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MULTIAGENT SYSTEMS Algorithmic, Game-Theoretic, and Logical Foundations

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The multiagent systems and problems related to their models belong to most extensive and rapidly developed topics of modern mathematical methods in economy. They cover a wide scale of optimization and decision-making methods used in both, macro- and namely microeconomic theories or applied procedures supported by mathematical tools and mathematical or logical structures, in general.

The aim of the referred book is to gather various views on the multilateral approach to optimality into one homogenous compendium, organized with respect to the mutual relations among particular multicriteria or multiagent methods. This volume includes chapters and sections regarding disciplines like computer science, artificial intelligence, economics, operations research, analytic philosophy or linguistics. They are analyzed, from the point of view of multisystem methods, by means of mathematical tools, mostly belonging to probability theory, formal logic, game theory, and optimal decision-making methods.

The comprehensive text is, besides the *Introduction*, divided into fourteen separate chapters, 79 sections and lots of subsections. It is concluded by four *Appendices* (three of them deal with auxiliary parts of probability or random processes theory, and one with formal logic), representative *Bibliography* (594 items) and the *Index*. The organization of chapters respects the basic structures of textbooks, or, better, of handbooks. Their sections have mostly firm structure starting by definitions and concepts and summarizing the main results. The last section of each chapters is devoted to the history and special references.

Particular chapters are devoted to the following topics. Distributed constraint satisfaction and distributed optimization (*Chapters 1* and 2), non-cooperative and cooperative game theory (*Chapters 3, 4, 5, 6* and 12) including the main solution concepts, normal and extensive forms of strategic games and the role of randomness in games. Further chapters deal with the learning and teaching phenomena (*Chapter 7*), communication (*Chapter 8*), protocols of groups including social choice theory, mechanism design and auctions (*Chapters 9, 10* and 11), and, finally, the concept of belief and its aspects (*Chapters 13* and 14).

The presentation of all topics is strictly mathematical, but the mathematical knowledge presumed for the reader is not complicated. Similarly, also the background knowledge of basic probability and basic computer science, as well as the elements of linear and integer programming and classical logic, are expected. Nevertheless, the more specialized segments of these fields are recollected in the appendices.

The volume is evidently intended to become an advanced and comprehensive textbook of the applied mathematics in which the phenomenon of multiagent methods or systems is widely exploited. Nevertheless, it can be very useful as a handbook of advanced multiagent methods deeply analyzing their mutual bounds and relations among their applications. The text is very well prepared and presented, which means that the referred book belongs to those of outstanding quality.

Milan Mareš