Introduction to Markov Decision Processes

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Part I - Fundamentals

"The higher a tree wants to grow, the deeper its roots must reach into the earth."

J.R.R. Tolkien, English Author 1892-1973

(Part I after introduction?)
This section of the book contains two chapters:

- Chapter 2: Model foundations
- Chapter 3: Examples and applications

Chapter **??** is critical because it carefully introduces all of the basic model components of a Markov decision process, derived components, and optimality criteria. We introduce two simple Markov decision process models that serve as the foundation for subsequent models and examples. The first is the one-period model, which considers the situation where a decision maker only has to make a single decision. The fundamental trade-off between immediate reward and subsequent reward is highlighted, building the foundation to understand more complex, multi-period models that are covered in the rest of the book. The second model is a numerical example of Markov decision process with two states. The two-state example will be revisited throughout the book to illustrate different concepts and algorithms. The learner is strongly encouraged to be "at one" with both.

To make concrete the model components that have been defined in Chapter **??**, Chapter **??** presents an extensive collection of applications and examples. For each example, we identify the aspects of that example that represent each component of the Markov decision process model. While reading this chapter, the learner is encouraged to identify other examples from their day-to-day life that can be modeled using a Markov decision process.

To successfully apply Markov decision processes in new application areas requires establishing roots in model fundamentals. To do so we encourage the reader to spend the time necessary to work through the model formulations in each example in Chapter **??**.

Bibliography