

Lab 1

Distributed Intelligent Systems,

Fall 2018

Anwar Quraishi

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Lab 1

- Self-Organisation
 - Part 1 focuses on models of biological ants using a trail laying and following behavior to exploit a food source.
 - Part 2: Ant Colony Optimization (ACO) approaches can be reformulated to a shortest path problem. Applied to the Travelling Salesman Problem (TSP).
- Lecture 1 and 2 of the course (and the additional readings).

Linux

- Labs will take place in Ubuntu Linux
 - You may log in with your GASPAR username and password
 - Your permanent personal storage is located in `/home/username/myfiles/`
 - Always work in that directory !!!
 - info on how to access this outside the lab:
<http://enacit.epfl.ch/stockage/etudiant.shtml>

Getting started

- Download Lab01.tar.gz from Moodle
- Decompress it into your user (myfiles) directory:

```
tar xvzf Lab01.tar.gz
```

Tools – Part 1 (C and Matlab)

On the terminal:

```
./antsim [environment] [species] [iterations] > simul.m
```

In Matlab:

```
>> simul
```

1 iteration

```
>> antsim_stepbystep
```

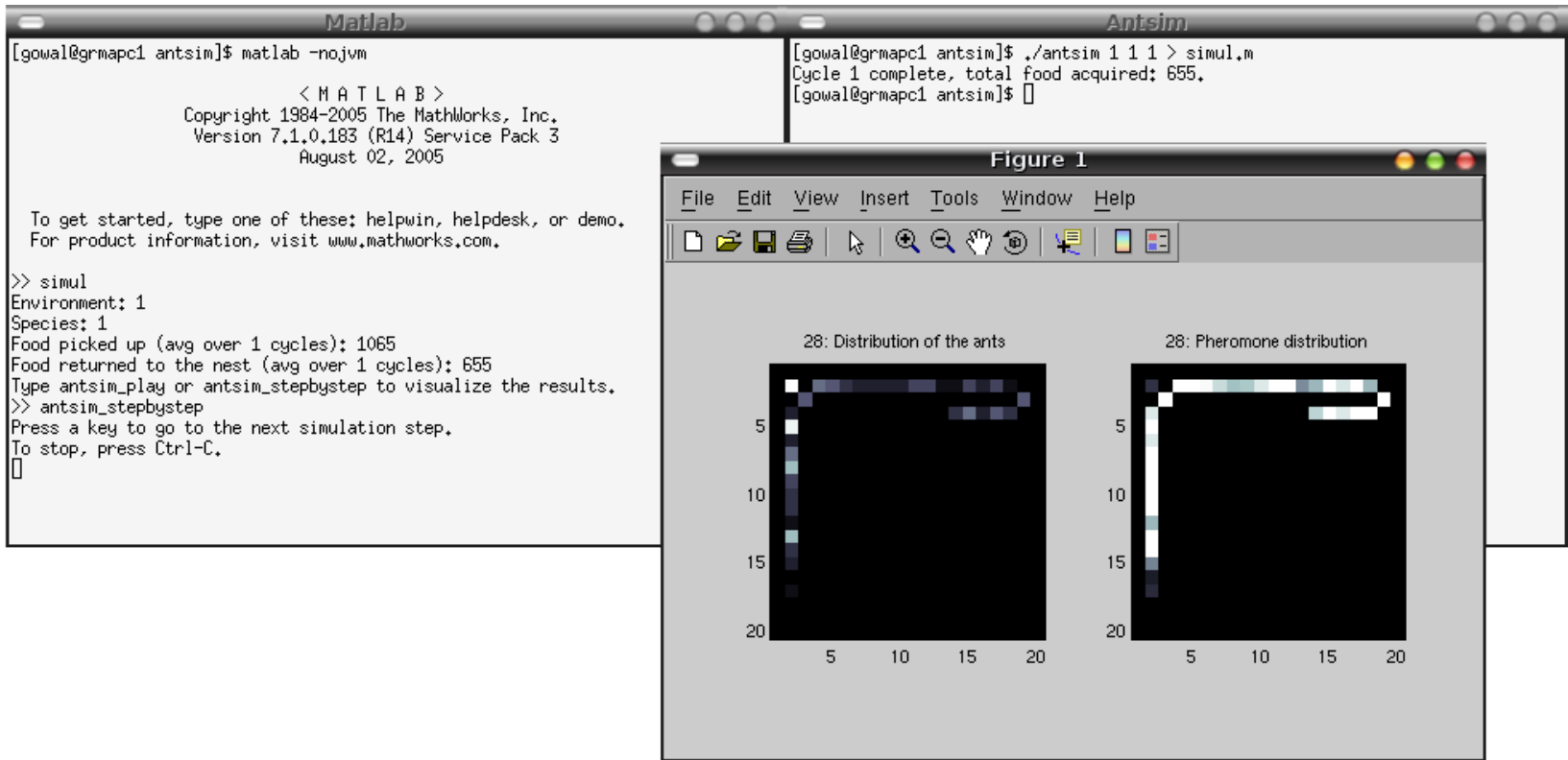
```
>> antsim_play
```

Multiple iterations

```
>> antsim_histogram
```

Example (1 iteration)

1.



The screenshot shows a Matlab window on the left and an Antsim window on the right. The Antsim window displays the output of a simulation cycle, including the number of ants and food acquired. A Figure window in the foreground shows two side-by-side plots: '28: Distribution of the ants' and '28: Pheromone distribution'. Both plots are 20x20 grids with axes labeled from 0 to 20. The ant distribution plot shows a cluster of white and light blue pixels in the top-left corner. The pheromone distribution plot shows a similar cluster of white and light blue pixels in the top-left corner, indicating the path of the ants.

```
[gowal@grmapc1 antsim]$ matlab -nojvm

< M A T L A B >
Copyright 1984-2005 The MathWorks, Inc.
Version 7.1.0.183 (R14) Service Pack 3
August 02, 2005

To get started, type one of these: helpwin, helpdesk, or demo.
For product information, visit www.mathworks.com.

>> simul
Environment: 1
Species: 1
Food picked up (avg over 1 cycles): 1065
Food returned to the nest (avg over 1 cycles): 655
Type antsim_play or antsim_stepbystep to visualize the results.
>> antsim_stepbystep
Press a key to go to the next simulation step.
To stop, press Ctrl-C.
[]
```

```
[gowal@grmapc1 antsim]$ ./antsim 1 1 1 > simul.m
Cycle 1 complete, total food acquired: 655.
[gowal@grmapc1 antsim]$ []
```

28: Distribution of the ants

28: Pheromone distribution

Example (10 iterations)

```
Matlab                               Antsim
[gowal@grmapc1 antsim]$ matlab -nojvm

      < M A T L A B >
  Copyright 1984-2005 The MathWorks, Inc.
  Version 7.1.0.183 (R14) Service Pack 3
  August 02, 2005

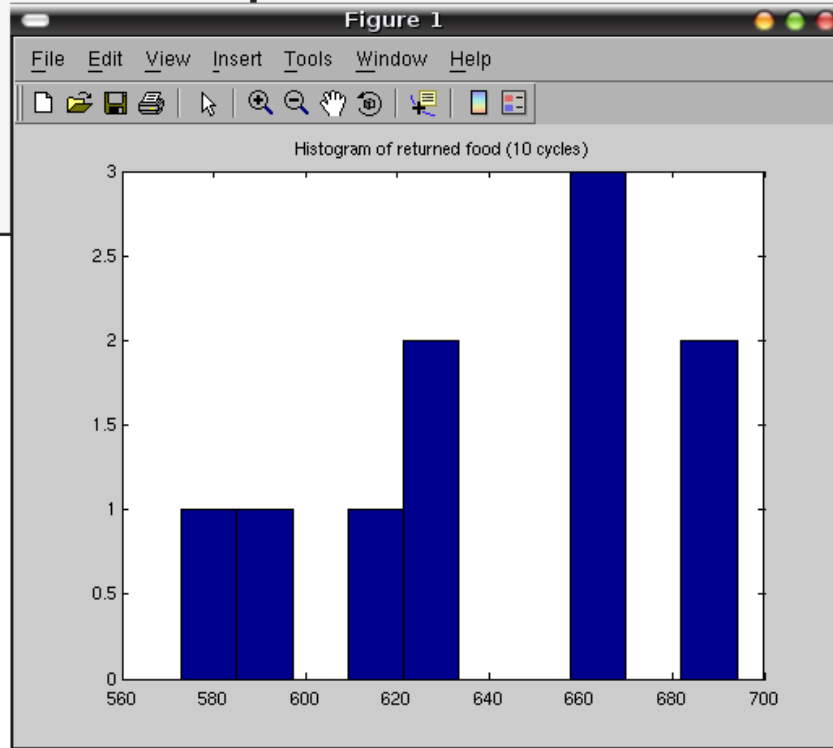
  To get started, type one of these: helpwin, helpdesk, or demo.
  For product information, visit www.mathworks.com.

>> simul
Environment: 1
Species: 1
Food picked up (avg over 10 cycles): 986
Food returned to the nest (avg over 10 cycles): 640.4
Type antsim_histogram to visualize the results.
>> antsim_histogram
>> []

[gowal@grmapc1 antsim]$ ./antsim 1 1 10 > simul.m
Cycle 1 complete, total food acquired: 666.
Cycle 2 complete, total food acquired: 624.
Cycle 3 complete, total food acquired: 683.
Cycle 4 complete, total food acquired: 573.
Cycle 5 complete, total food acquired: 694.
Cycle 6 complete, total food acquired: 590.
Cycle 7 complete, total food acquired: 669.
Cycle 8 complete, total food acquired: 615.
Cycle 9 complete, total food acquired: 666.
Cycle 10 complete, total food acquired: 624.
[gowal@grmapc1 antsim]$ []
```

2.

1.



Tools – Part 2 (Matlab)

- A Matlab script will allow you to implement different parts of the assignment:

```
tsp( 'random', cities) % random
```

```
tsp( 'guess', cities) % ?
```

```
tsp( 'ant', cities) % EAS
```


Additional recommendations

- **Read the first page of the lab **carefully**.**
- **Please fill in the feedback form on Moodle.**
- **This lab is not graded and you will be given a solution sheet after the session.**
- **This means that you can collaborate with each other.**

Questions...

- Office hours: email to TA mailing list
- TA mailing list: dis-ta@groupes.epfl.ch