

IN-CLASS WORK: MINI-PROJECT III

Today you will work in groups of two or three on assigned mini-projects (see below to which group and project you belong). All of you will do analysis using the Nagel-Schreckenberg traffic flow model.

We define the mean velocity at time t as

$$v_{\text{av}}(t) = \frac{1}{N} \sum_{i=0}^{N-1} v_i(t) \quad (1)$$

Mini-Project III.1 (Rajasri, Connor, Katie)

Copy into your working directory `~kvollmay/share.dir/inclass.dir/traffic10_miniIII1.py`

III 1a:

Look at this program and confirm that it determines $v_{\text{av}}(t)$.

III 1b:

Run this program for $PDEC=0.0$, $VMAX=4$ and for $PCAR=0.1$. Look at the result.

III 1c:

Run this program also for the following $PCAR=0.2, 0.3, 0.4, 0.6, 0.8$.

III 1d:

Make one figure $v_{\text{av}}(t)$ with all investigated $PCAR$. Today is not enough time for making talk slides, instead your result for today is one figure. So for your group this means $v_{\text{av}}(t)$ for $PDEC=0.0$ and all investigated $PCAR$. Label your result with what it shows. Put your graph (eps-file or xmgrace-file) into your `~/share.dir` and give read permission. We will all look at your result and try to interpret (just words are fine) your results.

Mini-Project III.2 (Narayan, Alex, CJ)

Copy into your working directory `~kvollmay/share.dir/inclass.dir/traffic10_miniIII1.py`

III 2a:

Look at this program and confirm that it determines $v_{\text{av}}(t)$.

III 2b:

Run this program for $PDEC=0.25$, $VMAX=4$ and for $PCAR = 0.1$. Look at the result.

III 2c:

Run this program also for the following $PCAR=0.2, 0.3, 0.4, 0.6, 0.8$.

III 2d:

Make one figure $v_{\text{av}}(t)$ with all investigated $PCAR$. Today is not enough time for making talk slides, instead your result for today is one figure. So for your group this means $v_{\text{av}}(t)$ for $PDEC=0.25$ and all investigated $PCAR$. Label your result with what it shows. Put your graph (eps-file or xmgrace-file) into your `~/share.dir` and give read permission. We will all look at your result and try to interpret (just words are fine) your results.

Mini-Project III.3 (Jonathan, Ziqi)

Copy into your working directory `~kvollmay/share.dir/inclass.dir/traffic11_miniIII3.py`

III 3a: You will see from the previous groups that $v_{av}(t)$ equilibrates after some time to some value v_{eq} around which v_{av} fluctuates. Your group will determine the average of the long time limit of $v_{av}(t)$ as function of c . Confirm that `traffic11_miniIII3.py` indeed determines

$$v_{eq}(c) = \frac{1}{(t_{tot} - t_{eq})} \sum_{t > t_{eq}}^{t_{tot}} v_{av}(t) \quad . \quad (5)$$

We now want to see how v_{eq} depends on the concentration of cars

$$c = \text{nocars/double(ROADLENGTH)} \quad . \quad (6)$$

There is no need to understand the theoretical values. I will explain them only if there will be enough time in class.

III 3b:

Run this program for `PDEC=0.0`. This will take a few minutes. Look at the result.

III 3c:

Ensure to keep `PDEC=0.0` (this is specific to your group) and run the program three times to get results for `VMAX=3` and `VMAX=4` and `VMAX=5`.

III 3d:

Make one figure $v_{eq}(c)$ with all investigated `VMAX`. Today is not enough time for making talk slides, instead your result for today is one figure. So for your group this means $v_{eq}(c)$ for `PDEC=0` and all investigated `VMAX`. Label your result with what it shows. Put your graph (eps-file or xmgrace-file) into your `~/share.dir` and give read permission. We will all look at your result and try to interpret (just words are fine) your results.

Mini-Project III.4 (Luke, Houtan)

Copy into your working directory `~kvollmay/share.dir/inclass.dir/traffic11_miniIII3.py`

III 4a: You will see from the previous groups that $v_{av}(t)$ equilibrates after some time to some value v_{eq} around which v_{av} fluctuates. Your group will determine the average of the long time limit of $v_{av}(t)$ as function of c . Confirm that `traffic11_miniIII3.py` indeed determines

$$v_{eq}(c) = \frac{1}{(t_{tot} - t_{eq})} \sum_{t > t_{eq}}^{t_{tot}} v_{av}(t) \quad . \quad (7)$$

We now want to see how v_{eq} depends on the concentration of cars

$$c = \text{nocars/double(ROADLENGTH)} \quad . \quad (8)$$

There is no need to understand the theoretical values. I will explain them only if there will be enough time in class.

III 4b:

Run this program for `PDEC=0.25`. Note that you will have to change this value. This will take a few minutes. Look at the result.

III 4c:

Ensure to keep `PDEC=0.25` (this is specific to your group) and run the program three times to get results for `VMAX=3` and `VMAX=4` and `VMAX=5`.

III 4d:

Make one figure $v_{eq}(c)$ with all investigated `VMAX`. Today is not enough time for making talk slides, instead your result for today is one figure. So for your group this means $v_{eq}(c)$ for `PDEC=0.25` and all investigated `VMAX`. Label your result with what it shows. Put your graph (eps-file or xmgrace-file) into your `~/share.dir` and give read permission. We will all look at your result and try to interpret (just words are fine) your results.