# Homework Assignment #5

**(as email due: Tuesday, February 7, 8:00 am )**

**1.** Finish today's in-class work **16.** Copy your program into your share.dir and make it readable. Answer to this question should be the filename of your program. I will check your program, so please let me know as soon as possible, once you finished your program. (due Tue, 8:00 am)

**2.** Start reading the papers which you found for your project to aquire the necessary knowledge for the background/method section(s) of your paper. Answer to this question should be "done" (although this is work which is never finished for ongoing research topics :-).

**3.** Read about "game of life" and "cellular automata". As answer to this question keywords and/or cool web pages or other sources like books are fine. (This is not intended to take much of your time. 2. of this assignment is for what you should spend most time.) Purpose of this question is to make your mouth watery for our next course material. **4.**

**Comments:** What of this assignment was most difficult and/or most interesting? Do you have any comments about last class and/or this course?

**Solutions** to programs for previous in-class work are e.g.
~ kvollmay/classes.dir/capstone_s2012.dir/unix_C++_intro.dir/C++2a.cc

# Paper

Use the following description of a scientific paper as guideline for the two papers of your main project. The first paper should include the title, the "introduction/background", the "model/method" and the "references", which are cited in these parts of the paper. In the second and final paper you will write the complete paper (revisit the sections of the first paper for changes.) For both papers use a more formal writing style than you will use in your oral presentation.

**Audience:** Your audience will be juniors and seniors who most likely do not have your background. Include therefore all information which is necessary to understand your project.

**Examples:**

- D. Chowdhury, L. Santen and A. Schadschneider, "Vehicular Traffic: A System of Interacting particles Driven Far From Equilibrium," Curr. Sci. India **77**, 411 (1999).
- all scientific papers you have read for your project.

**Contents:**

- Title
- Author(s), Address
- Abstract: An abstract is a summary of what you did and your results. The abstract is for a reader who might not have time to read the rest of your paper or who decides depending on your abstract if she or he reads the whole paper. The abstract should be understandable without the rest of the paper and should contain: the system you study, the model, the method and the results.
- Text: The following text should be understandable by itself. Reference any information which you used from other sources or which includes details not necessary for the reader's understanding.
  - Introduction/Background[1]:
    This section might give some historical background and/or necessary background information. You might talk about other models than the one you use. The Introduction also serves as a motivation for why your project is of specific interest and importance. The main purpose of the introduction is to put your project into context: What has been done in previous work? Which models have been used? Which experiments have been done? Which theory has been done? What were the results? Which of the models are you using, or if you build your own model, what are the reasons for altering the previously used models? As part of the introduction you might give a general description of your project. You might end your introduction with an outline of the rest of the paper.
    Please note my comments on your bibliography/model papers for a more specific description of this section for your project.

[1] Sometimes this is split into two sections

– Model:
In this section you describe your model exactly. This includes for example the dimension of your system, whether you use a lattice and all applied rules (as e.g. the steps in the Nagel-Schreckenberg traffic flow model). In principle, after reading your description any reader should be able to write the program for exactly the same model as yours. For a more specific description what this section should contain for your projects, use my comments to your bibliography/model.

– Theory:
You may not need this section. This is a section one uses if there are analytical calculations possible. For theoreticians this is the main section.[2]

– Simulation:[3]
This section includes the method you use. For the second paper you will include in this section a specification of all parameters used in your simulation. Your description needs to specify all details which are necessary to reproduce your simulation results, for example for the traffic flow model you specify the initial configuration (how do you put on cars and which velocities do you give them), the number of time steps, the lattice size, and the boundary conditions (what happens at the ends of the road).[4]

– Results:
This section describes the results of your project. It can include tables, formulae and figures. Tables and figures should have captions. Figure captions should have text which describes what the figure shows. All formulae should be numbered.

– Conclusions/Discussion:
In this section you draw conclusions of your results and you might include what one could do in future work.

– References:
This is the bibliography of all references to which you refer in the text.

[2]**Meghan,** you might include here the solution to the two body problem and a summary to some of the theory on the three body problem. **Kin,** you might refer to some very simple population dynamics solutions, such as exponential growth, and also a summary of which type of questions have been investigated, such as e.g. stability analysis. **Kota,** you summarize some of the theoretical work on Yatzee.

[3]This section is often combined with the section "Model."

[4]**Jessica,** you would include here how to rewrite the differential equation to get the update rule for $c(\vec{x}, t + \Delta t)$. **Lia,** you would specify the intial patterns $p$. **Matthew**, you would specify all probabilities for your DNA sequencing. For the case of trying out different sets of probabilities, you would specify those parameter sets.