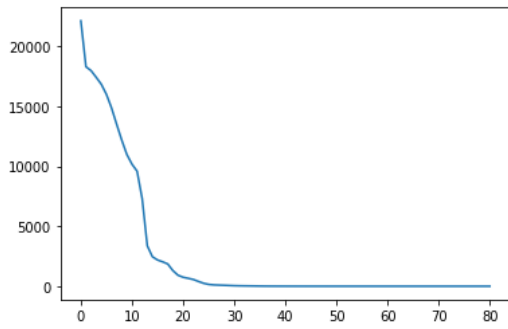


# Homework 7: Markov Decision Process based Planning

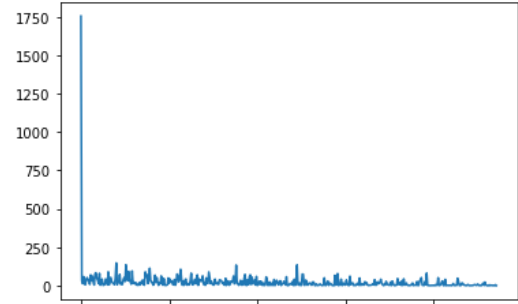
Huan Chen

## 1. Python Part

Dynamic programming (DP) and real time dynamic programming (RTDP) find the same optimal path: 12 steps. RTDP is more efficient and takes less time to finish the iteration (Bellmann error is less than 0.0001). Iterated cost is showed in Figure 1 and optimal path is showed in Figure 2.



(a) DP, consumed time 26.11 second.



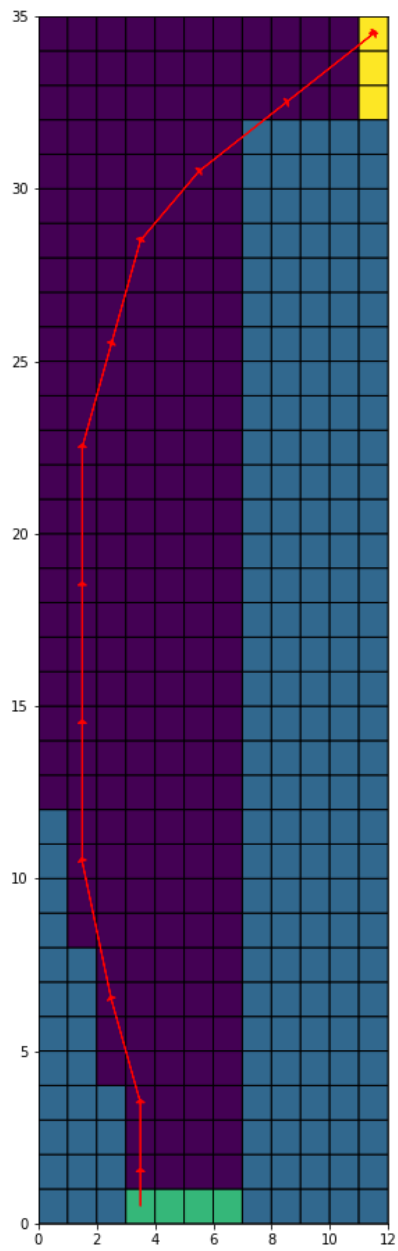
(b) RTDP, consumed time is 11.84 second.

Figure 1: Iterated cost of DP and RTDP

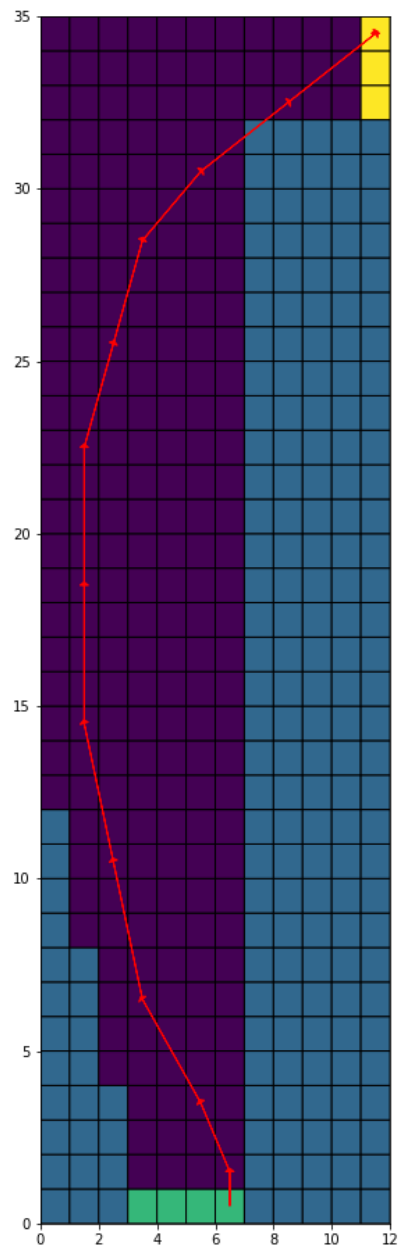
## 2. Main Takeaways

Consider uncertainties in planning process.

1. Uncertainty category: non-deterministic and probabilistic.
2. Markov decision process model.
3. minimax cost planning and expected cost planning (Dynamic programming and real-time dynamic programming).



(a) Path found by DP



(b) Path found by RTDP

Figure 2: Path found by DP and RTDP.