Advances in Dynamic Games and Applications

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The contents of this volume are primarily based on selected presentation made at the 8th International Symposium of Dynamic Games and Applications, held in Chateau Vaalsbroek, Maastricht, the Netherlands, July 5-8, 1998.

The symposium took place under the auspices of the International Society of Dynamic Games (ISDG), established in 1990. The conference has been cosponsored by the Control Systems Society of the IEEE, IFAC, INRIA and the University of Maastricht.

Every paper that appears in this volume has passed through a stringent reviewing process, as is the case with publications for archival journals.
The volume has four parts.
The first two parts contain mostly new research results and have a theoretical character.
The first part is dedicated to the theory of dynamic games. It contains 6 papers and it involves mainly deterministic dynamics.

Below we list the content of the first part:

Part I: Dynamic Games: Theory

1. On Problems with Information in Some Games: Modelling the Strategies in Some Dynamic Games
2. A Historical Perspective on Cooperative Differential Games
3. Certainty Equivalence Principle and Minimax Team Problems
4. Evolutionary Processes in Signalling Games: The Impact of Different Learning Schemes
5. Mixed Strategies for Hierarchical Zero-Sum Games
6. The Existence and Uniqueness in Equilibria in Convex Games with Strategies in Hilbert Spaces

The second paper is an interesting survey on Cooperative Differential Games. This paper provides a brief historical perspective on the use of cooperative solution concepts in the theory of differential and dynamic games. The paper surveys the publications that appeared in control journals, like Automatica, the Journal of Optimization and Applications (JOTA), the SIAM Journal on Control and Optimization, the IEEE Transactions on Automatic Control, and the proceedings of the successive Differential Games Symposia, during a period that spans from the origin of differential game theory, in the early 1960, until 1990. The survey concentrates on solution concepts that imply Pareto optimality with respect to the reward criteria of the different players. The survey does not include the topic of team theory.

The second part of the book is devoted to the study of dynamic games and contains 5 papers.
The topics of the papers from this part are connected with:

- existence of equilibrium payoffs in two - player stochastic games
- persistently good strategies for nonleavable stochastic games with finite state space
- stochastic hybrid zero-sum games with non-linear slow dynamic
- multichain Markov games
- perturbed zero-sum games

The third part of the book contains 4 papers and study the solution methods of dynamic games. It is dedicated to algorithms and numerical solution approaches for dynamic games.

The topics of the papers from this part are connected with:

- construction of singular surfaces
- parallel algorithms for the Isaacs equation
- computation of equilibria in piecewise deterministic games via stochastic programming methods
- comparison of two numerical approaches for the barrier and value of a simple pursuit-evasion game.

In the paper "Parallel Algorithms for the Isaacs Equation" is presented the numerical results obtained on two tests in R2 comparing the serial and the parallel algorithms. The parallel code has been implemented using the standard Message Passing Interface (MPI) library, both for portability and for efficiency on the program on a variety of hardware.

The platform considered is a cluster of two Digital AlphaServers 3/400 4100 with a 4 21164 (400-MHz clock) processor each and two Gigabytes of global RAM.

The parallel code has been developed with an optimized version of MPI, particularly suitable for the digital cluster architecture, using shared memory on each machine and a (very fast) memory channel link for the communication of different processors.

The fourth part of the book is concerned with several applications of dynamic games . It has three papers which deal with:

- optimal missile guidance upgrades
- homicidal chauffeur game
- "The tragedy of the commons" modelled by large games.

The book covers a wide area of applications and offers game theory tools useful for researchers who use game theory to build models in various disciplines.

It is an essential resource for all dynamic game researchers and professionals in the fields of systems and control engineering, operational research and applied mathematics.

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