Population Dynamics

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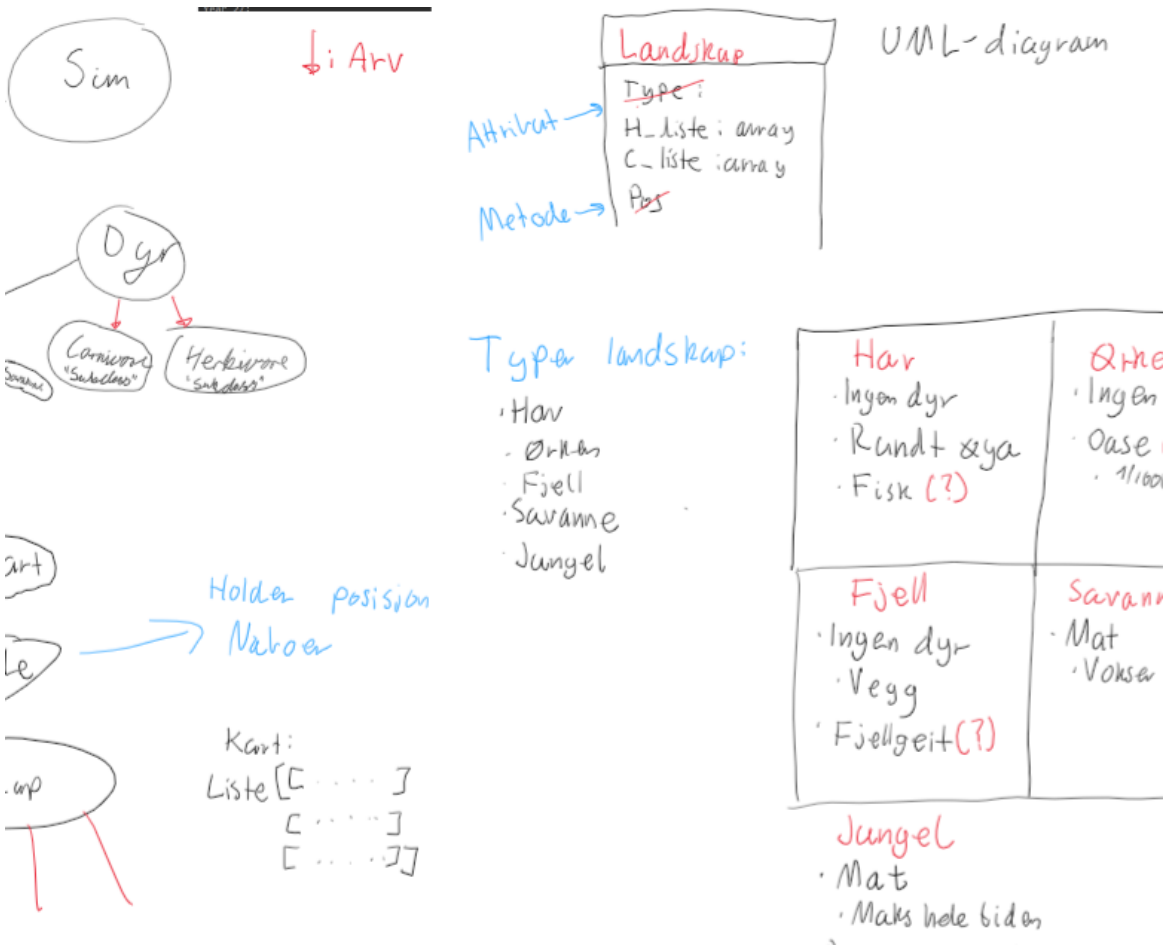
Before June block

Plan project structure

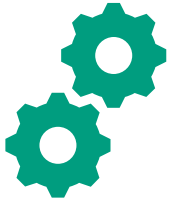
Understand class hierarchy



Development Process

- Test Driven development
- Git — 14 days before first merge conflict!!!
- Pair Programming for crucial steps
- TODOs for small tasks

Github



ContinuousIntegration

Issues for new tasks

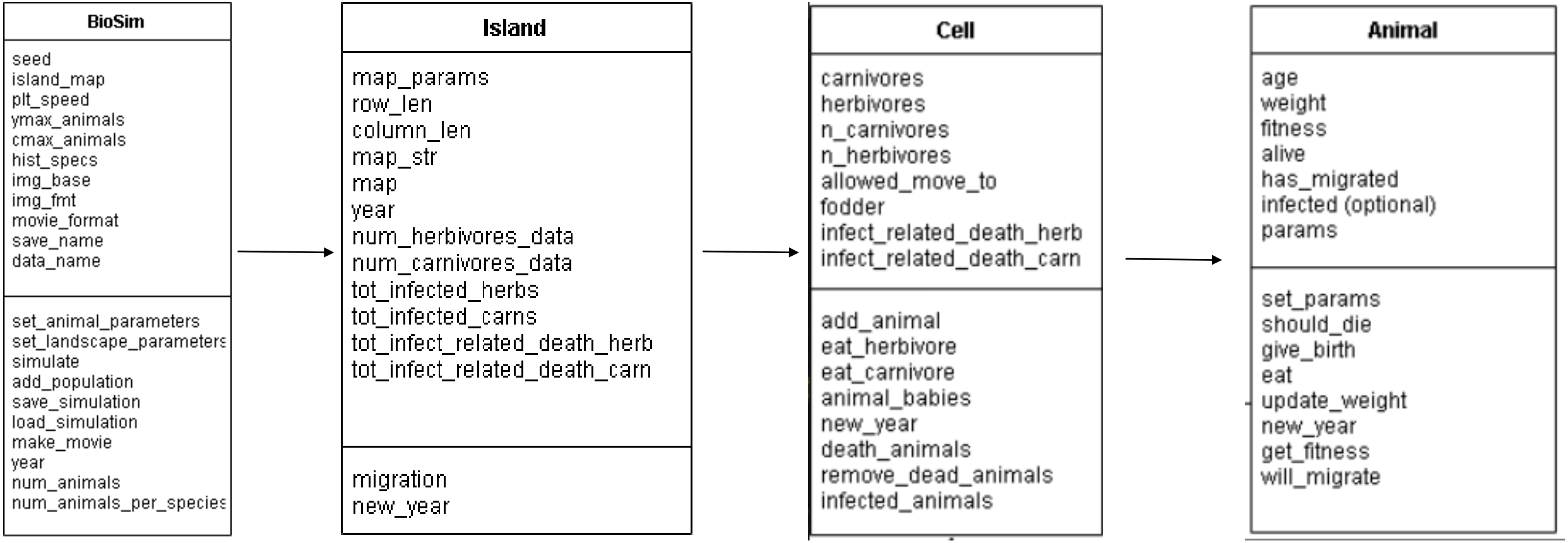
Milestones in BioSim Project

Mypy

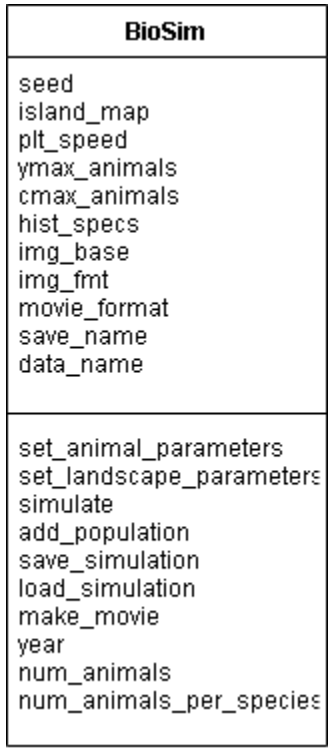
Static type checking

Herbs: List[Herbivores] = [Herbivore()…]

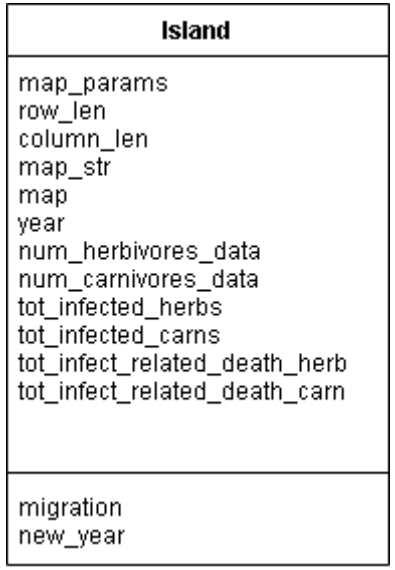
Our Solution



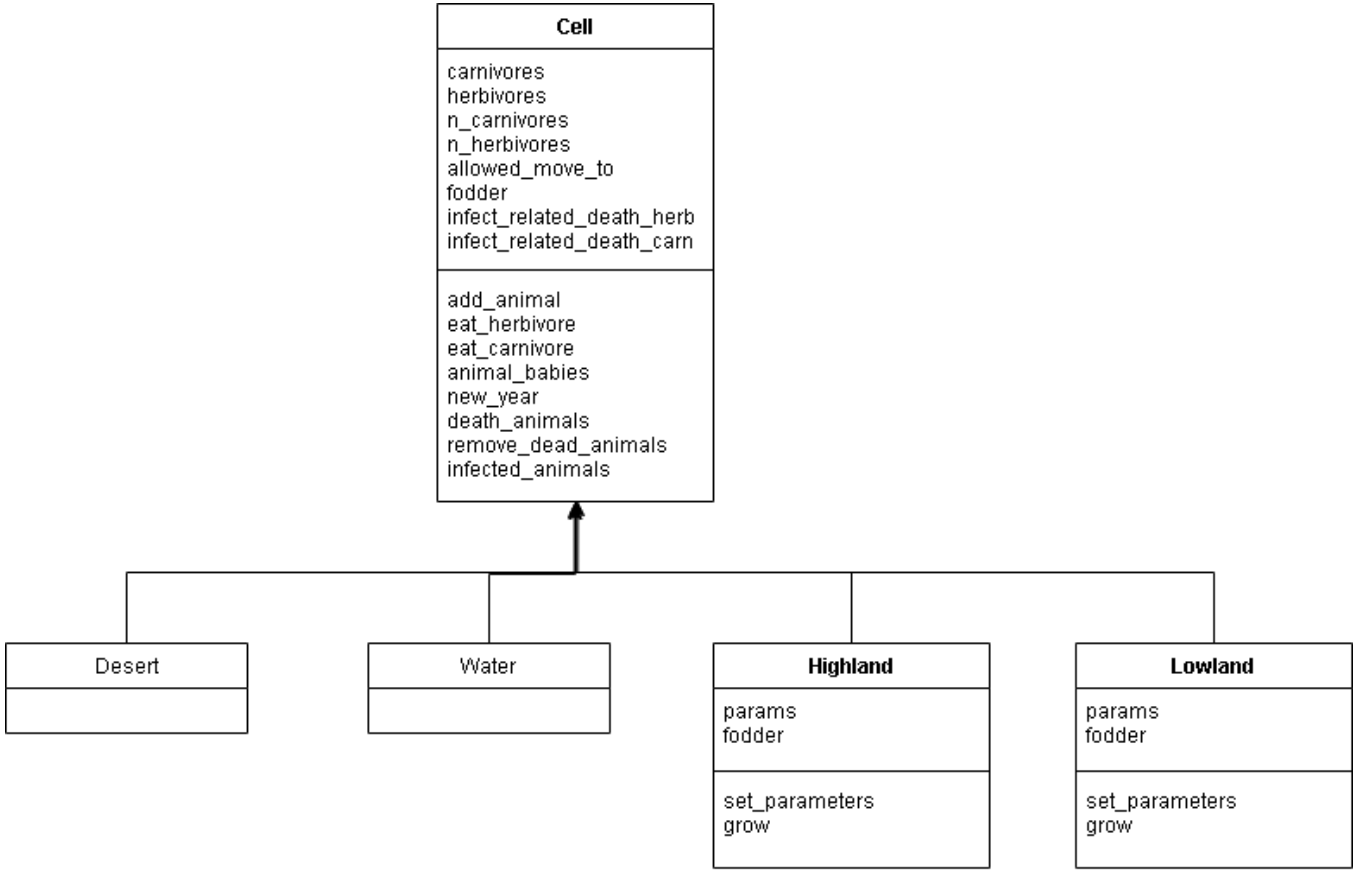
BioSim


BioSim
seed
island_map
plt_speed
ymax_animals
cmax_animals
hist_specs
img_base
img_fmt
movie_format
save_name
data_name
set_animal_parameters
set_landscape_parameters
simulate
add_population
save_simulation
load_simulation
make_movie
year
num_animals
num_animals_per_species

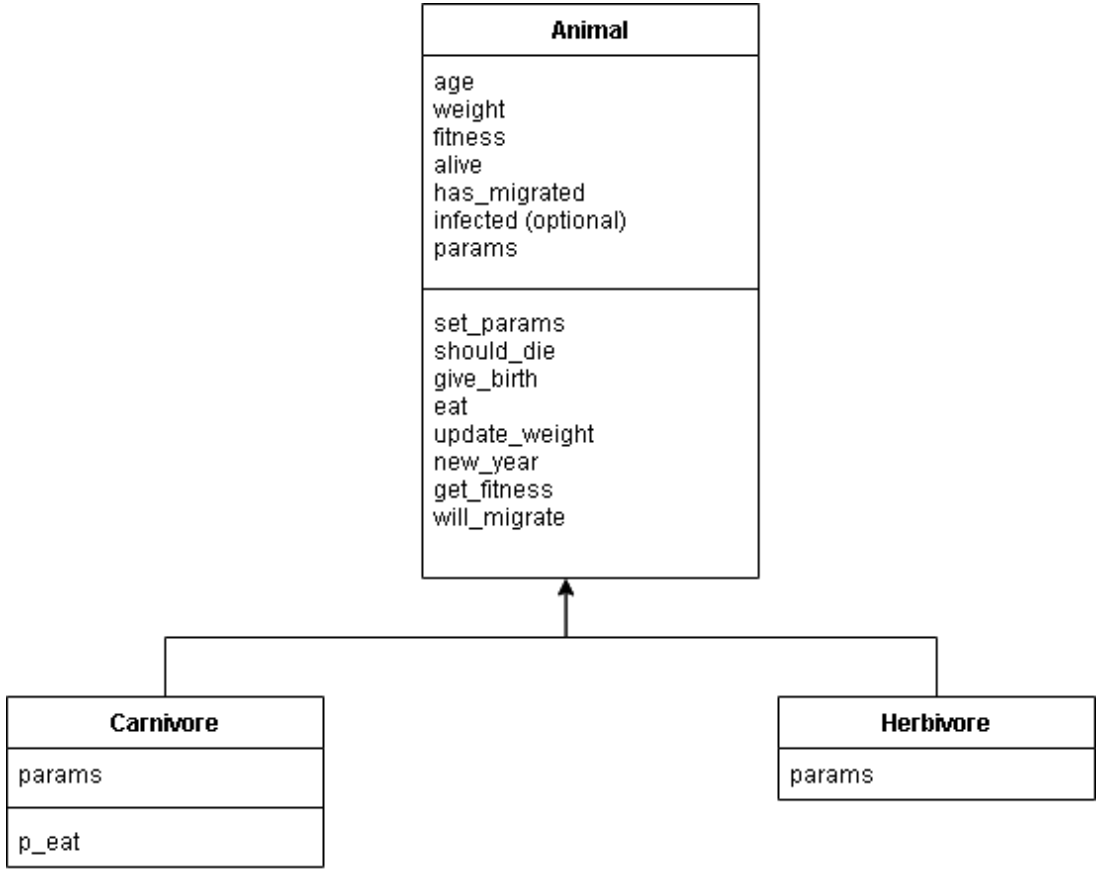
Island


Island
map_params
row_len
column_len
map_str
map
year
num_herbivores_data
num_carnivores_data
tot_infected_herbs
tot_infected_carns
tot_infect_related_death_herb
tot_infect_related_death_carn
migration
new_year

Cell


Cell
carnivores
herbivores
n_carnivores
n_herbivores
allowed_move_to
fodder
infect_related_death_herb
infect_related_death_carn
add_animal
eat_herbivore
eat_carnivore
animal_babies
new_year
death_animals
remove_dead_animals
infected_animals
Desert
Water
Highland
params
fodder
set_parameters
grow
Lowland
params
fodder
set_parameters
grow

Animals


Animal
age
weight
fitness
alive
has_migrated
infected (optional)
params
set_params
should_die
give_birth
eat
update_weight
new_year
get_fitness
will_migrate
Carnivore
params
p_eat
Herbivore
params

COVID-19

- Inspired by COVID-19 modelling lecture
- All animals in cell infected (social distancing)
- Offspring inherit COVID-19
- Seperate COVID-19 kill counter
- Completly optional by user

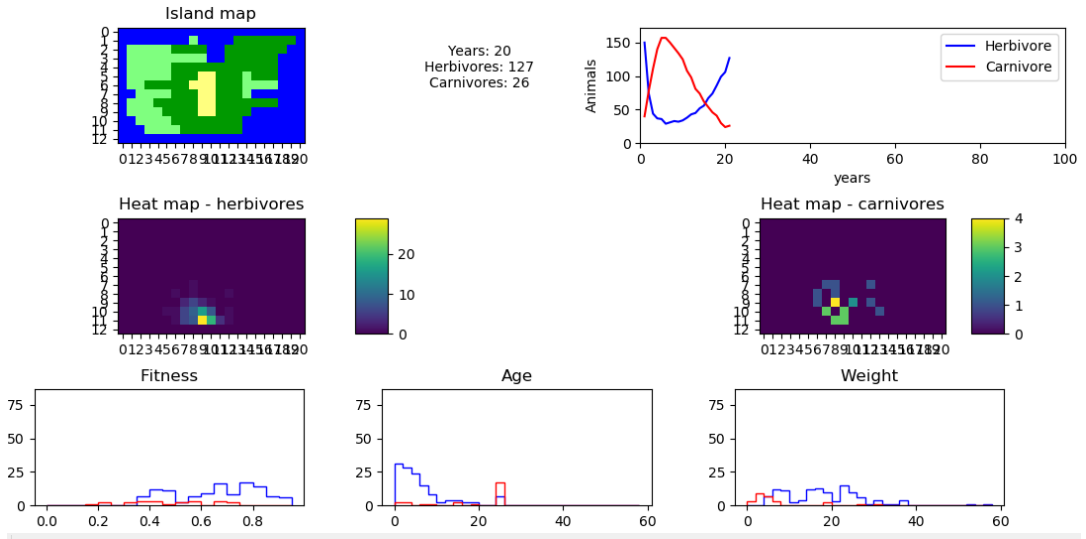
Years: 10
Herbivores: 289
Carnivores: 107

Tot infected herbivores: 1102
Tot infected carnivores: 669

Total infect related death herbivores: 208
Total infect related death carnivores: 170

Visualisation

- Object oriented approach
- Static and dynamic plots
- Animal counter



Test Coverage

Island.py 97% (Without __repr__)

Animal.py 100%

Cell.py 98% (Without __repr__)

Extras

- Serialization
- Load and save simulation
- COVID-19
- Mypy type checker
- Continous Integration

Improvements

- Optimization
- Numpy JIT compiling
- More statistical tests
- GUI
- More realistic Covid-19