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FACULTY OF EGINEERING AND TECHNOLOGY

Soft Computing

LECTURE -27

Umesh Kumar Gera
Assistant Professor
Computer Science & Engineering

OUTLINE

- Mutation
- Types of mutation
- References
- MCQ

MUTATION

Mutation

- Mutation is a background operator which produces spontaneous random changes in various chromosomes.
- A simple way to achieve mutation would be to alter one or more genes.
- In GA, mutation serves the crucial role of either (a) replacing the genes lost from the population during the selection process so that they can be tried in a new context or (b) providing the genes that were not present in the initial population.

MUTATION

Mutation

❑The mutation probability is defined as the percentage of the total number of genes in the population.

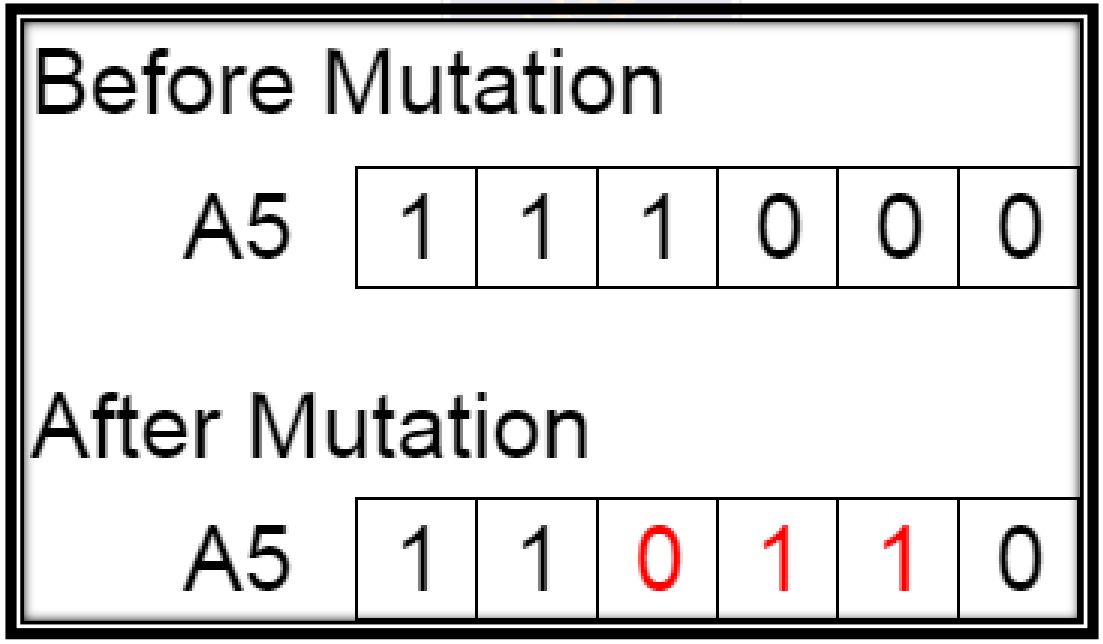
❑The mutation probability controls the probability with which new genes are introduced into the population for trial. If it is too low, many genes that would have been useful are never tried out, while if it is too high, there will be much random perturbation, the offspring will start losing their resemblance to the parents, and the algorithm [Knuth (1997)] will lose the ability to learn from the history of the search

❑There are a number of techniques for mutation. Some of which are discussed as under

MUTATION

Flipping

- Flipping of a bit involves changing 0 to 1 and 1 to 0 based on a mutation chromosome generated.
- Here explanation of flipping through diagram.



MUTATION

Interchanging

- Two random positions of the string are chosen and the bits corresponding to those positions are interchanged.

Parent	10100110
Child	11100010

interchanging mutation

MUTATION

Reversing

- A random position is chosen and the bits next to that position are reversed and child chromosome is produced.

Parent	**10100110**
Child	10100011

Reversing Mutation

MULTIPLE CHOICE QUESTION

6. What is the function of red and gam gene products?

a) It promotes the growth of the phage in the E. coli cells which are lysogenic for bacteriophage P1

b) It inhibits the growth of the phage in the E. coli cells which are lysogenic for bacteriophage P2

c) It inhibits the growth of the phage in the E. coli cells which are lytic for bacteriophage P1

d) It activates the growth of the phage in the E. coli cells which are lytic for bacteriophage P2

7. The red and gam genes are removed in which type of phages?

a) Substitution phage

b) Replacement and substitution phages both

c) Replacement phage

d) Substitution is preferred over replacement phage

8. Phages which are designated as spi-are _____

a) red+ gam+

b) red+ gam-

c) red- gam+

d) red- gam-

9. Choose the correct statement for RecBCD nuclease.

a) It promotes rolling circle replication

b) It is blocked by Gam protein

c) It blocks theta mode of replication

d) It is blocked by Red protein

10. The essential sites for recombination are known as _____

a) chi sites

b) rec sites

c) gam sites

d) red sites

11. The replication rate remains the same for all the phages irrespective of what sequence is there in the phage.

a) True

b) False

REFERENCES

- https://miro.medium.com/max/702/1*CGt_UhRqCjIDb7dqycmOAg.png
- https://shodhganga.inflibnet.ac.in/bitstream/10603/41504/12/12_chapter%202.pdf