

## A56. Overall idea of evolutionary algorithms

Our **objective** is to have a good chocolate bar. We have 50 possible ingredients (let's say `A, B, C, D, ..., AA, AB, AC, ..., AX`), but we can only use 20 of them in each bar. That is, the size of our search space is `50 Combination 20`.

In the **initialization** phase we can create 50 different chocolate bars (`individuals`), each one with a different combination of ingredients (`genomes`).

Pieces/Ingredients	In1	In2	...	In20
Piece 01	A	B	...	AX
Piece 02	E	H	...	C
...	...	...	...	...
Piece 03	A	AD	...	AE

**Fitness evaluation.** Some guys will taste our 50 pieces of chocolate, they will rate each piece, (let's say from 0 to 10). At the end each chocolate will score the average of the ratings

Pieces/Guys	1	2	...	n	fitness function
Piece 01	10	8	...	6.9	8.4
Piece 02	9	7	...	3.3	6.1
...	...	...	...	...	8.7
Piece 03	9.9	9	...	7.6	4.2

**External selection.** We will discard the pieces of chocolate with lower fitness ( $\lambda$ ), and we will stay with the rest of the pieces ( $\mu$  `survivors`).

**Parent selection.** From the  $\mu$  pieces of chocolates we have, we choose two of them (`parents`)

**Inheritance.** To produce new pieces of chocolate, we will use the `recombination by union of sets`, from the new set we choose the first 20 elements.

**Mutation.** We choose one ingredient (or more) and we replace it with another ingredient from the set of the rest 30 ingredients.