MULTI-AGENT SYSTEMS

Mandate 2

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Introduction

In our mandate, we discussed about rational choice theory, advertising, and neuromarketing.

Here are the key points pertinent to this extension of the mandate:

- There are three main facets though which advertisements can use consumers' rationality
  - **Assist** consumers in making rational calculations through value communication
  - **Discover** spending habits by modelling consumers as rational agents
  - **modify** the consumers' valuations through market manipulation
- Advertisers also exploit consumers' behaviour when they deviate from classical rational choice theory. In particular, we discussed
  - **Bounded Rationality** - *satisficing* behaviour
  - **Cognitive dissonance** - as a *sticking mechanism*
  - **Prospect theory** - showcasing *hashmaps* in the face of risk

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Influencers

With the explosion of social media, `influencers` have emerged as a great asset to advertisers. Sprout social defines as influencer as `someone in your niche or industry with sway over your target audience. Influencers have specialized knowledge, authority or insight into a specific subject. Their pre-existing presence in a niche makes them a useful launching pad for brands in search of credibility`. Although influencer-based marketing has been around for a long time, new niches and genres of influencers have emerged owing to the rise of social media and its power in manipulating consumers' decision making.

There is a lot of interesting work on identifying social media influencers (like the work done by Harrigan, et al.), but in this mandate, we will look at this phenomenon at a more abstract level - by **Qualitatively measuring their influence through agent-based modelling**.

Modelling the scenario

We model agents as points on a circular grid, having the following properties:

- Radius of influence: other agents look for what their neighbours (inside their radius) have and choose the majority
- Choice: Between two products, the influencer plans to shift some market share into product 2.
- Tendency: This represents the agent's tendency to get "swayed" by the market, we modelled this as the condition checked to increase or decrease the radius of influence

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Code

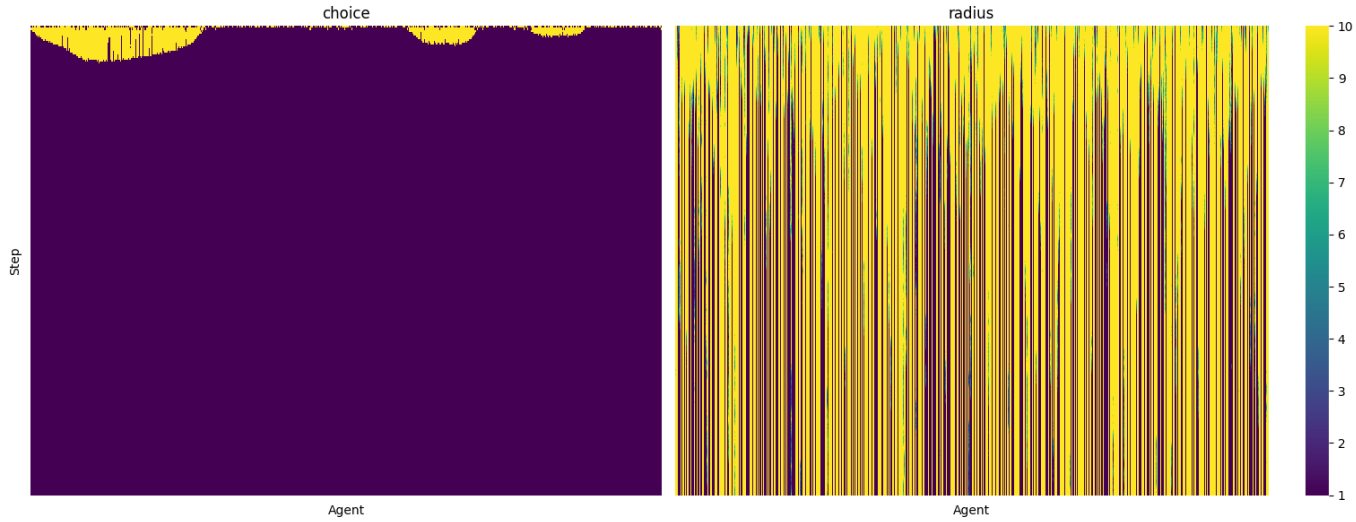
The code for this simulation builds on top of Austin Rochford's work. The simulations were run using the mesa library in python, and can be found here.

Experiments

We ran all simulations with 750 agents for 250 steps.

Experiment 1

In this experiment, we set constant random tendencies and radii of influence (max 50).



We can see that product 2 (yellow) has some market share and the relative radius values are spread out randomly from 1 to 10.

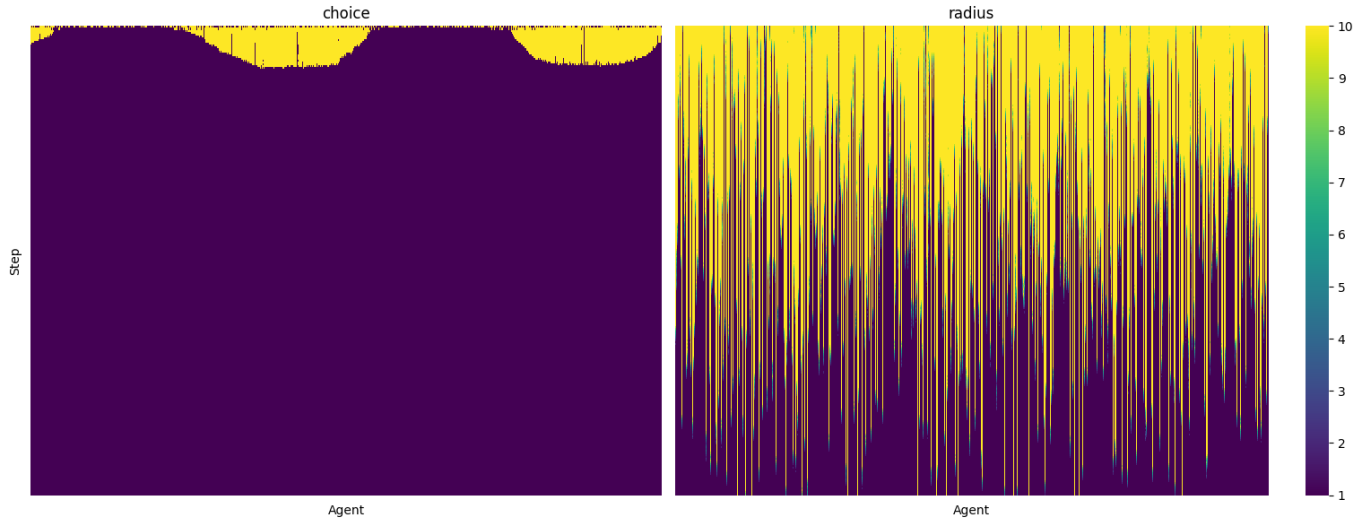
Experiment 2

In this experiment, we increased the max radius of an agent to 100 and increased the tendencies of an agent by `1.005x` at every relevant step. In the real world, this represents their increased exposure to target online advertisements and approximates the effects of echo chambers.

We can see that the radius values have increased from experiment 1, and there are clusters of agents choosing product 2.

Experiment 3

In this experiment, we keep the same max radius value, but look at the flipside of the effects - increased awareness about advertising tacts over time lead to a decay of tendencies by `0.99x` at every relevant stap. In the real world, this represents the increased usage of ad blockers.



We can see the stark contrast between `radius` values between those of experiment 3 and the earlier experiment 2. Also, clusters of "gullible" agents have emerged who influence others in their small circles.

Experiment 4

In this experiment, we emulate the effects of a famous influencer by increasing the initial tendency values by `1.5x` and setting a boost of `1.05x` at every relevant time step.

This experiment shows the largest values of market share and radius values. We can also clearly locate the influencer's target audience.