Simulating Society in R

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Socio-economic relationships in a society can be simulated with mathematical models. There are many special software (e.g.: Peersim, RePast, Swarm) to simulate single problems. A useful toolkit was written by Gaylord and D'Andria* in Mathematica, making use of it's rule-based programming style and graphical capabilities.

The R has almost the same tools for visualisation, however, it does not permit rule-based programming.

This above toolkit has been transformed to R. This is not only a simple translation because of the differences in the structure of the two program languages. By this way this toolkit is adaptable not only to two dimensional rectangular grid but also other topologies (e.g.: irregular grid, small world, random graph).

This package is demonstrated in the poster corresponding to the first three chapters of the book *Simulating Society — A Mathematica Toolkit for Modeling Socioeconomic Behavior*. The following two groups of social phenomena are simulated:

1) How do people come to have shared values based on ideas, beliefs, likes and dislikes, or attitudes? One possible mechanism for the spreading of values through population is through a sort of contagious process, occurring as individuals come into contact with one another and interact. This interaction results in a form of imitative behaviour sometimes referred to as cultural transmission or social learning.

   In the package several models of the change of values in mobile society are considered. Especially a simpler version of the model is analysed in which social status determines the direction of meme transmission.

2) Why are people generally honest in their dealings with others, even in the absence of a central authority to enforce good behaviour? The role of ostracism is modelled as a tool for discouraging bad behaviour, and thereby encouraging good behaviour. Two cases are demonstrated in which people have the ability to remember or learn about other people's bad behaviour. In the first situation, people remember every individual who has done them wrong in a previous encounter and they refuse to interact with such a person again. In the second situation, good guys use word-of-mouth or

*Gaylord, Richard J. and D'Andria, Louis (1998): Simulating Society - A Mathematica Toolkit for Modeling Socioeconomic Behavior; New York, NY: TELOS/Springer Verlag ISBN 0-387-98532-8

gossip in addition to personal experience to learn who are the bad guys, and they avoid interacting with a person with a bad rep even once.

In R program language there is no need to generate large data files because files can be analysed during the simulation process and only the necessary statistics need to be saved. This method is memory efficient compared to the post processing technique and faster than using two interacting programs.