2-Day Introduction to Agent-Based Modelling

Day 2: Session 7

Social Science, Different Purposes and Changing Networks

Manchester Metropolitan University

Different purposes for an ABM

- A lot of confusion occurs because there are many different uses for an ABM, e.g.
  - To predict something unknown from what is known (such as predicting final election results)
  - To explain some effect in terms of some other, more basic/more micro, processes
  - To illustrate an idea of how something might happen – an analogy in computer form
  - As a counter example to how people assume things must work
  - As an exploration of possibilities that one might not have thought of/imagined otherwise
- Unfortunately authors often do not clearly state which they are intending with a model, indeed they often seem to conflate them! ☹

Network Change Model

- Agents connect to each other and change their links
- Some agents freely give to those they are linked with (at a small cost to themselves), the rest do not at start only 10% are givers, and all linked randomly
- After that all agents follow same rules (apart from giving/not giving)
- But after a while the system self-organises to avoid non-givers and givers predominate

Behavioural Rules

- *Givers cause their neighbours to receive units of value at random*
- With a probability (prob-compare) an agent picks another at random. If its value (from gifts) is less than the one picked it imitates its strategy (giving/not), kills links and links to it
- With a probability (prob-rand-reset) kill all links and link to a random agent
- If it has too many links, drop one at random
- If it has too few link to someone agent is linked to (so called “friend of a friend”)
- With a probability (prob-change) swap colours

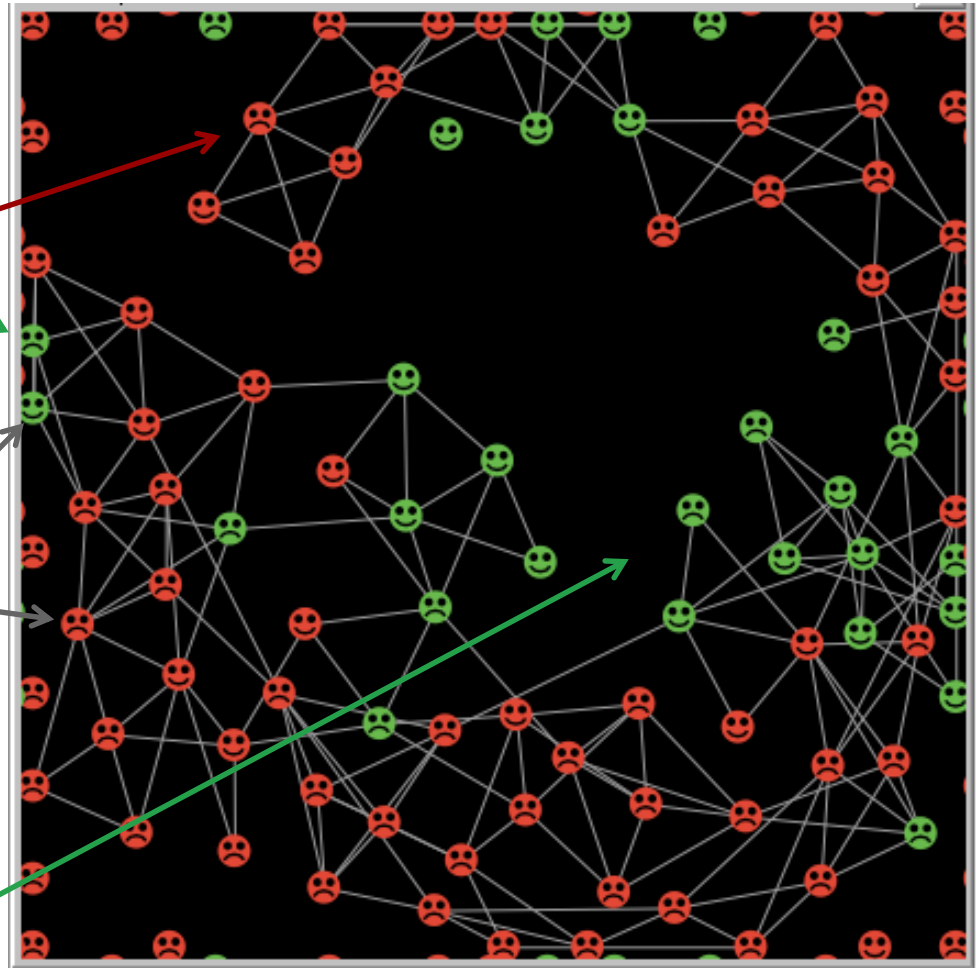
Network Change Model Display

Load and play with simulation "7-network change.nlogo"

Givers shown as green, non-givers as red

Agents with "happy" face have gained a value above average, those "sad" with a value below

Note how system has self-organised so that givers tend to cluster together



Questions!

- Given that there are no rules that obviously favour givers (indeed it costs them to give), why do givers eventually predominate?
- What experiments could you make to the code to try and discover what makes this happen? Try "commenting out" rules and see what happens.
- What does this simulation demonstrate (if anything)?
- How might you prove the effect in a paper?

Collecting Statistics

- From menu: File >> Export >>
  - Export View: saves the view of the world as a picture for future use
  - Export Plot: saves the data from a plot as a ".csv" file for use in plotting/analysis programs
  - Export Output: saves text in output area to a text file (if there is a log of text there from "show" statements in the code)
- For multiple runs, maybe with different parameters, with data automatically appended to a ".csv" file, use Tools >> BehaviourSpace (read about this in manual first)

The End

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http://cfpm.org/simulationcourse

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