Assignment 2 Proposal

Team 40
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Overview

Daisyworld is a hypothetical model that was introduced by James Lovelock and Andrew Watson in "Biological homeostasis of the global environment: the parable of Daisyworld".
It is designed to demonstrate how the creatures and the environment would affect each other and is done by simulating the relationship between 2 different daisies and the temperature. The aim of the model is to explore the “Gaia hypothesis”, which states that all living and nonliving things on earth compose a single, self-regulating system.

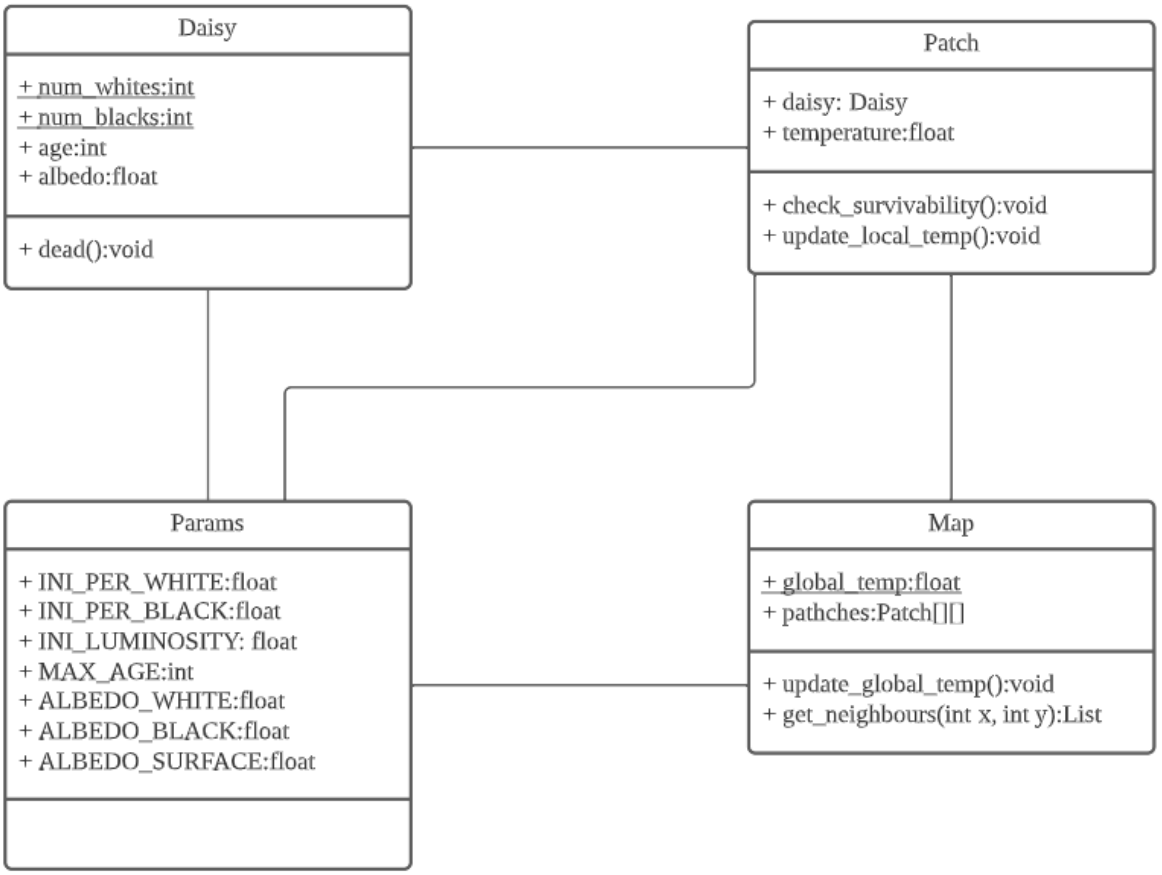
The design of the existing model

The model focuses on two agents, which are the black daisies and the white daisies. The key attribute that directly affects the survival of a daisy is the albedo, which refers to how much heat a daisy could absorb from the sunlight, thus influencing the temperature around. An extreme temperature would cause a daisy to die without any offspring while a comfortable temperature prompts more newborn daisies to appear on empty patches.

After each time step, the daisies grow older while influencing the temperature around them according to their albedo. After daisies reach their life expectancy or die due to extreme temperature, the patch then becomes empty. New daisies may be sprouted on empty patches when there are daisies nearby and they would share the same colour.

The design of our model

The diagram below illustrates how the daisyworld model is structured in Java. Most key components of the NetLogo model are transformed into classes in Java.



The UML class diagram

Task plan and Timeline

The tasks are written in the form of issues on the Kanban project in our Github Repository. The cards are labelled with “week 9”, “week10”, “week11”, and “week 12”, indicating the tasks should be done within which week. Tasks are evenly assigned to Haiyao and Lingjun throughout the process and can be seen on the card of Kanban.

The first phase of our assignment would be to understand the model we choose to replicate. This includes knowing the background issue which the model tries to simulate and all the behaviours of different agents defined by the NetLogo model. Also, how agents interact with each other is crucial for replication. It determines the trend of the model as time goes by and how the system might end.

Next, we would start to implement all classes with all required attributes and class-level functions. The classes are stated in the previous sections. And during the development, new classes may be added to explore how some of the key factors could affect simulation outcome.

Lastly, we will record the output of our system and compare them with the results from the NetLogo model to ensure they have similar behaviour. The analysis should be based on data derived from the two models and explore how extended features cause differences.

Documentation and reports will be carried out alongside the replication process.

Appendix

Kanban
https://github.com/luiszengii/NetLogo_WealthDistribution_replication/projects/2

Github Page
https://github.com/luiszengii/NetLogo_daisyworld_replication