

N-Queens Problem

Genetic Algorithm

Genetic Algorithm:

- Search Heuristic
- Inspired by Charles Darwin's theory of natural evolution

Notion of Natural Selection:

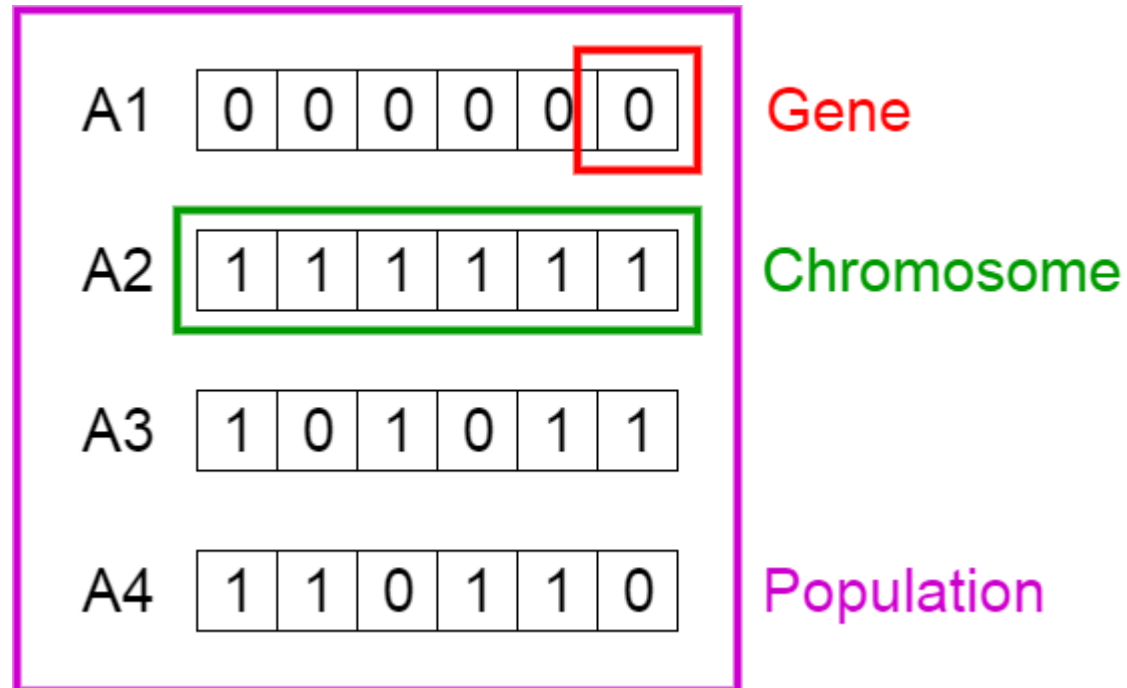
- Starts with the selection of fittest individuals from a population
- Produce offspring which inherit the characteristics of the parents and will be added to the next generation
- Parents have better fitness
 - Offspring will be better than parents
 - Have a better chance at surviving
- Process keeps on iterating and at the end, a generation with the fittest individuals will be found

Five phases in a Genetic Algorithm:

1. Initial population
2. Fitness function
3. Selection
4. Crossover
5. Mutation

Initial population:

- Begins with a set of individuals
- Characterized by a set of parameters (variables) known as **Genes**
- Genes are joined into a string to form a **Chromosome**



Fitness function:

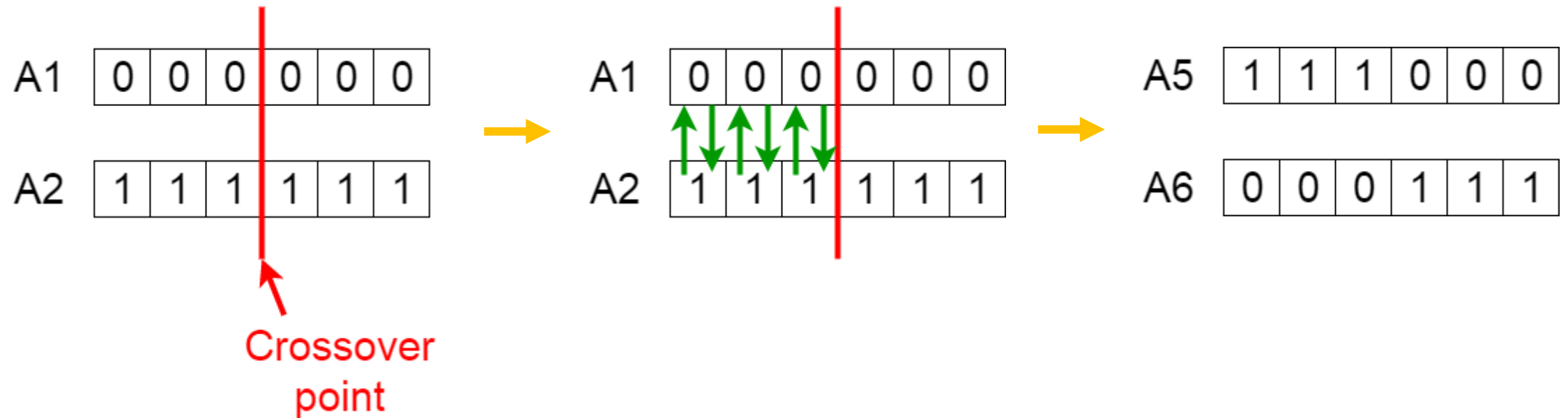
- The ability of an individual to compete with other individuals
- Gives a fitness score to each individual

Selection:

- Select the fittest individuals
- Pass their genes to the next generation
- Individuals with high fitness have more chance to be selected for reproduction

Crossover:

- For each pair of parents to be mated, a crossover point is chosen at random from within the genes



Mutation:

- Some of their genes can be subjected to a mutation with a low random probability

Before Mutation

A5	1	1	1	0	0	0
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After Mutation

A5	1	1	0	1	1	0
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The population has a fixed size. As new generations are formed, individuals with least fitness die, providing space for new offspring.

The sequence of phases is repeated to produce individuals in each new generation which are better than the previous generation.

START

Generate the initial population

Compute fitness

REPEAT

 Selection

 Crossover

 Mutation

 Compute fitness

UNTIL population has converged

STOP

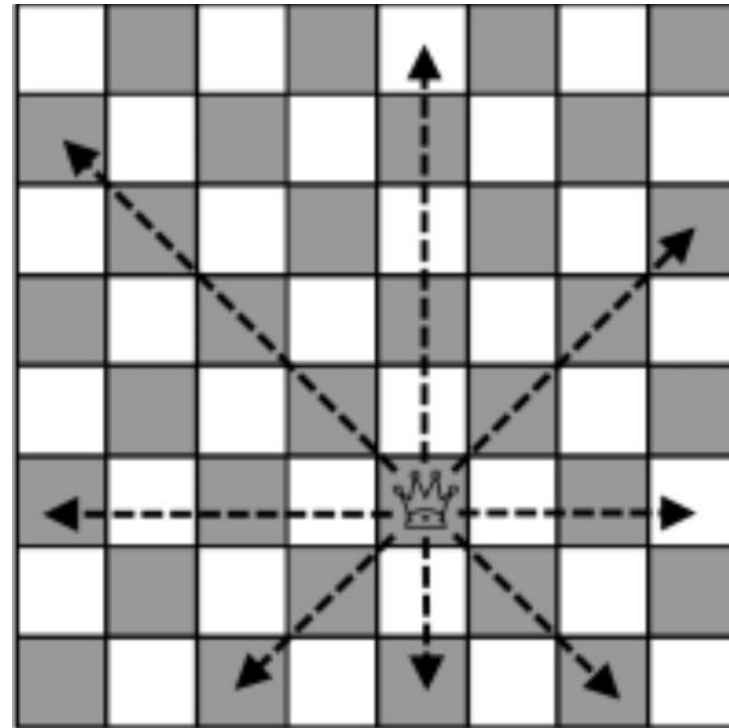


N-Queens Problem:

- Placing n queens in such a way that they cannot attack each other

The queens can attack each other if they are placed in:

- The same column
- The same row
- The same diagonal



Blazor:

- Build interactive web UIs using C# instead of JavaScript
- Can run client-side C# code directly in the browser, using **WebAssembly**



<https://github.com/eslamisepehr/NQueensProblem>



@EslamiSepahr

Source:

- <https://towardsdatascience.com/introduction-to-genetic-algorithms-including-example-code-e396e98d8bf3>
- <https://www.educative.io/edpresso/the-n-queen-problem>
- <https://dotnet.microsoft.com/apps/aspnet/web-apps/blazor>
- <https://www.pluggedin.com>
- <https://usatoday.com>
- <https://memegenerator.net>
- <https://www.gettyimages.com>

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**NOW DON'T ASK
QUESTIONS**

memegenerator.net