GAME THEORY

BERRA V

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-INTRODUCTION-

Name

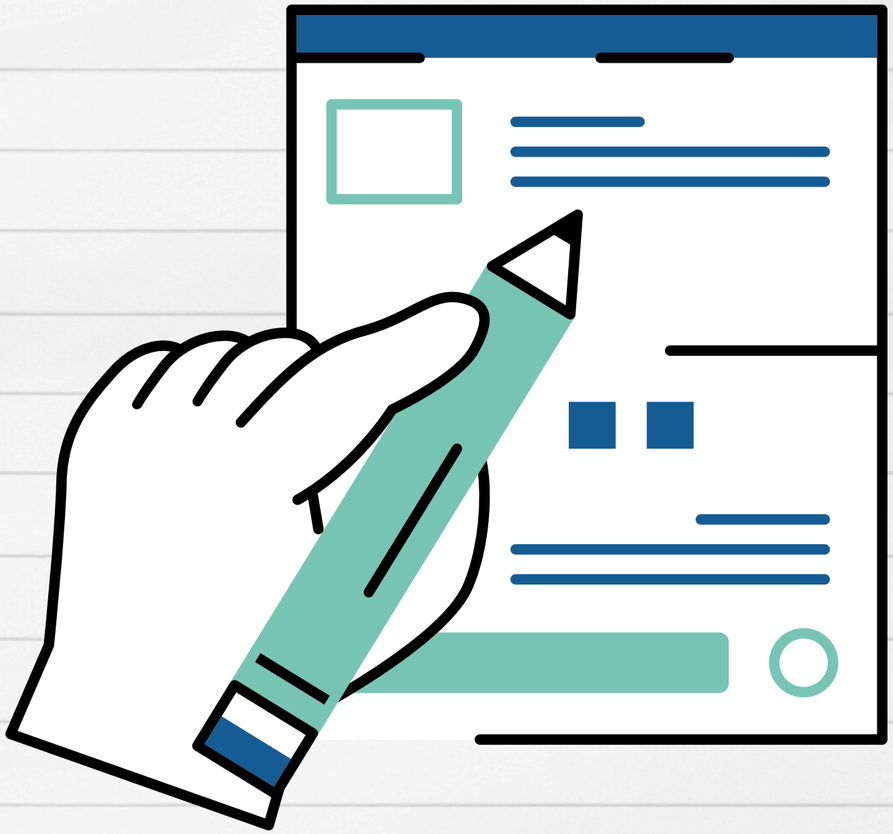
Hobby

What does “Game Theory” remind you of?

WHAT IS GAME THEORY?

- Game theory is a way for people/firms to make interdependent decisions.

- Game theory uses certain assumptions to determine the the best action for a player to take.
  - Rationality (Maximizing Utility)
  - Finite Number of Competitors
  - Perfect Information (Actions, Rules, Payoffs)
  - Perfect Competition



PLAYER

- The Decisionmaker
- **N = {1,2,3,4, ... , n}**

ACTION

- What the decisionmaker does
- ai - action a of player i

UTILITY (PAYOFF)

- The Result
- ui(a) - Utility for action a for player i

(Player 1, Player 2)		PLAYER 2 (Prisoner 2)	
		Stay Silent	Betray and Testify
PLAYER 1 (Prisoner 1)	Stay Silent	(-1,-1)	(-10,0)
	Betray and Testify	(0,-10)	(-4,-4)

COOPERATIVE GAMES

(Player 1, Player 2)		PLAYER 2	
		Left	Right
PLAYER 1	Left	(-100,-100)	(10,10)
	Right	(10,10)	(-100,-100)

NON COOPERATIVE GAMES

(Player 1, Player 2)		PLAYER 2	
		Heads	Tails
PLAYER 1	Heads	(-1,1)	(1,-1)
	Tails	(1,-1)	(-1,1)

ZERO-SUM GAMES

(Player 1, Player 2)		Goalie	
		Left	Right
Kicker	Left	(-1,1)	(1,-1)
	Right	(1,-1)	(-1,1)

Non-Cooperative Games!

NON-ZERO SUM GAMES

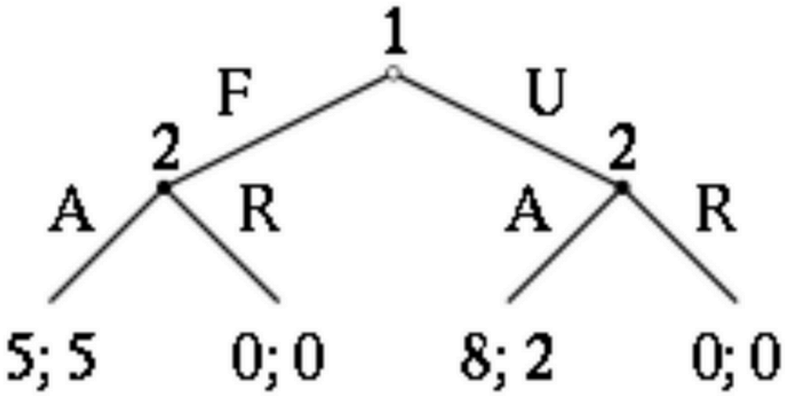
(Player 1, Player 2)		You	
		Correct	Defect
Your Colleague	Correct	(-1,-1)	(-4,0)
	Defect	(0,-4)	(-3,-3)

Cooperative Games!

SIMULTANEOUS MOVE

(Player 1, Player 2)		PLAYER 2	
		Left	Right
PLAYER 1	Left	(-100,-100)	(10,10)
	Right	(10,10)	(-100,-100)

SEQUENTIAL MOVE



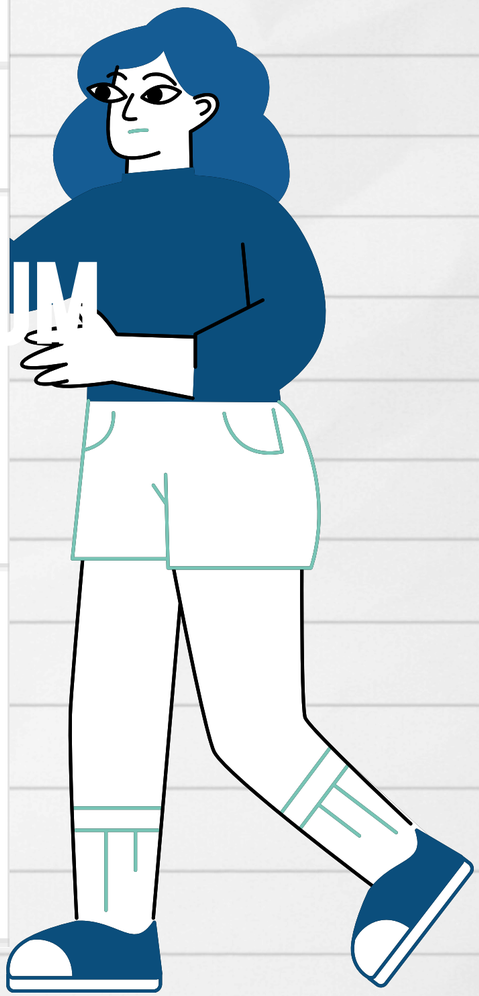
PARETO OPTIMALITY

Pareto optimality is a situation where no action or allocation is available that makes one individual better off without making another worse off.

NASH EQUILIBRIUIUM

The Nash equilibrium, named after the mathematician John Nash, is the most common way to define the solution of a non-cooperative game involving two or more players.

(Player 1, Player 2)		PLAYER 2 (Prisoner 2)	
		Stay Silent	Betray and Testify
PLAYER 1 (Prisoner 1)	Stay Silent	(-1,-1)	(-10,0)
	Betray and Testify	(0,-10)	(-4,-4)



Analyzing Pure Strategy Nash Equilibrium/Pareto Optimality

MIXED STRAREGY NASH EQUILIBIUM

(Player 1, Player 2)		PLAYER 2		Probabilities
		Opera	Football	
PLAYER 1	Opera	(1,2)	(0,0)	p
	Football	(0,0)	(2,1)	1-p
Probabilities		q	1-q	

Finding Expected Utilities! - to be explained on the board!
((P1(O),P1(F)),((P2(O),(P2(F)))

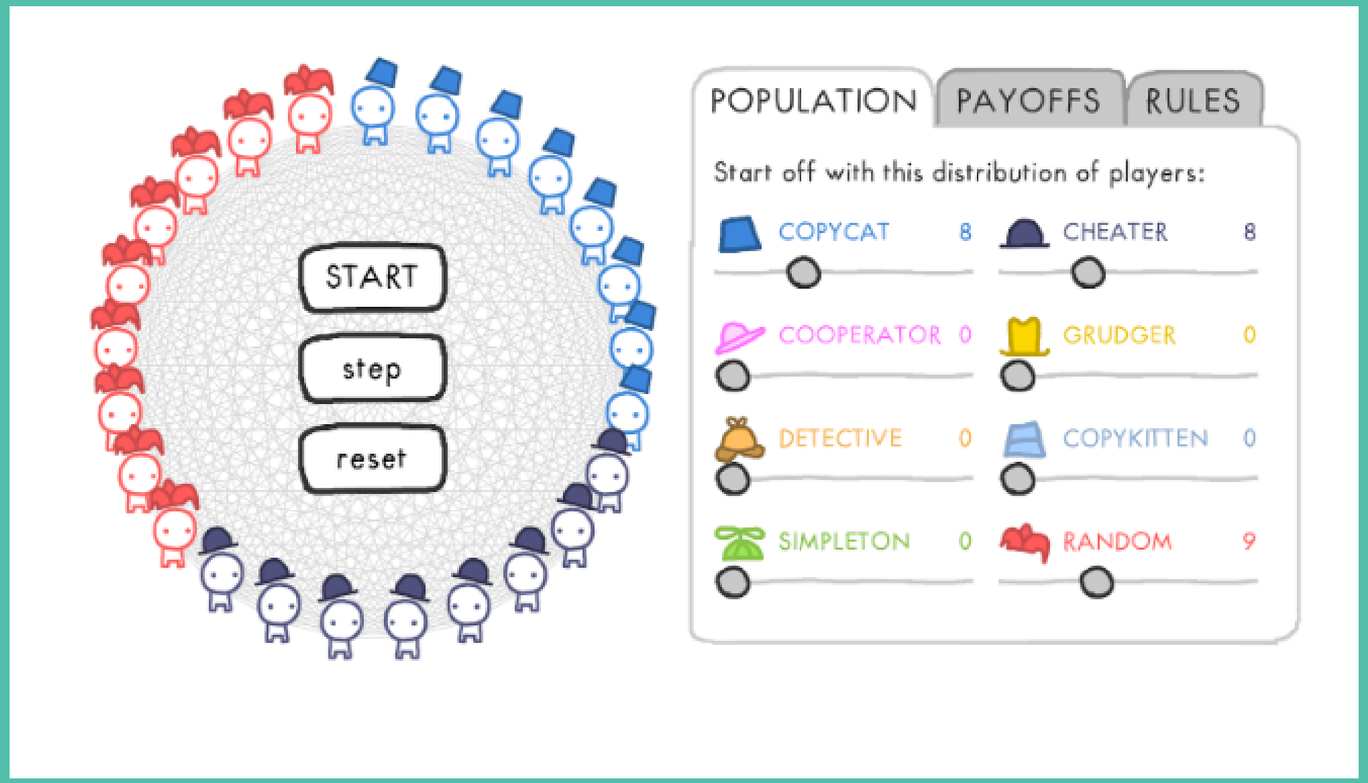
GUESS THE 2/3 OF THE AVERAGE GAME

https://tinyurl.com/2p8x3a76

REPEATED GAME SIMULATION

Link!

- Perfect Competition
- Different Strategies



THANK YOU VERY MUCH!