Glossy Buckthorn Population Management Using Reinforcement Learning

Problem Definition

- Controlling the population of Glossy Buckthorns in New England

Interpretations	
Natural Resource	Computer Science
• studying the growth cycle • finding effective ways of killing them • estimating the costs of each method	• making the simulator $\rightarrow$ samples • incorporating multiple actions in MDP • cost function to run RL methods

What has been done?

- ✓ Simulator $\rightarrow$ Do we need a simpler one?
- ✓ Problem formulation, in terms of MDPs
- ✓ MDP solvers (LSPI, Fast Feature Selection, State Aggregation)
- ✓ Optimal policy benchmarks
- ✓ Initial approximated optimal policies
- ☑ Optimal policy

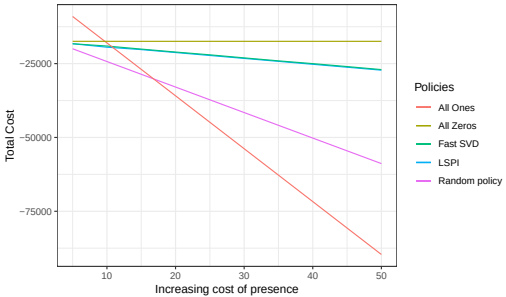
What do we need to solve our MDP?

- A **known optimal policy** that acts as our benchmark to evaluate different methods with it
- How we can find some optimal policies? Some **extreme** cases:
  - **Always Do Nothing**: When the cost of treatment is huge in compared with the cost of presence
  - **Always Do Something**: When the cost of presence is very large in compared with the cost of treatment
- But, does it make sense?

Experiments

Assume two different cost functions:

$$R(s) = \begin{cases} C_{treatment} = 5 \times i \\ C_{presence} = 10 \end{cases}$$



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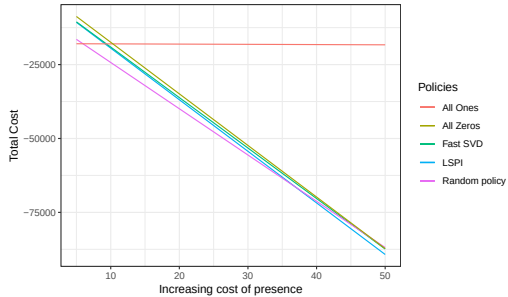
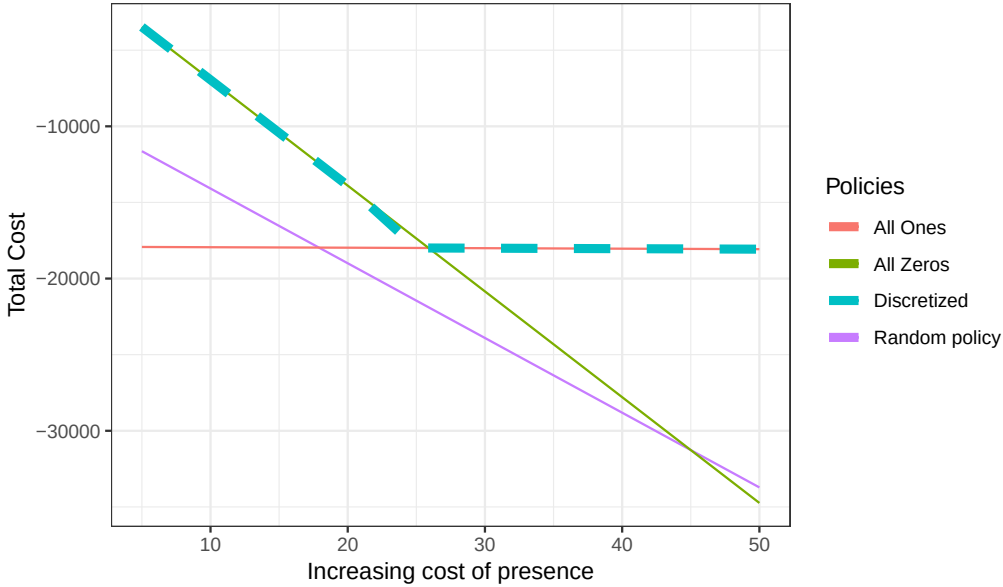


Some good results



Thank You!