PSET8

1. Greetings!
2. This is a demo of simulating an infectious process
3. We have a simulation developed in OCaml using object oriented programming concepts
4. First I am going to show you my simulation of the infectious process with the default values in the config.ml file
5. Then I will show you how the infectious process evolves when we change various parameters in the config.ml file

Simulation with the default parameters

1. Here I am showing the simulation with the default parameter values
2. On the LHS, we see how susceptible individuals are getting infected
3. Susceptible individuals are shown in BLUE
4. Infected individuals are shown in RED with a circle around it
5. The radius of the red circles is proportional to the required social distancing
6. The gray crosses correspond to the diseased individuals

Simulation with the default parameters

1. On the RHS, we have a stacked bar graph, which is quite informative
2. The gray area at the bottom of the graph corresponds to the diseased people
3. The red area corresponds to the infected people
4. The blue area corresponds to the suscebtile people
5. And finally the black area at the top corresponds to the folks, who have recovered and are now immune to the disease
6. At the bottom, we have the statistics about the population
7. From the left to right, these numbers are XX of diseased, XX of infected, XX of susceptible and XX of recovered and have immunity

Changing the default parameter values

1. Let me now repeat the simulation, after changing certain parameter values
2. I am going to update the config.ml file and compile again
3. BTW, the file, config.ml, has all the parameter values that we can play around with and observe how the changes affect the infectious process
4. I am going to change the NEIGHBOR_RADIUS from its default value of 4 to 1.
5. What does it mean?
6. It means that now less people will become infected. Because, the infection does not spread that far away from an infected person
7. Let me recompile and re-run the experiment...

Changing the default parameter values

1. Let me now change the NEIGHBOR_RADIUS to 8
2. What will it do?
3. It means that the disease is more contagious - it can spread to more people than before
4. Let me recompile and re-run the experiment
5. As we can see, a lot more people got infected - and consequently, a lot more people died as a result of the infection

Changing the default parameter values

1. Now, let me increase the IMMUNITY PERIOD item First, let me change the NEIGHBOR_RADIUS to 4
2. The default immunity duration is 100 time steps
3. Let me change it to 200 time steps
4. This means a person who was previously infected and recovered will have twice as long as immune to the disease
5. Let me recompile and re-run.
6. Here it is ... As we can see, more people have recovered and are immune to the disease. Because the black area is very large

Changing the default parameter values

1. There are many more parameters that we can change and see how the infectious process are impacted by those changes
2. For example, the probability of mortality or mortality rate
3. The default value in the config.ml file is 0.02
4. However, for certain infectious diseases this can be higher
5. For both the IMMUNITY PERIOD and RECOVERY PERIOD, not only can we change their mean values, but also the standard deviation - so this simulation can very closely model a true infectious process
6. Thank you so much!