Homework Assignment Sheet #1

EES 4760/5760 Agent- and Individual-Based Computational Modeling

Homework for Aug. 22–Dec. 5, 2019

General instructions for homework assignments

- Homework is due by the beginning of class on the due date. Late homework will be accepted for half-credit if it is turned in within a week of the due date.

- Because much of the homework will involve working with NetLogo models, I will use Box as a method for managing homework that involves computer files.

- Set up your Box account by going to `http://vanderbilt.box.com` and logging in with your VUNET ID and password. You can find detailed instructions at `http://it.vanderbilt.edu/services/box/`.

- Create a folder called `lastname_EES_4760` (undergraduates) or `lastname_EES_5760` (graduate students), putting your own last name for `lastname`.

- Invite me as a collaborator to the class folder (see instructions at `http://bit.ly/1ZgOpIF`, under "Step 2: Collaborate with Your Team"). On the menu for the class folder, go to "sharing" and "invite collaborators." Then put my email address (`jonathan.gilligan@vanderbilt.edu`) and set the permission to "Editor." This will let me comment on your work after you turn it in.

- Inside this folder, each you start a new homework assignment, create a folder for it. I recommend calling these folders `HW_1`, `HW_2`, etc. Store all the files for a homework assignment in the folder for that assignment.

- You can upload your homework files to the homework folder from the web on `http://vanderbilt.box.com` or you can install the Box desktop application from `https://www.box.com/box-for-devices/` to automatically keep your box account synchronized with your computer.

I encourage you to discuss homework assignments with your classmates. Some assignments will explicitly tell you to work in a team with a classmate. Even when the assignments do not specify working in teams, it is still fine to work together on homework assignments, but **unless the assignment tells you to work in a team, you must actually do all the work yourself**. This means that you can ask a classmate to explain how they solved a problem but you have to go through the steps independently and put the answer in your own words, not simply copy someone else's work.

It is a violation of the honor code to turn in homework that someone else has done for you or which you copied from someone else. If you are unsure about how the honor code applies to an assignment, please ask me.

Homework Policy: Extra-Credit Options

Some homework problems are assigned to graduate students only. Undergraduate students may choose to do any of these problems that interest them, and will receive for extra credit if they do.

I assign grades based on the required work, so your grade will not be affected by whether or not other students do extra credit problems (in other words, I never curve grades downward).

If you did poorly on some homework problems, or did not turn in some homework problems, you can make up some of that deficit by doing extra-credit problems on subsequent assignments. Extra credit on homework only counts toward your homework grade for the semester and cannot compensate for missed work on other assignments, such as the team project or research project.

Thu., Aug. 22:

No homework for today.

Tue., Aug. 27: Homework #1: Set up Box and NetLogo

Everyone:

- **There is nothing for you to turn in**, but do the following two tasks to prepare for next week:

- Download NetLogo version 6.0.2 from `https://ccl.northwestern.edu/netlogo/` and install it on your computer.

- Set up your Box account. Make a Box folder for your homework for this course (call it `Lastname_EES_4760` (undergraduates) or `Lastname_EES_5760` (graduate students), substituting your own last name), and share it with me, giving me "Editor" role.

Thu., Aug. 29: Homework #2: Introducing NetLogo

Everyone:

- As you read along with Section 2.3, follow along on your computer and build the *Mushroom Hunt* model by typing in the code shown in the textbook. The whole program is shown on pages 27–29. **Save your model as `mushroom_hunt.nlogo`.**

  This exercise may seem very simple, but it is the first step toward learning how to program NetLogo and it will be an important first step toward writing your own models.

  After you are done typing in your model, try running it.

  When you are done, make a subfolder called HW_2 in your Box folder for this class, and upload your model.

Notes on Homework

I recommend getting together with a classmate and working together on this assignment. Since the assignment consists of typing code in and running it, do not worry about your work being identical to your partner's. However, I strongly recommend that you type everything in yourself because you will not learn if you just copy someone else's code or download the code from a source on the web.

    If you run into trouble and cannot make your model work, do not worry. Ask a classmate for help, or email me (and attach your `.nlogo` model file), or simply come to class on Tuesday with questions about the problems you had getting your model to work. Since your model file will be on Box, we will be able to discuss the problems in class.

Tue., Sep. 3: Homework #3: Becoming familiar with NetLogo

Everyone:

- This homework consists of reading and working through tutorials, so there is nothing to turn in.

- Everyone should do exercises 1–2 in Chapter 2 of Railsback & Grimm. This consists of reading and working through tutorials, so there is nothing to turn in.

Thu., Sep. 5: Homework #4: Experimenting with NetLogo

Everyone:

- Make a folder called "HW_4" in your Box folder and upload your work when you're done (Word or text files for the descriptions and ODD document, and `.nlogo` files for your NetLogo models).

- Railsback & Grimm, Chapter 2, exercises Exercises 3–4.

  For exercise 4 in chapter 2, you will make seven sequential modifications of the basic mushroom hunt model. Each step modifies the previous one, so the last model will have all the modifications from the bulleted list in Ex. 2.4. Save each model with a new name, such as `ex_2_4a.nlogo`, `ex_2_4b.nlogo`, \dots, `ex_2_4g.nlogo`

- Railsback & Grimm, Chapter 3 exercise 3.

  Write your answers in any convenient text format (a simple text file, a Word document, a `.pdf` file, or whatever suits you). Call the file `ex_3_3.docx` (or `ex_3_3.pdf`, etc.).

Notes on Homework

My advice for Chapter 3, Exercise 3 is don't be too ambitious with your model, but keep it very simple. Don't worry about getting everything right. If there are things you don't feel sure about or don't know how to express, you should just write a parenthetical note in your ODD document commenting on your difficulty. Come to class prepared to talk about how this exercise went and where you felt confused about trying to specify your model.

     As always, I recommend working with another classmate or in a group, comparing your different ways of approaching the exercises, and discussing any difficulties together.

Tue., Sep. 10:

No homework for today.

Thu., Sep. 12: Homework #5: Science with models: Butterfly mating

Everyone:

- Railsback & Grimm, Ch. 4, Ex. 4.2, 4.4

- Railsback & Grimm, Ch. 5, Ex. 5.1, 5.2, 5.4, and 5.7.

Graduate Students:

- Railsback & Grimm, Ch. 5, exercises 5.5 and 5.8

Notes on Homework

For exercise 5.1, you shoudl have three versions of the model. Each version adds new changes on top of the previous version:

- one version of the model that incorporates all the changes (listed with triangular bullets in the book) in section 5.2 (pp. 64–68),

- one version that starts with the previous version from 5.2 and also incorporates the additional changes in section 5.4 (p. 70),

- one version that starts with the previous version from 5.4 and also incorporates the additional changes in section 5.5 (p. 73)

For exercise 5.2, look in the NetLogo dictionary for a command that does what you want. The point of this exercise is to start getting you used to looking for new NetLogo commands when you want to do something you haven't yet learned about.

Tue., Sep. 17:

No homework for today.

Thu., Sep. 19: Homework #6: Reproducing a model from its ODD

Graduate Students:

- Graduate students should do Railsback & Grimm, Ex. 5.11

Notes on Homework

GRADUATE STUDENTS:

You can download the journal article for this exercise, R. Jovani & V. Grimm. (2008) "Breeding synchrony in colonial birds: From local stress to global harmony", *Proc. Royal Soc. London B* **275**, 1567-63 from the class web site, `https://ees4760.jgilligan.org/files/models/chapter_05/Jovani_Grimm_2008_Breeding.pdf`.

- The paper by Jovani and Grimm forgot to specify the parameter SD. It should have the value 10.0.

Tue., Sep. 24: Homework #7: Testing and debugging models

Everyone:

- Railsback & Grimm, Ch. 6, Ex. 6.2, 6.3, 6.5

Graduate Students:

- Railsback & Grimm, Ch. 6, Ex. 6.4, 6.7

Thu., Sep. 26:

No homework for today.

Fri., Sep. 27: Semester Project Assignment: Research project proposal

Everyone:

- Turn in a one-to-two page (double-spaced) proposal for your semester research project.

Notes on Assignment

This proposal should describe the topic you want to work on, identify a published open-source model you want to work with, and and describe how you think you might want to extend it.

You should consult the textbook, the Model Library in NetLogo, and the list of reading and computational tools and resources I distributed on the first day of class (it's also posted on the course web site).

If you really want to write your own model instead of working with a published one, that is also acceptable, but be aware that it may be a lot more work. I recommend that you do this only if you have previous experience in programming.

See the semester project assignment for details.

Tue., Oct. 1: Homework #8: Analyzing model experiments

Everyone:

- Railsback & Grimm, Ch. 8, Ex. 8.1, 8.2

- Railsback & Grimm, Ch. 9, Ex. 9.1, 9.3, 9.4

Graduate Students:

- Railsback & Grimm, Ch. 8, Ex. 8.3, 8.4

- Railsback & Grimm, Ch. 9, Ex. 9.6

Thu., Oct. 3: Homework #9: Programming agent sensing

Everyone:

- Railsback & Grimm, Ch. 10, Ex. 10.1, 10.2

- Railsback & Grimm, Ch. 11, Ex. 11.1, 11.2

Graduate Students:

- Railsback & Grimm, Ch. 11, Ex. 11.3

Tue., Oct. 8:

No homework for today.

Thu., Oct. 10: Team Project Assignment: Team modeling project presentations

Everyone:

- Teams will give a presentation on their projects.

Notes on Presentation

See the team project assignment sheet for details on what I expect for the presentation.

Fri., Oct. 11: Team Project Assignment: Team modeling project reports

Everyone:

- Turn in written report for team project on your Box folder.

Notes on Report

See the team project assignment sheet for details.

Tue., Oct. 15: Semester Project Assignment: Analysis of a published model

Everyone:

- Study the code and ODD of the model you chose for your semester research project, play with the model and run some BehaviorSpace experiments to examine its output.

  Turn in a 3–5 page (double-spaced) write-up about the model.

Notes on Assignment

See the project assignment sheet for details about this assignment.

Thu., Oct. 17:

No homework for today.

Tue., Oct. 22:

No homework for today.

Wed., Oct. 23: Semester Project Assignment: Research project ODD

Everyone:

- Turn in an ODD for extending your chosen model to ask new questions.

Notes on Assignment

See the semester research project assignment sheet for details.

Thu., Oct. 24: Fall Break

Fall Break. No class. Enjoy yourselves.

Tue., Oct. 29:

No homework for today.

Thu., Oct. 31:

No homework for today.

Tue., Nov. 5:

No homework for today.

Thu., Nov. 7:

No homework for today.

Fri., Nov. 8: Semester Project Assignment: Draft model code for research project

Everyone:

- Turn in a draft `.nlogo` file with your modified model. The ODD for your modified model should be included in the "Info" section of the model.

  You should *also* turn in a document that describes what you are satisfied with about your draft model and what problems you are struggling with.

Notes on Assignment

The model code you turn in should run, but it does not need to be perfect.
    The point of this deadline is so that you can check in with me about how things are going so I can give you feedback and suggestions.
    See the project assignment sheet for details.

Tue., Nov. 12:

No homework for today.

Thu., Nov. 14:

No homework for today.

Tue., Nov. 19:

No homework for today.

Thu., Nov. 21:

No homework for today.

Tue., Nov. 26–Thu., Nov. 28: Thanksgiving Break

Thanksgiving Break. No class. Enjoy yourselves.

Tue., Dec. 3: Semester Project Assignment: Research project presentations

Everyone:

- You will make a ten-minute presentation in class about your model (seven minutes of talking and three minutes for questions).

Notes on Assignment

There will not be time to go into all the details in your presentation, so focus on:

- the big question you were addressing,

- a short description of the approach you took to answer it using an agent-based model,

- what you learned from running the model.

See the project assignment sheet for details.

Thu., Dec. 5: Semester Project Assignment: Research project presentations

Everyone:

- You will make a ten-minute presentation in class about your model (seven minutes of talking and three minutes for questions).

Notes on Assignment

There will not be time to go into all the details in your presentation, so focus on:

- the big question you were addressing,

- a short description of the approach you took to answer it using an agent-based model,

- what you learned from running the model.

See the project assignment sheet for details.

Fri., Dec. 6: Semester Project Assignment: Research project report

Everyone:

- Turn in a written report about your research project. Your report should follow the model of a research report for *Science* magazine:

Notes on Assignment

See the project assignment sheet for details.