

Genetic Algorithms

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Please read the student handout first. Thanks!

Section Breakdown:

1. Introduce genetic algorithms and where they are applied (If you have a chance, please read the article "15 Real-World Uses of Genetic Algorithms" <http://brainz.org/15-real-world-applications-genetic-algorithms/>)
2. Explain crossover and mutations with pictures and the examples below
3. Write pseudocode on whiteboard
4. Code up the solution with the students either on the computer or on the whiteboard
5. Discuss tradeoffs, if arrays were used instead of linked lists
6. If time left, talk about cool things you can do with biocomputation!

Concepts Covered:

- Linked Lists
 - basic linked list operations
 - Comparison with other data structures, e.g. arrays.

Related Courses:

- Complexity Theory. What are NP-hard problems? (CS103)
- Biocomputation (CS274)

Examples to work through with students:

a) Crossover:

A crossover point of value a is between the characters at indices $a-1$ and a . If the chromosome is ABCDEF and $\text{crossoverPoint} = 3$, then the split is between C (at index 2) and D (at index 3).

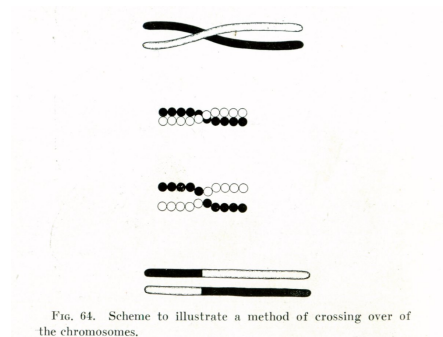
parentA = AGGTCA

parentB = CACATT

If $\text{crossoverPoint} = 3$, we should get the following two child chromosomes:

childA = AGGATT

childB = CACTCA



b) Mutation:

chromosome = AGGTCA

If $\text{deletionIndex} = 2$, $\text{insertionIndex} = 5$ and the gene to be inserted is 'C', then after the mutation, we get:

chromosome = AGTCAC