BIOSIM

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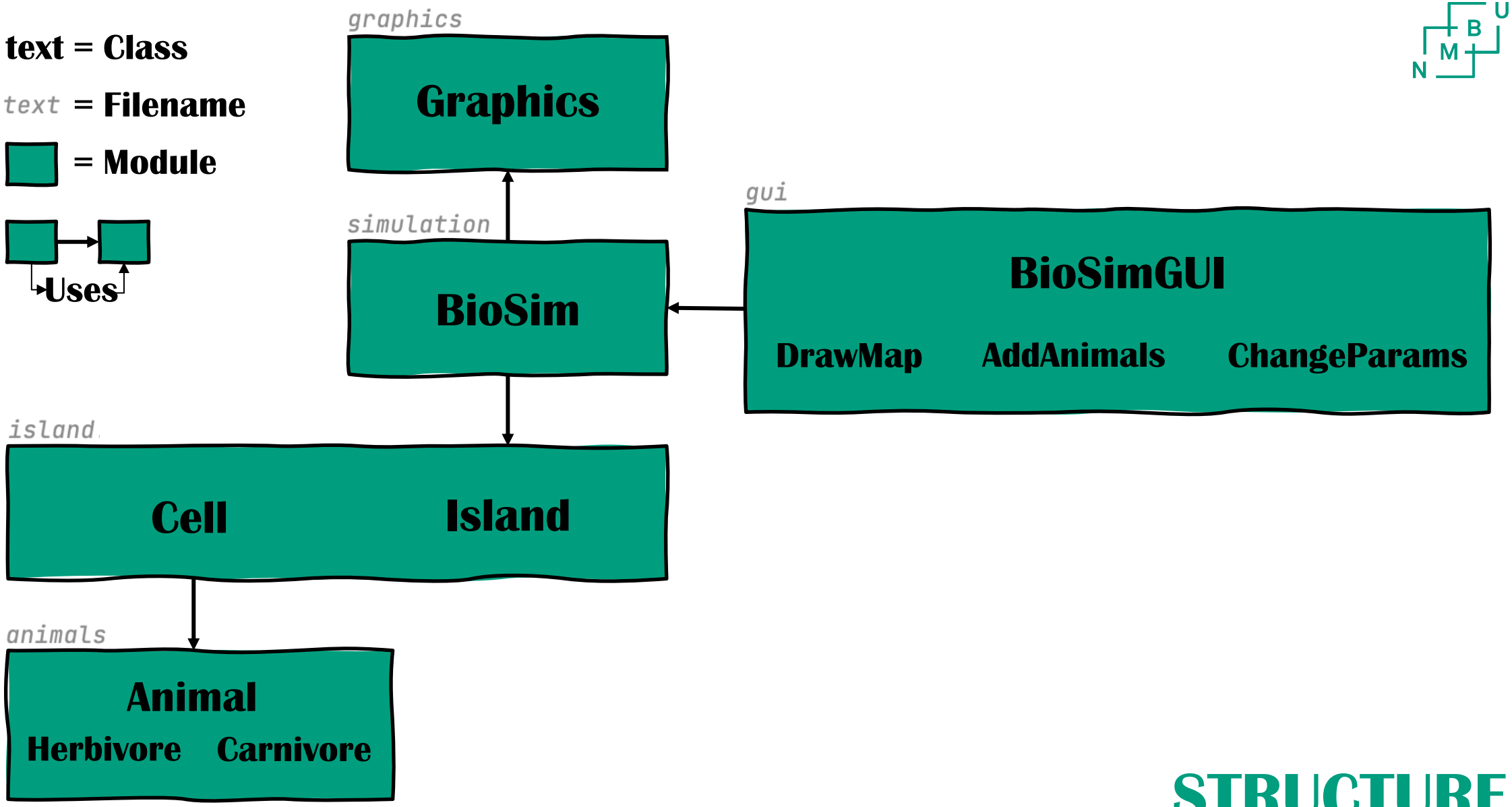
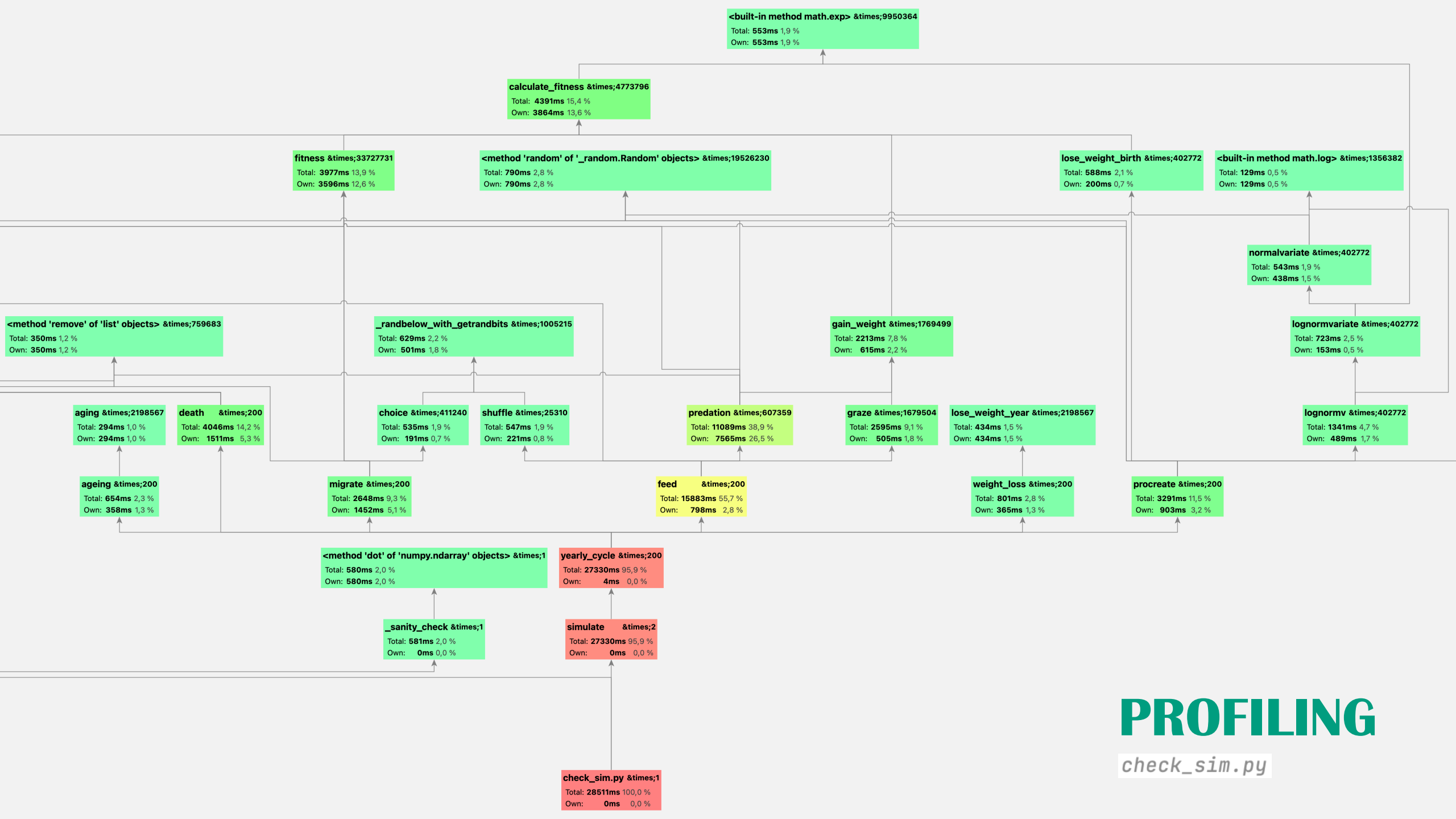
By encouragement of The Environmental Protection Agency of Pylandia

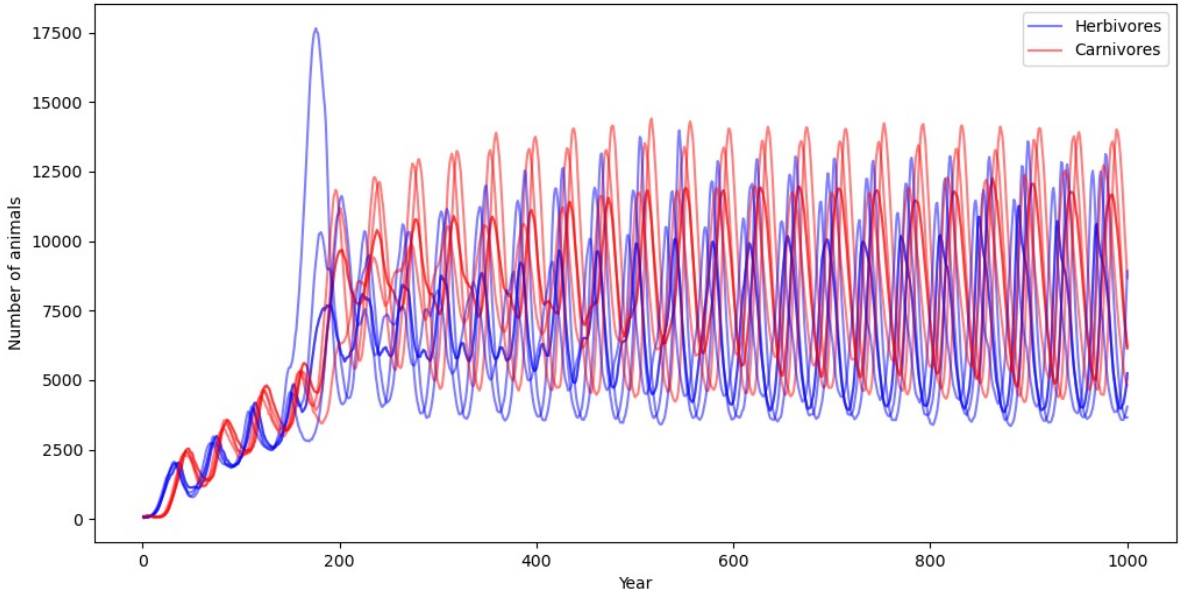

text = Class
text = Filename
= Module
Uses
graphics
Graphics
simulation
BioSim
gui
BioSimGUI
DrawMap
AddAnimals
ChangeParams
island
Cell
Island
animals
Animal
Herbivore
Carnivore

STRUCTURE


<built-in method math.exp> ×9950364
Total: 553ms 1,9 %
Own: 553ms 1,9 %
calculate_fitness ×4773796
Total: 4391ms 15,4 %
Own: 3864ms 13,6 %
fitness ×33727731
Total: 3977ms 13,9 %
Own: 3596ms 12,6 %
<method 'random' of '_random.Random' objects> ×19526230
Total: 790ms 2,8 %
Own: 790ms 2,8 %
lose_weight_birth ×402772
Total: 588ms 2,1 %
Own: 200ms 0,7 %
<built-in method math.log> ×1356382
Total: 129ms 0,5 %
Own: 129ms 0,5 %
normalvariate ×402772
Total: 543ms 1,9 %
Own: 438ms 1,5 %
<method 'remove' of 'list' objects> ×759683
Total: 350ms 1,2 %
Own: 350ms 1,2 %
_randbelow_with_getrandbits ×1005215
Total: 629ms 2,2 %
Own: 501ms 1,8 %
gain_weight ×1769499
Total: 2213ms 7,8 %
Own: 615ms 2,2 %
lognormvariate ×402772
Total: 723ms 2,5 %
Own: 153ms 0,5 %
aging ×2198567
Total: 294ms 1,0 %
Own: 294ms 1,0 %
death ×200
Total: 4046ms 14,2 %
Own: 1511ms 5,3 %
choice ×411240
Total: 535ms 1,9 %
Own: 191ms 0,7 %
shuffle ×25310
Total: 547ms 1,9 %
Own: 221ms 0,8 %
predation ×607359
Total: 11089ms 38,9 %
Own: 7565ms 26,5 %
graze ×1679504
Total: 2595ms 9,1 %
Own: 505ms 1,8 %
lose_weight_year ×2198567
Total: 434ms 1,5 %
Own: 434ms 1,5 %
lognormv ×402772
Total: 1341ms 4,7 %
Own: 489ms 1,7 %
ageing ×200
Total: 654ms 2,3 %
Own: 358ms 1,3 %
migrate ×200
Total: 2648ms 9,3 %
Own: 1452ms 5,1 %
feed ×200
Total: 15883ms 55,7 %
Own: 798ms 2,8 %
weight_loss ×200
Total: 801ms 2,8 %
Own: 365ms 1,3 %
procreate ×200
Total: 3291ms 11,5 %
Own: 903ms 3,2 %
<method 'dot' of 'numpy.ndarray' objects> ×1
Total: 580ms 2,0 %
Own: 580ms 2,0 %
yearly_cycle ×200
Total: 27330ms 95,9 %
Own: 4ms 0,0 %
_sanity_check ×1
Total: 581ms 2,0 %
Own: 0ms 0,0 %
simulate ×2
Total: 27330ms 95,9 %
Own: 0ms 0,0 %
check_sim.py ×1
Total: 28511ms 100,0 %
Own: 0ms 0,0 %
PROFILING
check_sim.py

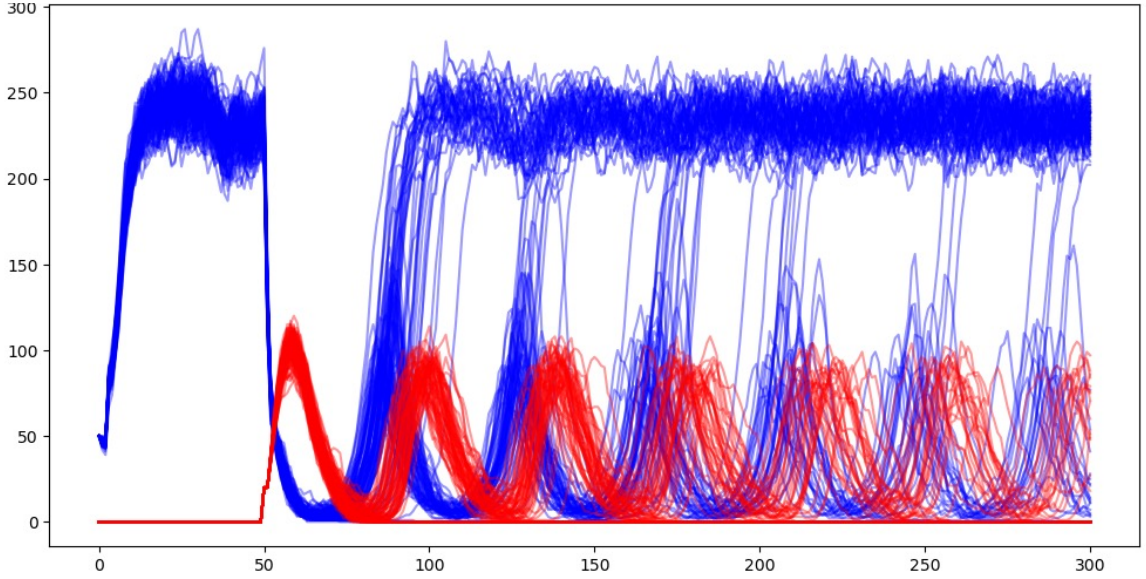
CREDIBILITY

sample_sim.py

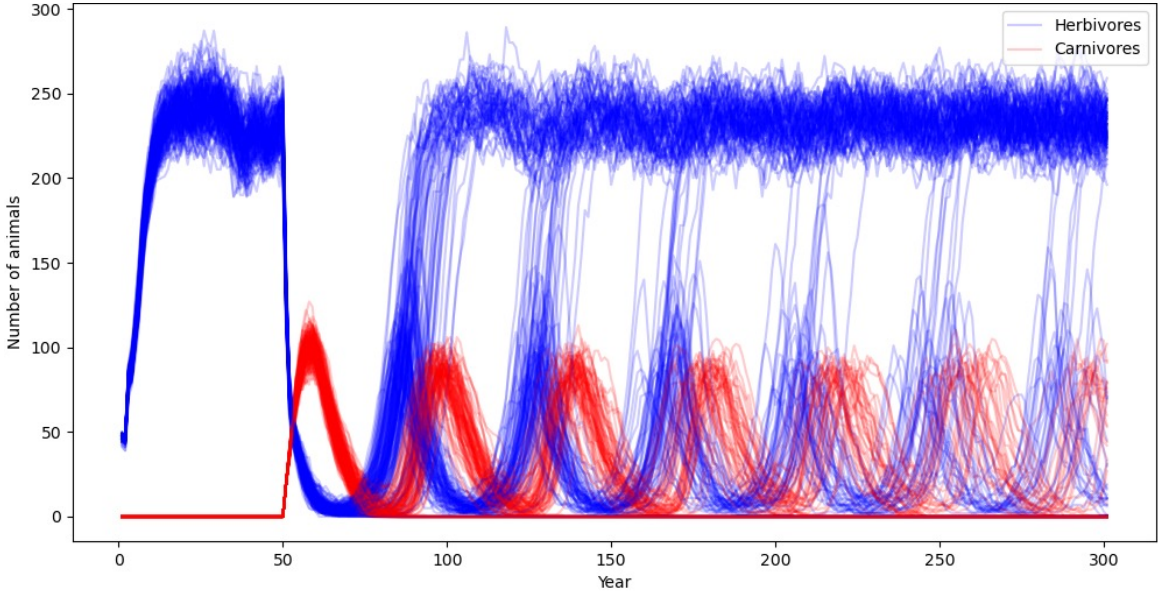


SOLUTION REFERENCE

mono_hc.py



OURS



ELEGANT SOLUTIONS

- **GENERALISED & EASILY EXTENDABLE**

```
# Animal.__subclasses__()

# Species.__class__.__name__
```

- **FAST**

```
# Inhabited cells

# .copy()
```

CELL CLASS

```
def __init__(self, cell_type):
    self.cell_type = cell_type
    self.fodder = Island.get_fodder_parameter(cell_type)
    self.animals = {cls.__name__: [] for cls in Animal.__subclasses__()}
```

PROCREATION METHOD

```
for cell in self.habitated_cells.keys():
    p_baby = {cls.__name__: cls.gamma * len(cell.animals[cls.__name__])
              for cls in Animal.__subclasses__()}

    for animal in list(itertools.chain(*cell.animals.values())).copy():

        # Procreation may only take place if the following is satisfied:
        if animal.w >= animal.w_procreate:

            if random.random() < min(1, animal.fitness * p_baby[animal.__class__.__name__]):
                baby_weight = animal.lognormv()

                # If the parents' weight is greater than the baby's weight * xi, the
                # baby is born, and the parents' weight decreases accordingly ^:
                if animal.lose_weight_birth(baby_weight):
                    baby = animal.__class__(age=0, weight=baby_weight)
                    cell.animals[baby.__class__.__name__].append(baby)
```

TEST COVERAGE

- **Thorough tests of all modules, testing:**

  # Units

  # Integration

  # Statistics

TOX coverage:

- **graphics.py and gui.py are omitted**
- **Missing coverage due to:**

  # Graphics

  # Unimportant lines

	Stmts	Miss	Cover
__init__.py	3	0	100%
animals.py	139	0	100%
island.py	175	4	98%
simulation.py	75	11	85%
	392	15	96%

EXTRA FEATURES

▪ Motion (species specific)

Possibility of changing:

```
# Movable terrain types
# How far (many cells) to move
```

▪ Graphical User Interface

Intuitive

Easy to use

```
# Only allowed values are
  possible to insert
```

Fun!

▪ Documentation

Custom colours

Additional sections on:

```
# Examples
# Expansion
# Future ideas
```

Graphical examples

Thorough docstrings, with

```
# Math-formatted formulas
# Python-formatted examples
```

NOTES

```
# Fixed bug: vis_years != 1
```

EXAMPLE

```
# Show movie here.
```