Game Theory Lab 4

Aim: Program to implement strategic form - elimination of dominant strategy

Theory

1) Strategic form, also known as normal form is a representation in game theory that lists the strategies chosen by the players.

2) The elimination of dominant strategy is a concept used to simplify strategic form games by iteratively removing strategies that are clearly suboptimal, regardless of the choices made by other players

3) A dominant strategy is the one that provides a player with a higher payoff then any other strategy, regardless of choices made by the other players

4) The process of elimination begins by identifying and eliminating dominanted strategies, which are those that yield a strictly lower payoff than any other available strategy.

5) After eliminating these dominated strateg-ies, the game is left with a reduced set of strategies for each player.

6) This process helps to focus on the most relevant strategies and outcomes, making it easier to analyze and find equilibrium points in strategic form games.

Conclusion

Strategy of elimination of dominant strategy has been implemented.

Prasad Jawale   DIGAD   20

Game Theory lab 5

Aim: To write a program on minimax theorem
and minimax strategies

Theory:
1) The minimax theorem is a fundamental concept
in game theory that provides a solution for
zero sum games

2) It asserts that in such games, there exists
at least one mixed strategy nash equilibrium,
where each player minimizes their maximum
possible loss.

3) Minimax strategies refer to the strategies
employed by players in a zero sum game to
achieve this equilibrium.

4) The maximizer (player seeking to maximise
their gain) aims to minimize their maxmin
value, which is the smallest possible gain they
can secure.

5) Conversely, the minimizer (player seeking to
minimize their loss) aims to maximise the
maximum value, which is the largest possible
loss they can incur

6) These strategies are based on the assumption
that players are rational and fully aware
of each other's strategies

Conclusion: minmax strategy has been implemen
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Game Theory 6

Aim: Perfect information games : trees, players assigned to nodes, payoffs, backward induction and subgame perfect equilibrium.
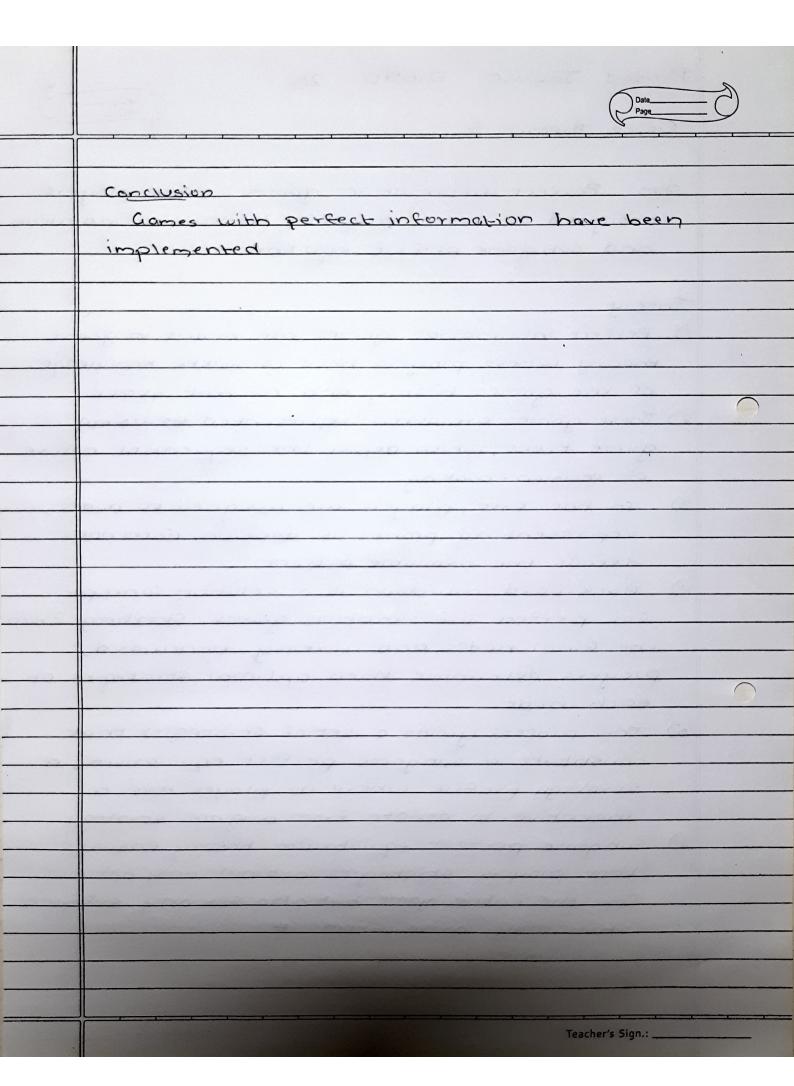
Theory:

1) Perfect information games are models in game theory where players have complete knowledge of the game's history and current state

2) These games are often represented as using game trees, which depict the sequential nature of decision-making.

3) In the tree, players are assigned to nodes, representing points of decision. Each node details the available actions.

4) Backward induction is a solution concept for perfect information games. Starting from the final nodes and working backward, players determine their optimal strategies at each node.

5) This process yields a set of strategies that constitute a subgame perfect equilibrium, a strategy profile where no player has a incentive to deviate from original strategy.

6) Subgame perfect equilibrium theory ensures that player's strategies are not only optimal for the entire game but also for any subgames that may arise from it.

Conclusion

Games with perfect information have been implemented

Game theory lab 7

Aim: Imperfect information games — mixed strategy
nash equilibrium - finding mixed strategy nash equilibri
for zero sum games, mixed versus behavioral strategy

Theory:
1) Imperfect information games are games in which
   players do not have full information about the
   actions or payoffs of other players.
2) It adds a element of uncertainty and comple-
   -xity to the decision making process.
3) Mixed strategy nash equilibrium is a solution
   concept used in imperfect information games.
4) It involves players choosing their actions probab-
   -ilistically, assigning probabilities to different
   strategies.
5) For zero sum games, finding a mixed strategy
   nash equilibrium involves determining the
   optimal probability distribution over strategies
   that maximizes one player's expected payoff
   while minimizing the other player's expected
   payoff.
6) Mixed strategies differ from behavioral
   strategies. Mixed strategies involve players
   randomizing their choices according to a specified
   probability distribution.
7) Behavioral strategies, on the other hand, may
   involve non randomized, more complex decision making
   processes

Conclusion:

Games with imperfect information strategy have been implemented.