

Introduction to Dynamic Programming

Joshua Saunders

February 2018

1 Introduction

After a performance measure for a system has been chosen, we must next choose a method to minimize it. One technique is *dynamic programming*.

1.1 Principle of Optimality

According to Bellman [1],

An optimal policy has the property that whatever the initial state and initial decision are, the remaining decisions must constitute an optimal policy with regard to the state resulting from the first decision.

Figure 1 shows a multistage decision process. The first decision leads from a to b with a cost of J_{ab} .

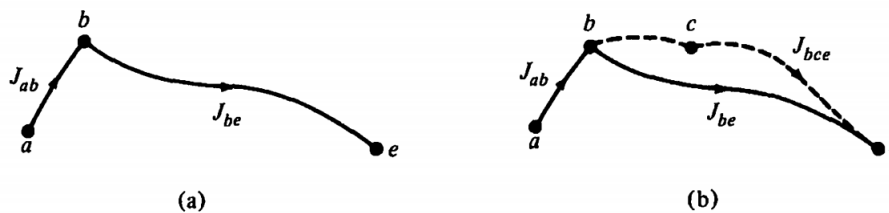


Figure 1: (a) Optimal path from a to e (b) Two possible optimal paths from b to e [2]

References

- [1] R. E. Bellman and S. E. Dreyfus, *Applied Dynamic Programming*. Princeton University Press, 2015.
- [2] D. E. Kirk, *Optimal control theory: an introduction*. Dover Publications, 1998.