

Game Theory Through Linear Algebra

By Sean Hurst

- Abstract:

Game Theory deals with the choices that players make in games. Psychologists call it the theory of social interaction because it attempts to consider the choices that one player can make against another. Although game theory is focused around board games, cards, and other competitive games, it can also be applied to military strategy in war. My project will primarily focus on determining how a person's chances can improve by making certain choices, or by minimizing the amount of negative choices a person can make. This will be done through examples that apply to everyday life to demonstrate how influential Game Theory is. All math will be exclusively done using linear algebra.

- Outline:

- Before examples:
 - Introduce Game Theory
 - What exactly is a “Game”?
 - The “Prisoner’s Dilemma”
 - Risk vs. Reward and the Nash Equilibrium
 - Zero Sum vs. Continuous Games
- Present examples:
 - Winning football games (Board)
 - You are the coach of a football team and don’t know which play strategy to use against the other team.
 - Store pricings based on other stores (Board)
 - You are a store owner and want to force other stores around you to sell their products at a loss.
 - Every single move made in Chess (Computer - Maple)
 - You are playing Chess with a friend and want to win the game in as few moves as possible. You know your friend likes to use their Queen more than any other piece.
 - Military war strategy (Computer - Maple)
 - You are a general in the military and can only take specific resources into war. What resources should you take?
- Questions at the end