

# Genetic-Alogorithm



# Invention:

- Developed in **1960s** by **John Holland** and his team
- It was based on Charles Darwin's theory of **natural selection**
- It is now very commonly used in **Search Algorithms**, has many **variants** and can generate high quality Solutions to **optimize** a search












# knapsack problem:

Choosing the best set of items where we can have a **large amount of different combinations**



# How it works:

- it starts with a population of possible(random) solutions

1			
2			
3			
4			

# Evaluation:

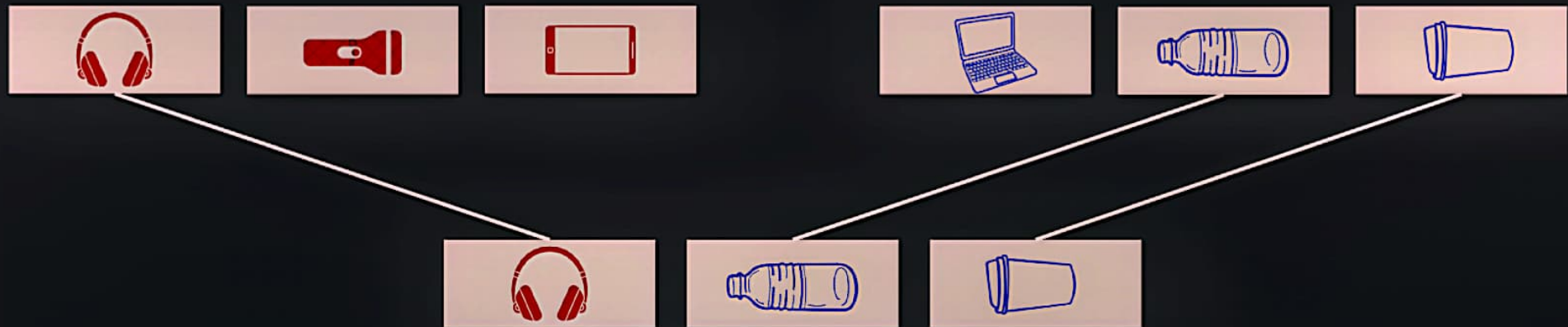
- a fitness function will **evaluate** the fitness of these solutions to determine which ones are closer to our target



- preferably, they will be sorted and accessing the best ones will be faster

# Cross-over:

- **Combining** our fittest solutions to make new ones which have a **better chance** of being the target or better solutions

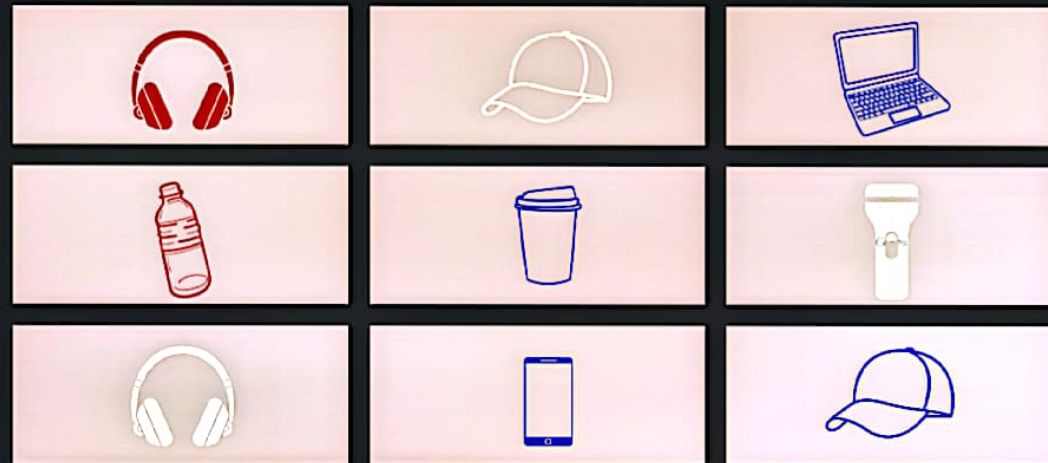


- **Elitism** : keeping our best options from the last generation in case the new gen was a worse result



# Mutation:

- Randomly mutating some of our combinations by **changing one item/digit** which could be the key item to make the best solution



## Eventually:

**This process of 1.Evaluation 2.Crossover 3.Mutation will continue until we either find the target or the best solution by the maximum number of specified rounds**

**These key ingredients stay the same through out all different versions of Genetic-Algo and its variants**

**initial population - fitness function -  
crossover function-mutation**