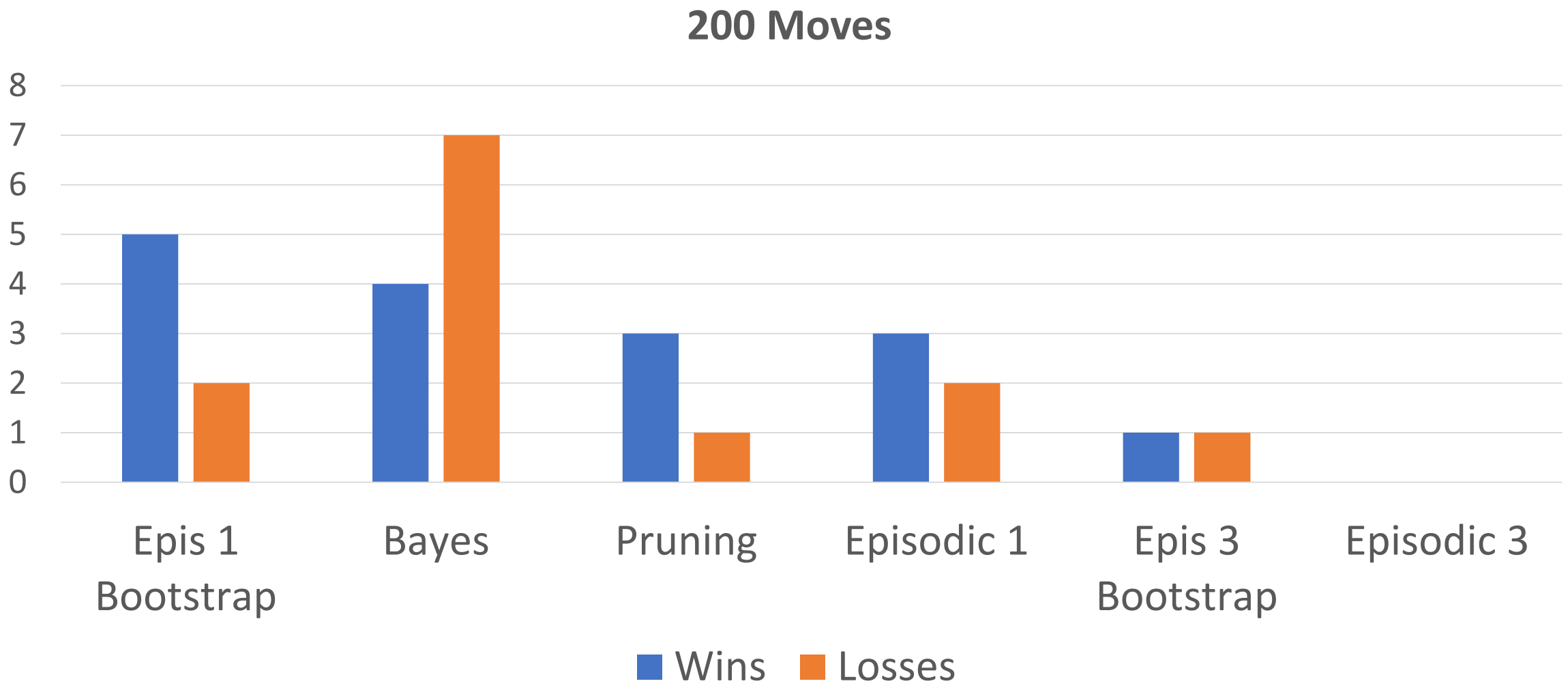
Test MDP Environment







Test Performance



Thanks


LET ME SPRINKLE SOME
DEEP LEARNING MAGIC
memegenerator.net