Cannlytics

Cannabis Data Science

Cannabis Data Science #59

March 30th, 2022

Searching for the origins of data science

The Electronic Computer Project (1945-1947)

A Sprinkle of Economics: Competing for Profits

Market Effects
- Michael Porter
Competitive rivalry
- Degree of advertising - Competitive Advantage / Comparative Advantage
Buyer power
- Buyer concentration to firm concentration ratio - Price elasticity of demand.
Supplier power
- Input costs
Threat of new entry
Threat of substitution
Observe:
Markets of substitute goods tend to experience great volatility in prices, driving down producer profits.
Prices tend to be reduced in attempts of producers to capture market share.

Game Theory

Repeated Games

- Finite games: Usually solved by backwards induction.
- Infinite games: Difficult to solve.
- Even if the game being played in each round is identical, repeating that game a finite or an infinite number of times can, in general, lead to very different outcomes (equilibria), as well as very different optimal strategies.

Modeling Player Preferences

Given that player i's valuation of the game diminishes with time depending on a discount factor $\delta < 1$, then player i's utility is

$$U_i = \sum_{t \geq 0} \delta^t u_i(x_t)$$

The cutting edge: Repeated games with incomplete information.

Solving Games

Nash Equilibrium
Subgame perfect Nash equilibrium

Congestion Model

Given

- Cannabis producers, $i = 1, ..., N$,
- Cannabis products, $m = 1, ..., M$,
- A time horizon, $t = 1, ..., T$.

Under the following assumptions:

- Any producer can produce any product.
- The *cost* to produce an item of any type is $c = 0$.
- A producer can change the type of product it produces at a set *interval*, t_i.

Strategy: Every time, t_i, a producer can choose it's product type:

1. The producer looks at the number of producers of each type, n_m,
2. The producer calculates the average profits for the producer of each product type, $E[\pi]_m$, for t_i,
3. The producer chooses the most profitable product to produce, $m*$, for t_i, taking into consideration that each other producer, $j = 1, ..., J$, will produce the product that is most profitable for them at each t_j.

Question and Hypothesis

Question of the day.

- What is the **Nash Equilibrium** of the game?

 **Thank you for coming.**

Insights of the Day

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What would you like to talk about next week?