

Homework Assignment #3

due: Tuesday, February 16, 10 am
(via gradescope and ~/share.dir/)

Use my feedback on your first version of the Bibliography & Model for your main project to revise it.

Due Tue, Febr. 16, 10:00am:

1. Your final version model/bibliography
(via gradescope) Describe your model as detailed as possible. (Handwritten is fine, whatever is fastest for you. Content is what you spend time on.) Try to rephrase your description already with a notation as precise as possible. For example for the Ising model in two dimensions, you need to say that you have spins S_{ij} on a rectangular lattice. On each lattice site ij the spin is $S_{ij} \in \{+1, -1\}$ where $i = 1, 2, \dots, L$ and $j = 1, 2, \dots, L$. And for the Ising model you would make a sketch of the lattice. You would then continue with the update rules. Goal is to get you started on writing the model section of your first paper. All this might be easiest in form of a handwritten description. Keywords are fine. Provide the necessary equations and figures. (hand-written equations and sketches are fine.)
2. final version of References which specify model & background of your project:
(via gradescope)
 - at least five scientific papers
 - any further references, which are necessary to define your model precisely (and necessary provide information on technique, e.g. Euler step) and which provide the information about previous work on the topic of your project

This list of references of papers and book(s) are references related to your project. Goal is to work on the References section of your first paper. Use the format described below. These references may not all be exactly for your model but are references you will need for your background section.

3. paper(s) which describes best the model you will use (In case of a book being your major source, just make a copy of the appropriate page(s)).
 - via gradescope
 - via your ~/share.dir/
Please give readpermission. If you have done so already, no need for doing this step again. If you have not yet done this and/or have some additional major paper, please do this step.

Bibliography/Model

Goals:

(A) Goal (Now): As listed below your assignment is to have a useful list of references and a detailed model description. The references will be the references of your scientific paper(s) of the course. Use as guidance for your search of references: Main Goal is that you will know the **model** of your project precisely. For the example of the traffic flow it would mean that you know exactly all rules of how cars are put on the street, how they are moved further on the street and how their velocities are updated. Goal is that you know every detail of your model, so that you will be able to write the program for your model (starting mid March).

Usually it is a long process to find the paper(s) which describe a simple enough model (for a one semester long instead of year long project) and to find paper(s) which are written clearly enough (the majority of papers are written for experts and are not always very pedagogical). You will have to jump from paper to paper, i.e. start with a list of papers you found via web of science, scan the papers, check references therein and go from those references to the next set of papers, etc. This takes many days and sometimes weeks of work and that's why we dive into the bibliography already now.

(B) Goals (Later): As part of your first paper you will also describe the **background** for the model you will use for your project. In case of the traffic flow model this would mean that you find out (by finding and reading the appropriate references) which other traffic models have been studied (e.g. two lane, city grid, ...) and what the main results are (including some theoretical and experimental results). You should become an expert in the topic of your project. You will find this information in scientific papers in a paragraph usually called "introduction" or "background" or "theory".

How to Read Papers:

To scan efficiently through the papers and to read more carefully through the papers, indicate on a copy of each paper: motivation, previous models, model/simulation, results. These keywords will help you to identify most important papers and to summarize all your findings for your papers.

Curr. Sci. India **77**, 411 (1999).

How to Give Reference: (Examples; format as in APS journals)

Article: D. Chowdhury, L. Santen and A. Schadschneider, Curr. Sci. India **77**, 411 (1999).

Book: M.E.J. Newman, *Computational Physics*, Revised and expanded, (Createspace, North Charleston, SC, 2013).

Gould, H.; Tobochnik, J.; Christian, W. *An Introduction to Computer Simulation Methods : Applications to Physical Systems*, Revised third.; ComPADRE: Place of publication not identified, 2017.