NIM GAME

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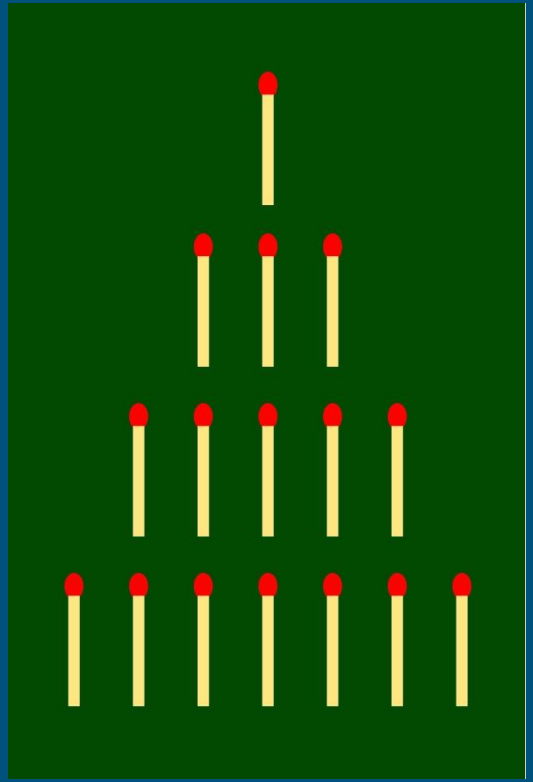
Context

Nim Game :

- At each turn you can take as many item from one row as you want.

- The player who takes the last one loses



What is an individual in this context?

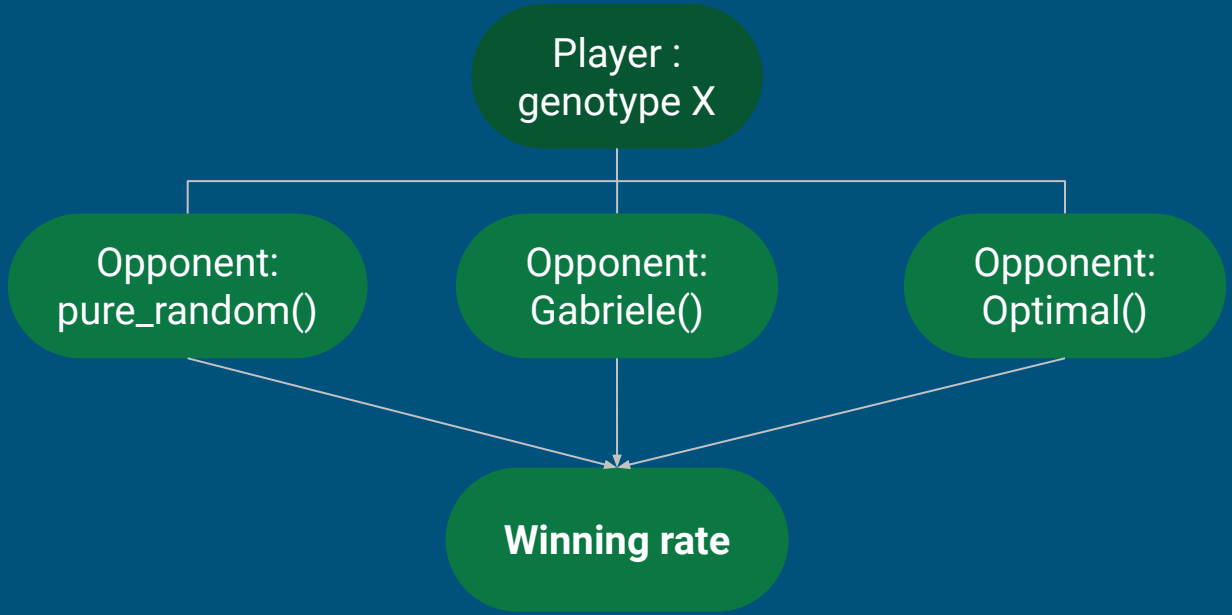
- **Genotype :** A list of probabilities where each element of the list represents the probability of using a certain strategy at each move (can use different strategies within a game)

```
list_strategies =[pure_random, gabriele, optimal]
genotype        =[ 0.3       ,   0.1   ,   0.6  ]
```

- **Fitness:** Calculates the rate of winning the game after N tries when the player uses a specific genotype against an opponent who plays with different strategies in every try.

Fitness function explained

- **Who plays first? ⇒ It alternates between the 2 players in every match**
- **Number of matches ⇒ Fixed parameter to 20 matches for each individual (can be modified)**

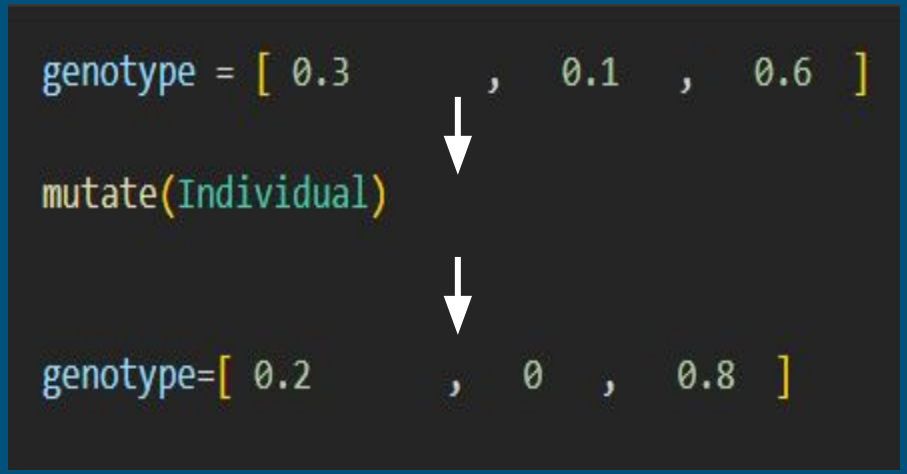


Offspring

- The selection pool of the parents is random.
- The chosen one is the parent who has the best fitness.
- Each individual of the offspring list has a probability of 80% to mutate

Mutation

- The function *mutate (Individual)* modifies randomly the genotype of an individual by changing the rate of using one of the strategies:



Results

```
best ind
0.6333333333333333
[0.4883741711253023, 0.2360375123501256 6, 0.275588316524572]
 The player who won is
0
```

Still very variable, it would be better to add more rules to the genotype and play more games to have an accurate win rate and create more generations.

Do you have any questions ?

githubs : https://github.com/Paul-Raphael/Computationnal-Intelligence

https://github.com/aasalma/Computational-Intelligence