Abstract Chapter 8

Tools II: More Formal Concepts of Game Theory and Evolutionary Game Theory

This chapter offers a concise formal guide to the major concepts of game theory and evolutionary game theory. It starts with a formal definition, also introducing the underlying assumptions and properties of strategic games as well as common forms of notations: formal notation, normal-form notation, and extensive notation. After some brief considerations on decision theory the chapter presents one-shot game solution concepts including SESDS, the Nash equilibrium, and Nash equilibrium refinements in pure and mixed strategies. Further, sequential games, repeated games, and supergames are introduced. This part of the chapter also offers an introduction to subgame perfectness and the folk theorem. The chapter proceeds with a presentation of the different approaches to evolutionary game theory. This includes evolutionary stable strategies as well as replicator dynamics and a number of important auxiliary techniques such as stability evaluation in dynamic systems. All methods discussed in this chapter are illustrated by numerical examples.

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