The University of Melbourne
School of Computing & Information Systems

COMP90083 Computational Modelling & Simulation

Assignment 1, 2020

Released: Wednesday 12 August, 2020
Due: 23:59, Sunday 6 September, 2020

Overview

In this assignment, you will use NetLogo to create an agent-based model (ABM) of a complex observed phenomenon: the spread of an infection (such as COVID-19) through a population. Deliverables include a functional NetLogo model of the system, a description of the model using the ODD protocol (Overview, Design concepts, Details), and a brief report describing an investigation conducted using the model.

The objectives of this assignment are to gain experience in:

- using NetLogo to implement an ABM;
- using the ODD protocol to describe an ABM;
- using an ABM to answer a question of scientific or policy interest.

Background

COVID-19 emerged toward the end of 2019 and spread rapidly across the world. Throughout the ongoing pandemic, models have played an important role in developing insight into the dynamics of the outbreak, and informing the public health response.

For example, models have been used to explore:

- the role that asymptomatic individuals play in spreading COVID-19;
- the effectiveness of isolation, testing, quarantine and social distancing for controlling the spread of COVID-19;
- the likely impact of COVID-19 outbreaks on the health system, in terms of number of hospital and intensive-care unit beds required.

Your tasks

Your tasks are:

1. to extend the existing NetLogo model of SIR transmission (epiDEM basic) to capture relevant aspects of COVID-19 transmission;
2. to design and execute one or more experiments with your model in order to address a scientific or policy-relevant question;
3. to write a description of your model using the ODD protocol, and a brief report of your experiments.

Approach

- Start by familiarising yourself with the basic SIR model in NetLogo.
- Read a couple of the recommended papers and choose a question. Keep your question simple! Note: your question does not have to be *novel*—you may choose a question from one of the readings.
- Determine how you need to modify the SIR model in order to answer your question: Do you need to change the disease model? Do you need to change the population structure or attributes?
- Decide what experiments you need to run—which scenarios you need to compare—in order to answer your question.

Procedure and assessment

- This assignment is to be completed *individually*.
- Late submissions will incur a penalty of 2 marks for every day (or part thereof) after the deadline. If there is a valid reason that you require an extension, email Nic well before the due date to discuss this.
- You should submit you assignment via Canvas LMS. Please upload:
  1. Your NetLogo model file;
  2. A document containing your ODD description (max 2 pages);
  3. A document containing your model report (max 2 pages).

  All three files should contain your name and student number.
- We encourage use of the Piazza Discussion Board to discuss and ask questions about this project; however, all submitted work must be your own individual work.
- This project counts for 20% of your total marks in this subject. Marks will be awarded according to the following criteria:

Criterion	**Description**	**Marks**
Question	The question proposed is clearly articulated, feasible, interesting and relevant.	2 marks
Model description	The model is comprehensively described, making appropriate use of the ODD protocol. The design of the model is well matched to the research question.	6 marks
Model implementation	The NetLogo code is well structured, readable, and is well commented and explained. The model interface is clear and intuitive.	6 marks
Model report	The experiments conducted are clearly described and address the question. The results of the experiment are appropriately represented in figures and/or tables. The results are interpreted and an answer to the question is provided.	6 marks
Total		20 marks

Nic Geard
9 August 2020