1. Structure

I. Introduction

- explains that the motivation behind evolving a virtual ecosystem

II. Virtual Environment and Animated Agents

- presents what the virtual environment is consisted of

III. Evolutionary Algorithms and Chosen Design

- presents the chosen chromosome representation, population mode, fitness function, genetic operators

IV. Natural Disruptions to Ecosystems

- shows how sudden disruptions can affect which species will thrive in an environment.

V. Experimental Results and Comparisons with Real Life.

- describing the simulated results, drawing conclusions and comparing them to real-life events.

VI. Butterfly Effect

- highlights the importance of variey of life.

- shows the drastic changes the disappearence of a species will afect the rest of them.

VII. Conclusion

- conclusion of the paper, highlighting the important points.

2. Bibliography

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3. The plan

Hypothesis:

The extinction of a species or a natural disruption can throw off or even destroy the ecological balance of the entire ecosystem.

Methodology:

By answering the below questions, I ensure valid and reliable results that address my research aims and objectives:

> What data to collect? I am collecting data regarding to the species survival and adaptation after an impactful event happened to the ecosystem.
>
> Who to collect it from? I am collecting data from both my simulation and from real-life events.
>
> How to collect it? I will show statistics of key variables that belong to the ecosystem and to the animals that are involved in the simulation. From there, I will collect the data that I need. For real-life events, I will get data from articles, books, news and already existing statistics, to back up my simulated data.
>
> How to analyse it? I will compare both real-life data and simulated data and draw conclusions that may or may not approve of my original hypothesis.
>
> Why both a simulation and real-life events? Real-life events are limited and finite. A simulation offers countless opportunities to experiment with evolution. If the simulation provides correct data, simulating an accurate ecosystem could potentially be used to model how species might develop in the future and predict how changes in the environment could affect different species.

Descripion of original approach:

I will build a visual simulation with both an ecosystem of my choice and an ecosystem from an existing event to check the accuracy of the program. After the right modifications and the right accuracy percentage, I will start gathering data until I can reach to a conclusion and test my hypothesis.

Description of experiments that should be done:

Removing the pray/predator to see the changes in the ecosystem.

Getting rid of a little animal, like a bee, to see that despite its size, it can have a huge impact.

Throwing a small meteor at the ecosystem, starting a fire, deleting 3/4 of the food, or any other diruption.

4. Original contribution

In what way can it be a contribution to the state of research in the field ?

The purpose of the research is to study the importance of biodiversity and ecological balance and to gather data and statistics. By programming this simulation that can create statistics based on given variables, I am allowing others to experiment and draw their own conclusions for their own research papers. Also, others can use my analysis and my statistics to raise awarness and educate people on animal extinction, use it to prevent future disasters by finding early a possible imbalance of an ecosystem, or predict how changes in the environment could affect different species.

To what question is answering:

What are the most important species for every type of ecosystem ? (For example, in a hourglass type ecosystem it'll be an intermediate species. In a pyramid type ecosystem it'll be superpredators.)

What would happened if X went extinct? (where X is a species)

What is the ideal ecosystem? (so in case something happens, the ecosystem will survive with minimal damage)

What are the keystone species for a given ecosystem?