

The Pre Kernel: An Innovative Solution for Cooperative Games

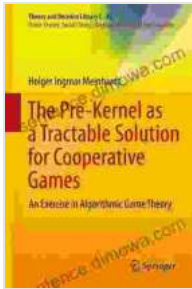
Cooperative game theory is a branch of game theory that deals with situations where players can cooperate to achieve mutually beneficial outcomes. However, forming and maintaining cooperation can be challenging, especially when players have conflicting interests. The Pre Kernel method is a solution concept that addresses these challenges by providing a framework for fair and efficient coalition formation and bargaining.

The Pre Kernel method is based on the idea of a "pre kernel," which is a set of payoffs that satisfy certain desirable properties. These properties include:

- **Individual Rationality:** Each player receives a payoff that is at least as good as what they could receive if they acted alone.
- **Coalition Rationality:** Each coalition receives a payoff that is at least as good as what they could receive if they formed a separate coalition.
- **Symmetry:** Players who are symmetrically situated receive the same payoff.
- **Monotonicity:** As the number of players or the size of the pie increases, each player's payoff does not decrease.

The Pre Kernel method constructs a pre kernel by first finding a set of payoffs that satisfy individual rationality and coalition rationality. Then, it

checks if the payoffs are symmetric and monotonic. If they are, the set of payoffs is a pre kernel.



The Pre-Kernel as a Tractable Solution for Cooperative Games: An Exercise in Algorithmic Game Theory (Theory and Decision Library C Book 45)

by Holger Ingmar Meinhardt

★★★★☆ 4 out of 5

Language : English
File size : 15914 KB
Text-to-Speech : Enabled
Enhanced typesetting : Enabled
Word Wise : Enabled
Print length : 471 pages
Screen Reader : Supported



The Pre Kernel method has several desirable properties that make it a valuable solution concept for cooperative games. These properties include:

- **Tractability:** The Pre Kernel method can be computed efficiently, even for large games.
- **Equity:** The Pre Kernel method provides a fair distribution of payoffs among players.
- **Bargaining Proof:** The Pre Kernel method is resistant to bargaining, meaning that it is difficult for players to improve their payoffs by negotiating outside of the pre kernel.
- **Coalition Stability:** The Pre Kernel method promotes coalition stability by providing incentives for players to cooperate.

The Pre Kernel method has been applied to a wide range of cooperative games, including:

- **Coalition Formation:** The Pre Kernel method can be used to help players form coalitions that are fair and efficient.
- **Bargaining:** The Pre Kernel method can be used to help players reach agreements that are mutually beneficial.
- **Resource Allocation:** The Pre Kernel method can be used to help players allocate resources fairly and efficiently.

The Pre Kernel method is a powerful and versatile solution concept for cooperative games. It provides a tractable, equitable, and bargaining-proof approach to coalition formation and bargaining. The Pre Kernel method has been applied to a wide range of games and has proven to be a valuable tool for promoting cooperation and achieving mutually beneficial outcomes.



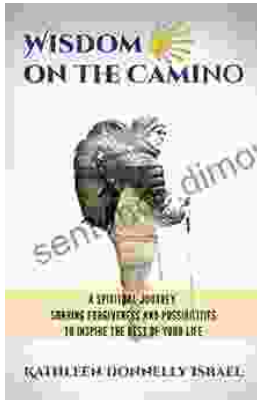
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