Simulation Project Documentation

Overview of your program's purpose and features:

It’s a simulation based on three very known native animals of Australia, Echidna, Koala, and Dingo. The Echidna and Koala are herbivorous animals where the Dingo is a predator animal. This program initializes a world with specific numbers of each animal. Along with the steps, the status of each animal is changed and the world updates on each cycle.

Usage of simulation:

It’s a 2D simulation developed using the python matplotlib library. There is no usage guide applicable as it will show the world in a 2D simulation and the position and updates of each animal on its own in every cycle.

Discussion of Code:

World create:

At first, a 2D world was created with maximum boundaries, a definite number of animals of each kind and a definite number of cycles.

Initial position and status:

Giving initial coordinates and status to each animal.

Movement:

Echidnas move up to 1 block in any direction. The koala moves up to 2 blocks in any direction and the dingo up to 3 blocks. The direction of movement and the final decided block travel is a random decision.

Traveling tiredness:

If animal travel up to 9 blocks it becomes tired and sleeps for a cycle. And after a cycle of sleep, its status is restored.

Position update:

After every cycle, the position of the animal is updated and shown in the simulation.

Death:

If an echidna or a koala is in the 1 block reach of a dingo, the dingo eats it. A message is shown about the dead animal, its position, and its killer. Then the program deletes all data regarding that animal.

Reproduction chance:

Reproduction chance is a random factor where an echidna has a 15% chance, a koala has a 13% chance and a dingo has a 10% chance to breed.

Birth:

A baby animal is born if two same types of animals are in a 1 block reach of one another satisfying the random reproduction chance.

Test and Evaluation:

A number of different tests were made with the program changing the parameters, RMAX, CMAX, POP\_echidna, POP\_koala, and POP\_dingo. RMAX and CMAX determine the world border and POP variables determine how much of each animal will come with the world generation, Less than 2 animals of a type won’t be able to reproduce.

When the world border is shrunk the animals live in a dense environment and that scales up the interactions. If the number of herbivorous animals is much more than predators, the world becomes full of herbivorous animals, as they reproduce at a multiplicative rate. And if the predators are higher in number then the herbivorous ones can’t keep up and all become dead after some cycles. So there is some count range of different animals where the animals can keep a balance between death and reproduction.