Habib University

FALL 2019

CS 262 – INTRODUCTION TO COMPUTATIONAL SOCIAL SCIENCE

Assignment No. 2 – October 9, 2019

Due Date: October 21, 2019 (1155h PKT). Grading: 05 %.

This is a very unrealistic model and is specifically created as a mock model to test a few features of NetLogo. It is specified as below:

I. **Model Title:** 'A Very Simple Marriage Model'

II. **Purpose:** The model was designed to simulate monogamous marriages and to address the following question: How does variability in the *life expectancy*, *marriage-age*, and *female-to-male* ratio affect the rates of monogamous marriages in a population?

III. **Agents/Entities and Time:**

   a. **Agents/Entities:** We have one kind of entity: individuals representing humans in a society. Agents are characterized by the following attributes:

   i.   *Gender:* Either 'male' or 'female'.

   ii. *Age:* specified in years, ranging from 1 to **max-age**. The default is 80 years.

   iii. *Marital status:* At any time, agents are either 'unmarried', 'married', or 'widowed'. At the time an agent is created, they are assigned the 'unmarried' marital status.

   iv. *Spouse:* an agent with whom a marriage link is established. In that case, both the agent and their spouse's marital status is set to 'married'. [Hint: use *nobody* primitive in NetLogo for a spouse when a spouse does not exist – check dictionary].

   b. **Time:** A tick (time step) in this model corresponds to one year in the lifetime of agents.

IV. **Process Overview and Scheduling:** Four main processes that occur at every time step (tick) in a model run.

   a. *Aging:* Every time step (tick), all agents advance to one year in age.

   b. *Check-Death:* If an agent reaches the **max-age** (a global variable), they die. In that case, the marital status of an agent's spouse, if exists, is set to 'widowed'.

   c. *Marriage:* This is a very simplistic and orthodox representation. We assume strict monogamy and there is no divorce or extramarital relationship. At every tick, **eligible females** search for a spouse from a pool of **eligible-males.** If found, the **spouse** for both agents is **set** and the couple's marital status is set to 'married'.

i. *eligible-males:* All male agents whose marital status is 'unmarried' and have an *age* which is at least ***marriage-eligibility-age*** (a global variable) and at most ***max-age-to-marry*** (a global variable).

ii. *eligible-females:* Female agents whose marital status is 'unmarried' and have an *age* which is at least ***marriage-eligibility-age*** (a global variable) and at most ***max-age-to-marry*** (a global variable).

d. *Create-New-Agents:* At each tick (representing a year), new agents are created in the same number as those who had died this year to keep the total population of agents as constant. The process of creating new agents is as follows:

i. set shape of an agent as "person" [for visualization].

ii. Place the agent randomly on the grid [for visualization].

iii. Assign gender based on the global variable ***percentage-females***, which defines the percentage of females in the population. For example, if it is set to 60%, the chances for a newly created agent to be a female will be 60%.

iv. Set marital status to be 'unmarried'.

v. If an agent is created at the time of **setup**, then set age to be a number randomly drawn from a range (0, **max-age**), otherwise, age is set to be 1 year for agents created during a simulation.

e. *Stop simulation:* If the number of time steps (years) is equal to **stop-time** (a global variable), then *stop* the simulation.

V. *Stochasticity*: Or randomness occurs in two ways:

i. Assignment of gender at the time of creating a new agent, drawn randomly based on the global variable ***percentage-females***.

ii. Assignment of age (at setup), drawn randomly from a range of (0, **max-age**).

iii. Picking up a spouse by an eligible female agent from a pool of eligible male agents.

VI. **Model Initialization (Setup):** There is no spatial representation of the environment. The model has several global parameters that are outlined as below:

a. **num-agents:** Number of agents in the model (default: 1000). Notice that in this model, the total number of agents remains constant throughout a simulation (see above).

b. **stop-time:** Time to *stop* the simulation. The default is 100 ticks (years).

c. **percentage-females:** used to assign *gender* to agents at the time of their creation (default: 49). Since it is a percentage, the acceptable values must be in the range from 0 to 100.

d. **max-age:** Maximum age that an agent can reach in this model. Once reached to this age, agents die (default: 80 years).

e. **marriage-eligibility-age:** Minimum age from which agents become legally eligible for marriage (default: 18 years).

f. **max-age-to-marry:** The maximum age until which eligible female or eligible male agents will look for a spouse if their status is 'unmarried'.

VII. **Input Data:** The model has no input data.

VIII. **Outputs:** The following screenshot from implementation in NetLogo shows three types of outputs in the form of *time series plots*, *histogram* and *monitors*.