

Simulating Evolution

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Abstract

The main purpose of this program is to accurately simulate the genetic evolution of a species. It will attempt to do so using methods such as genetic mutation, genetic drift, and natural selection by means of both microevolution and macroevolution.



Background

"Genetic changes do not anticipate a species' needs and those changes may be unrelated to the selection pressures on the species. Nevertheless, evolution is not a fundamentally random process."

Mechanisms that Decrease Genetic Variation

Natural Selection

Natural selection is when the frequency of the more prolific members of a species increases.

Genetic Drift

This occurs when the allele frequency changes.

Mechanisms that Increase Genetic Variation

Genetic Mutation

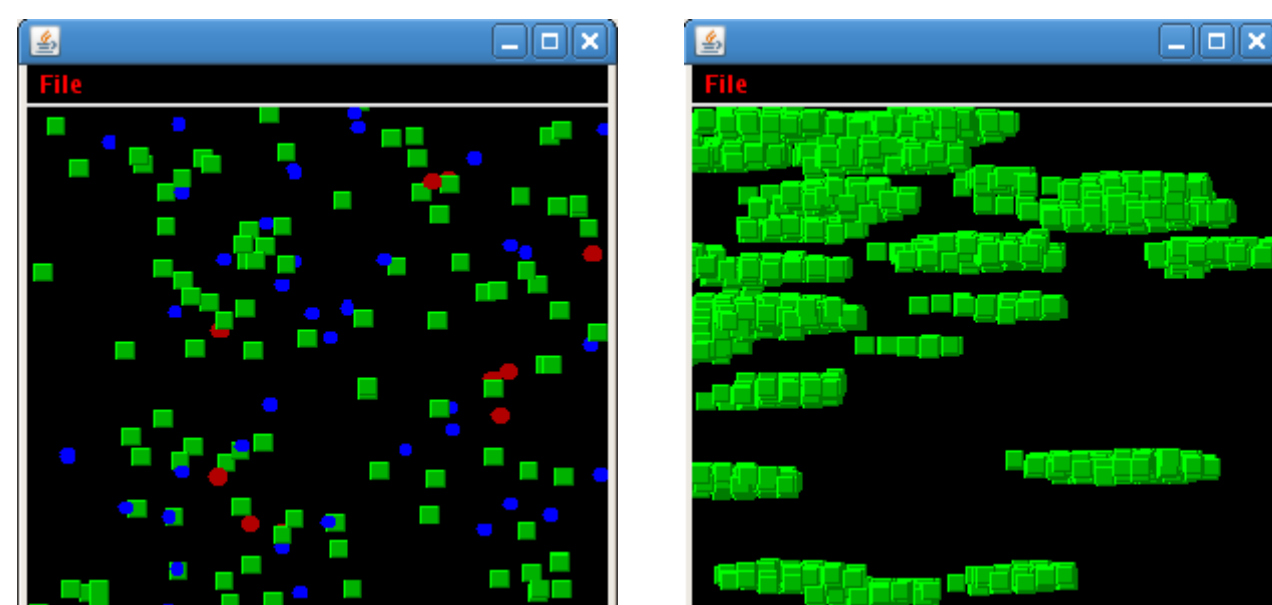
This occurs when the gene sequence altered because the copy of "DNA" is corrupt.

Recombination

This includes crossover of genes from the mother and the father to produce genes of the child.

Gene Flow

This occurs when genes drift into a population from a different population through mating.



Procedures/Methodology

Steps to Simulating Evolution

- 1) Create a changing environment with which a species may interact
- 2) Create a food source for the species
- 3) Create a species with designated traits to be tracked
- 4) Possibly create an herbivorous species and a predator
- 5) Define how the species may evolve (genetic algorithms)
- 6) Track the changes in traits and make observations
- 7) Adjust the model until a balance is achieved

Algorithms

1) *Process for Recombination*

The process for creating a new organisms with a new combination of genes mixed from its parents (and sometimes randomly mutated) takes the traits from both parents and gives the child a trait that is either equal to one of the parents, or is a mix of the two (something in between). The assignment of the trait is semi-random.

2) *Randomization for Mutation*

The process by which genes are mutated is completely random. In fact, it is double random because the swapping of genes is random and the chance that it is mutated is also random.