Behavorial game of theory and business stragegic model

Group 7: Game of theory

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Abstract- We are choosing Behavioural game theory and business strategic model as our sub topic in the game theory.

Behavioural game theory depends on psychological elements and learning. Phenomena discovered in the studies of individuals are evident. The strategic principles of all types are violated.
Business Game theory can help companies make strategic choices within or outside of their organizations, especially against competitors.

Keywords—game theory, human behaviour, business psychology, rationality, nash equilibrium

I. INTRODUCTION

Behavioral Game theory is a special branch of mathematics which has been developed to study decision making in complex circumstances. The idea to see business and human psychology as a Game, that runs through modern strategic thinking.

II. BACKGROUND

Behavioral game theory is established in 20th century. The mathematics show models based on the behavioral game theory were adapted to reflect decision maker preferences and attempt to rationalize choices that did not maximize utility.

III. MOTIVATION

The main two concepts of game of theory are rationality and common knowledge. Any model of the real world must make simplifying assumptions, because the real world is too messy to analyze with any precision. So, we will demonstrate how assumptions are being made and analyze it by making game in java.

IV. LITERATURE SURVEY

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2. Aumann, R. (1991). Game Theory. In Eatwell John, Milgate Murray, and Newman Peter (eds.). The New Palgrave: A Dictionary of Economics, London: Palgrave Macmillan.

V. MATHEMATICAL MODEL:

HOW DO WE CALCULATE THE UTILITY /PAY-OFFS OF PLAYER A AND PLAYER B IN THE MIXED STRATEGY NASH EQUILIBRIUM?

The general mathematical formulation is given as:

Consider the game

$$(A, B) \in \mathbb{R}^{m \times n}$$

with **σr** and **σc** are the mixed strategies for the row and column players here A and B respectively.

Then the utility/pay-off for the row player (A) is:

$$u_r(\sigma_r, \sigma_c) = \sum_{i=1}^{m} \sum_{j=1}^{n} A_{ij} \sigma_{ri} \sigma_{cj}$$

and utility/pay-off for the column player (B) is:

$$u_c(\sigma_r, \sigma_c) = \sum_{i=1}^{m} \sum_{j=1}^{n} B_{ij} \sigma_{ri} \sigma_{cj}$$

The probability of being in a given cell of (A or B) is

$$\sigma_{ri} \sigma_{cj}$$

The value of the cell is

$$A_{ij} \text{ or } B_{ij}$$

VI. Numeric Result

Utility to A will be:

0.67*0.33*4 +0.33*0.67*0+0.33*0.67*0+0.33*0.67*2 =1.3266

and for B it will be:

0.33*0.67*2 + 0.67*0.33*0 + 0.33*0.67*0+0.67*0.33*4 = 1.3266

VII. Contribution

Dhanya Mehta

- Working on behavioral game of theory: in which it explained how player makes decision in real life and trying to attaining dominating position.
- Explaining nash equilibrium and its constrains and real-life applications and case study of prison dilemma.
- Literature survey and research and ppt presentation.

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Spandan Shah

- Discussing about how game of theory works in understanding business models and how brands in competitive world follows game of theory as a strategic model
- Answering questions like “Why brand outlets which are selling same product/ competitor are always seen near to each other!”
- Ppts presentation.

Yug Patel

- Contributing code of tic tac toe or where we will show practical life application of game of theory.
- Literature survey and research.

I. REFERENCES

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https://towardsdatascience.com/game-theory-in-python-with-nashpy-cb5dceab262c

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