A Dynamic Game Model of Collective Choice in Multi-Agent Systems

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A study by Goolsbe and Klenow [Goolsbe and Klenow ’02].

- Samples of 208 U.S. cities.
- $x$–axis = Fraction of households owning a computer at the beginning of 1997.
What are the collective choice problems?

- The collective choice problems are concerned with situations and decision making when a large number of agents make a socially influenced choice amongst different alternatives.
Example 1 - Robotics

- Collection of robots exploring an unknown terrain.
- Multiple potential sites of interest to visit (Discrete choices).
- The robots must stay as much as possible grouped to carry out some collective tasks (Social effect).
Example 2 - Elections

- A group of voters are choosing among a set of candidates (Discrete choices).
- Along the path to choose a candidate, changing one’s opinion requires an effort but deviation from the majority’s opinion involves a discomfort (Social effect).
Problem Statement

Social effect (Remain Grouped)

Initial Distribution

Before time T

Home Destination P1

Home Destination P2

Home Destination P1
Questions

- How do the agents act on the individual level? Do they make their choices before or while moving?
- Can one anticipate the macroscopic behavior of the population, i.e., the distribution of the agents between the alternatives?
- If yes, are there multiple potential macroscopic behaviors?
- What is the necessary information to anticipate this macroscopic behavior?
- How does the strength of the social effect influence the macroscopic behavior?
- How the presence of an advertiser affects the individual and macroscopic behaviors?
Thank you