Rabbit Population ABM

Release 1

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CHAPTER 1

agent-based-modelling

1.1 agentframework module

class agentframework.**Agent**(*env*, *agents*, *x*, *y*)
Bases: object

An Agent takes a random walk through a two-dimensional environment.

environment
The environment in which the Agent is moving. A list of equal-length lists of integers.

env_height
The height of the environment.

env_width
The width of the environment.

y
Integer. The Agent's y-coordinate within the environment.

x
Integer. The Agent's x-coordinate within the environment.

distance_between(*agent*)
Find Euclidean distance between this Agent and another Agent.

Parameters **agent** – Another Agent.

eat()
Define an agent's eating of resource from environment.

move()
Move agent with random unit-sized step in each of two dimensions.

class agentframework.**Environment**(*file*)
Bases: object

Transforms a CSV file into a 2-d environment with which an agent can interact.

env
A list of equal-length lists of integers representing grass in a field.

class agentframework.**Fox**(*env*, *agents*, *x*, *y*)
Bases: *agentframework.Agent*

TODO: A Fox is an Agent that hunts rabbits and eats them.

class agentframework.**Rabbit**(*env*, *agents*, *x*, *y*, *lifespan*)
Bases: *agentframework.Agent*

A Rabbit is an Agent that eats grass, reproduces, ages, and dies.

die()
When a Rabbit dies, it is removed from the list of living Rabbits.

eat()
A Rabbit eats just like an Agent, but dies if it runs out of energy.

get_older()
Rabbits age; and when their age exceeds their lifespan, they die.

mate(*range*)
Mature female rabbits become pregnant whenever male is in range, and then give birth after ten steps.

Parameters **range** – Integer. Distance within which Rabbits mate.

move()
Rabbit moves just like an Agent, but uses energy to do so.

1.2 gui module

gui.**run**()
Runs the Graphical User Interface.

gui.**update**(*frame_number*)
Updates the visualization for matplotlib.

1.3 read_cmd module

This module reads parameters for the model from the command line, and defines the default parameters if none are specified.

read_cmd.**parameters**(*cmd_line_input*)
Read parameters defined from command line, or return with defaults if no explicit parameters set.

Parameters **cmd_line_input** – List of strings read from command line by sys.argv.

Return: Tuple (num_of_agents, lifespan, neighbourhood, num_of_iterations, animate)

1.4 run_model module

An agent-based model demonstrating population dynamics of mating rabbits.

This file is intended to be the main script run from the command line.

run_model.**create_rabbits**(*environment*, *num_of_rabbits*, *coordinates*, *lifespan*)
Make new Rabbits, and return them in a list.

Parameters

- **environment** – A list of equal-length lists of integers representing quantities of grass in a field.
- **num_of_rabbits** – An integer specifying how many rabbits will be created.
- **coordinates** – A list of dicts including "x" and "y" values.
- **lifespan** – An integer specifying at what age these new rabbits will die.

Return: A list of Rabbits.

run_model.**my_timer**(*process*)
Decorator function to time the process.

run_model.**rabbits_interact**(*rabbits*, *neighbourhood=10*)
Shuffle the rabbits and then make them interact.

Parameters

- **rabbits** – List of Rabbits.
- **neighbourhood** – Integer representing distance at which Rabbits will mate.

run_model.**run_model**()

run_model.**save_data**(*environment*, *rabbits*)
Saves data generated by running the model.

Write environment to CSV file, and Agent data to text file, and test data to CSV file.

Parameters

- **environment** – A list of equal-length lists of integers representing quantities of grass in a field.
- **rabbits** – List of Rabbits.

1.5 visualize module

visualize.**show_plot**(*environment*, *rabbits*, *neighbourhood*, *num_of_iterations*)
Shows animated plot of rabbits' movements.

Parameters

- **environment** – A list of equal-length lists of integers representing quantities of grass in a field.
- **rabbits** – List of Rabbits.
- **neighbourhood** – Integer representing distance at which Rabbits will mate.
- **num_of_iterations** – Integer. Maximum repetitions of agent interactions.

1.6 web_scraper module

web_scraper.**scrape**(*src*)
Scrape x and y values from online table found online.

Parameters `src` – String representing URL.

CHAPTER 2

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