

Smart Rockets

Using Genetic algorithm

NEXT-GEN TEAM

HUSSEIN ALI

MOKHTAR MOHAMMAD

MOHAMMAD KHALED

ABDELRAHMAN MOSTAFA

Slides Content

- Introduction to genetic algorithm
- Introduction to smart rockets
- Work Mechanism Of smart rockets
- Work Flow Of smart rockets
- conclusion

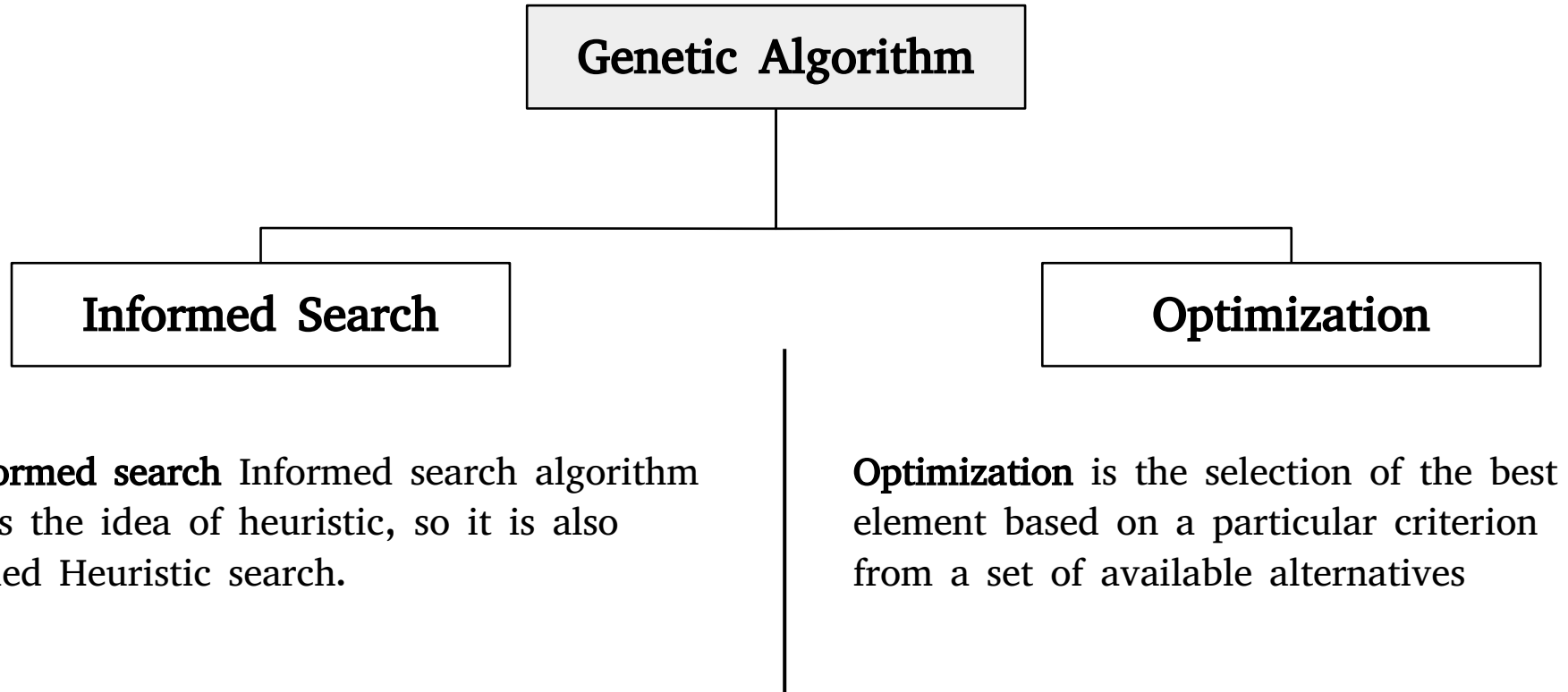
Introduction to the genetic algorithm

- The algorithm is inspired by Darwin's Assumption of natural evolution.
- The algorithm reflects the process of natural selection where the fittest individuals are selected for reproduction in order to produce offspring of the next generation.
- Five phases are considered in a genetic algorithm.

Initial population - Fitness function – Selection – Crossover – Mutation

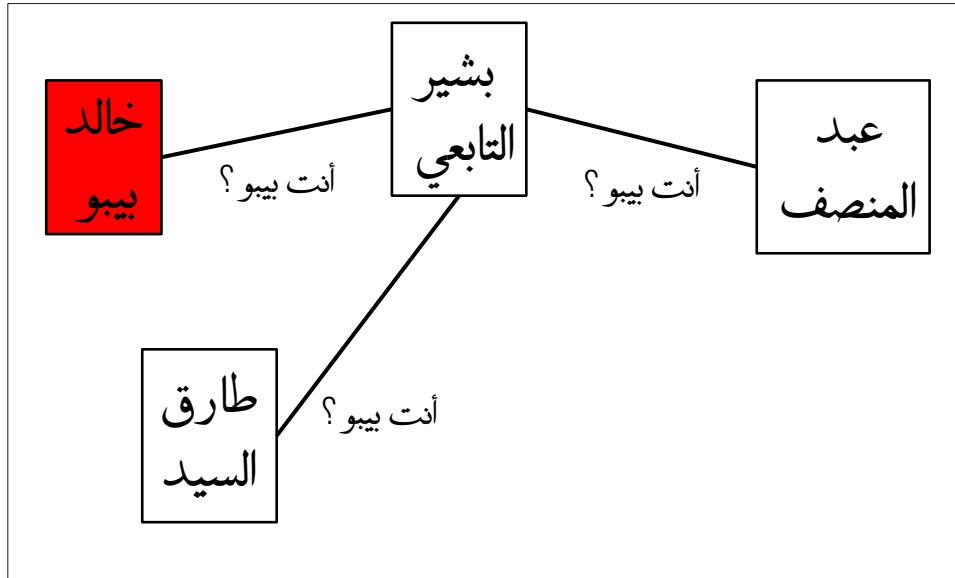
- The algorithm are commonly used to generate high-quality solutions to optimization and search problems

Introduction to the genetic algorithm

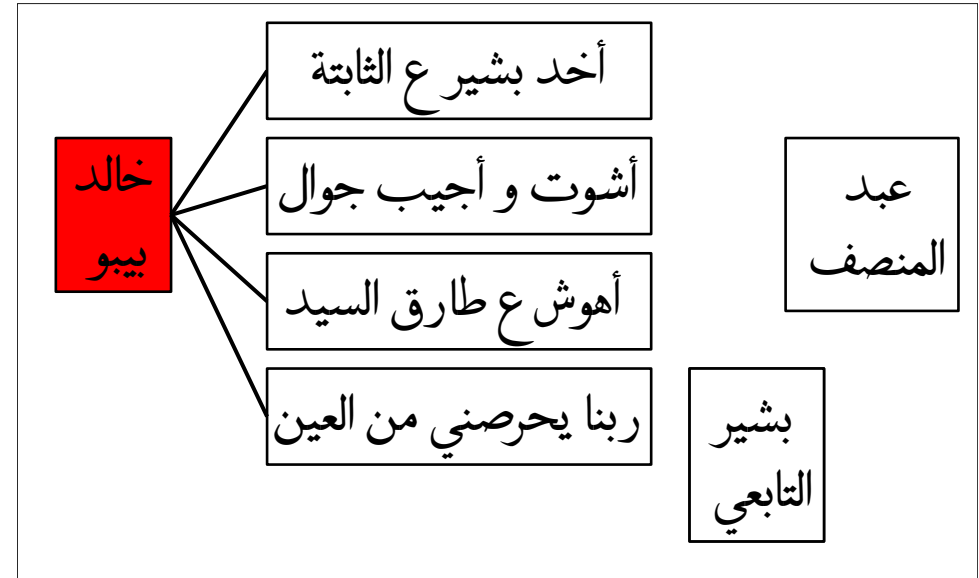


Introduction to the genetic algorithm

Informed Search



Optimization

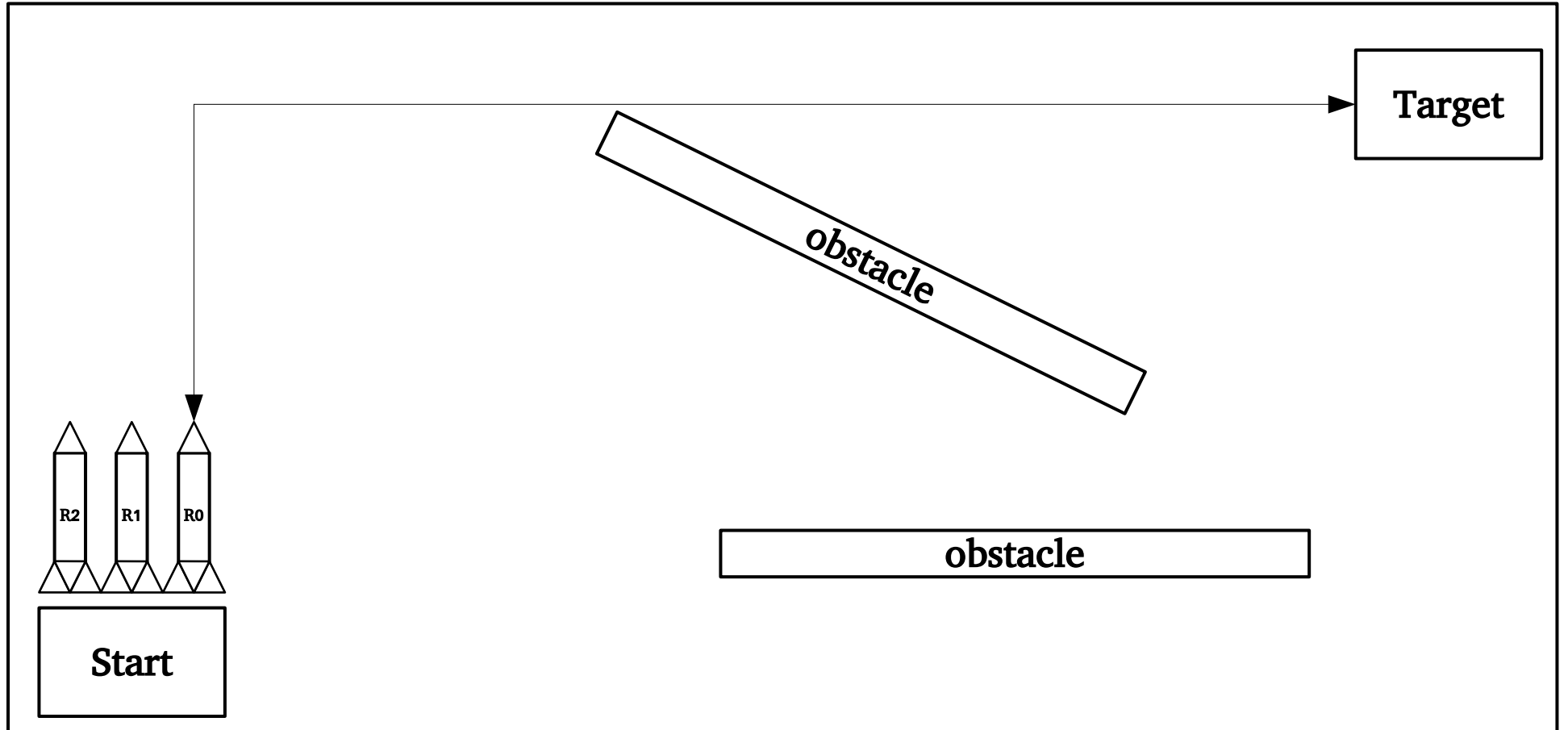


Introduction to the smart rockets

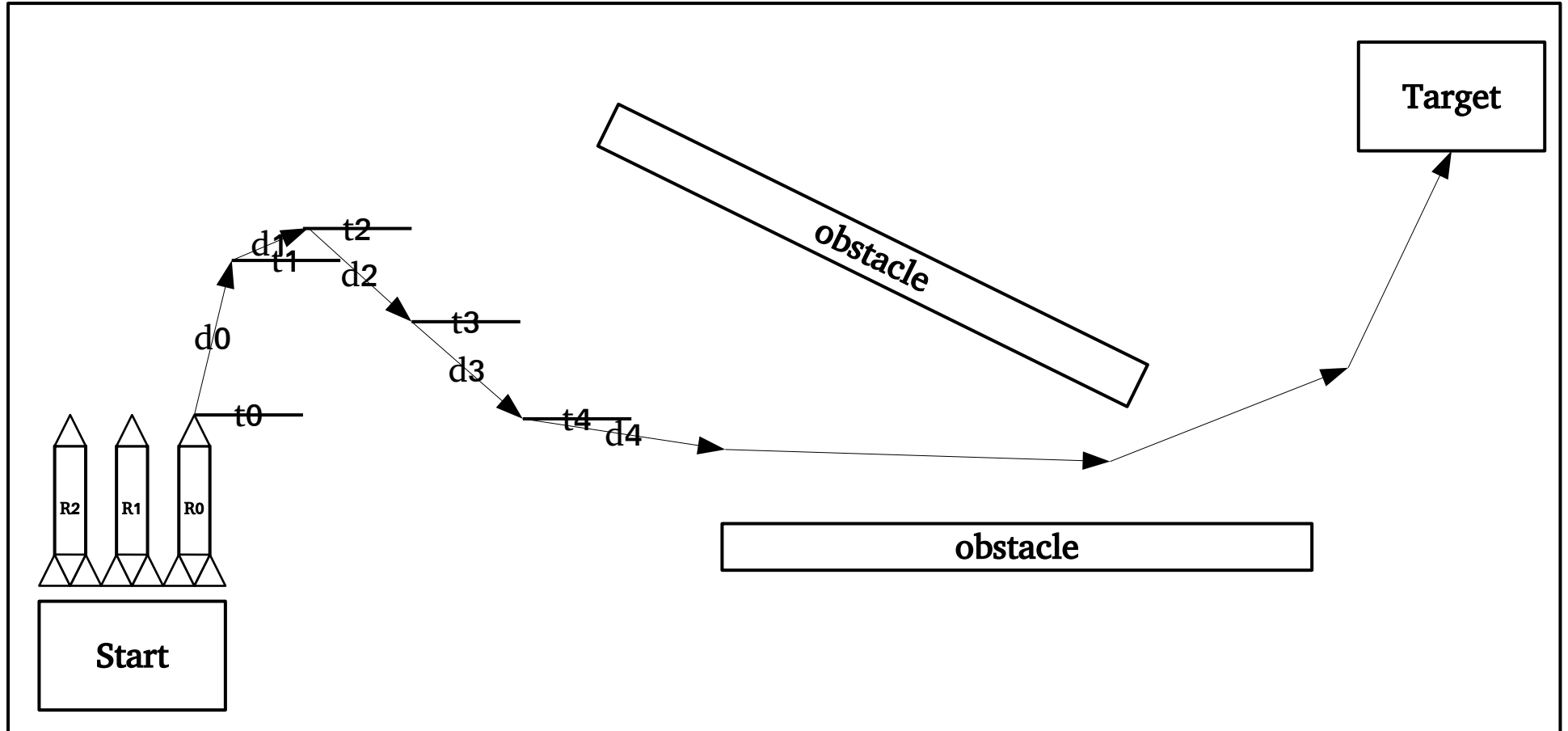
- In 2009, Jer Thorp released a genetic algorithms example on his blog entitled “Smart Rockets”.
- Jer points out that NASA uses evolutionary computing techniques to solve all sorts of problems, from satellite antenna design to rocket firing patterns.
- This inspired him to create a Flash demonstration of evolving rockets.
- Here is a description of the scenario:

A population of rockets launches from the bottom of the screen with the goal of hitting a target at the top of the screen (with obstacles blocking a straight line path).

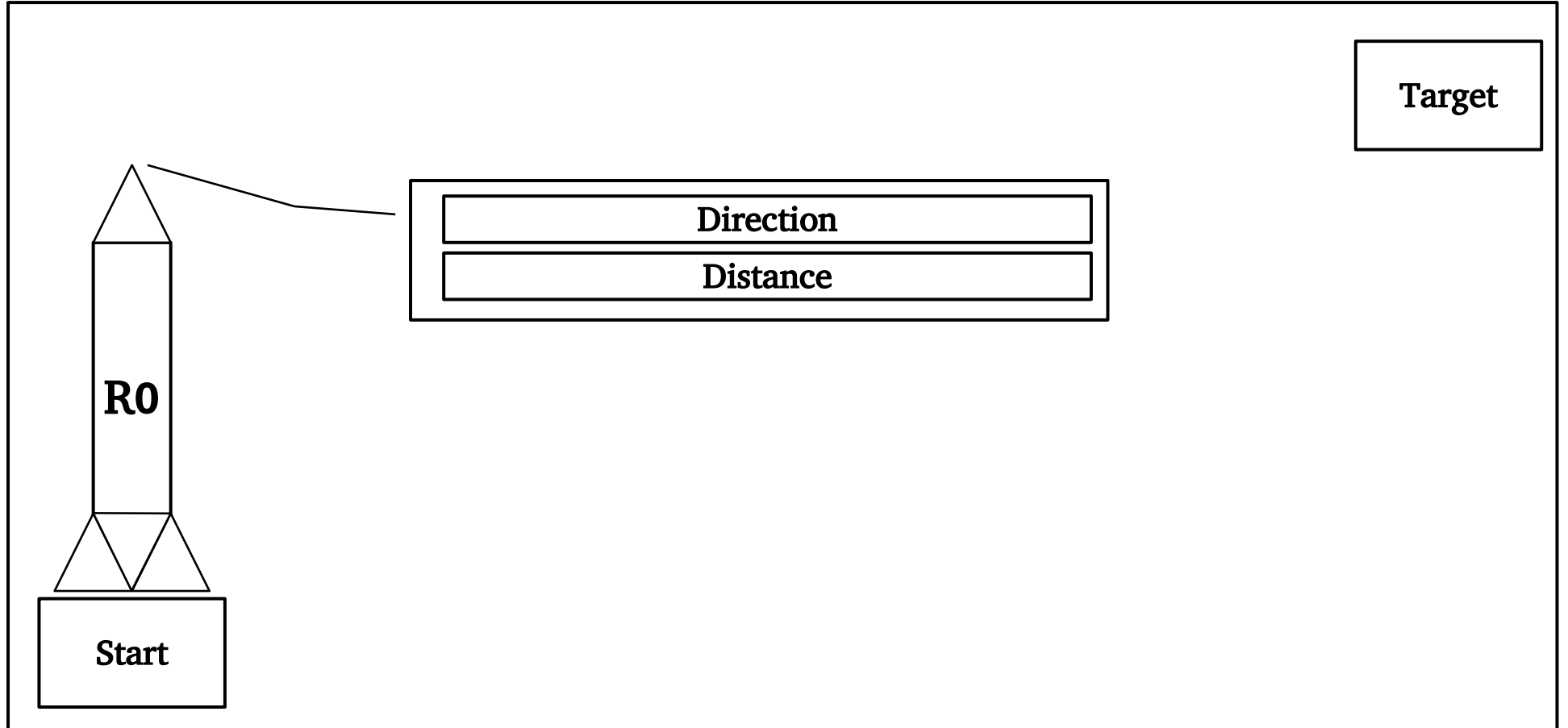
Introduction to the Smart Rockets



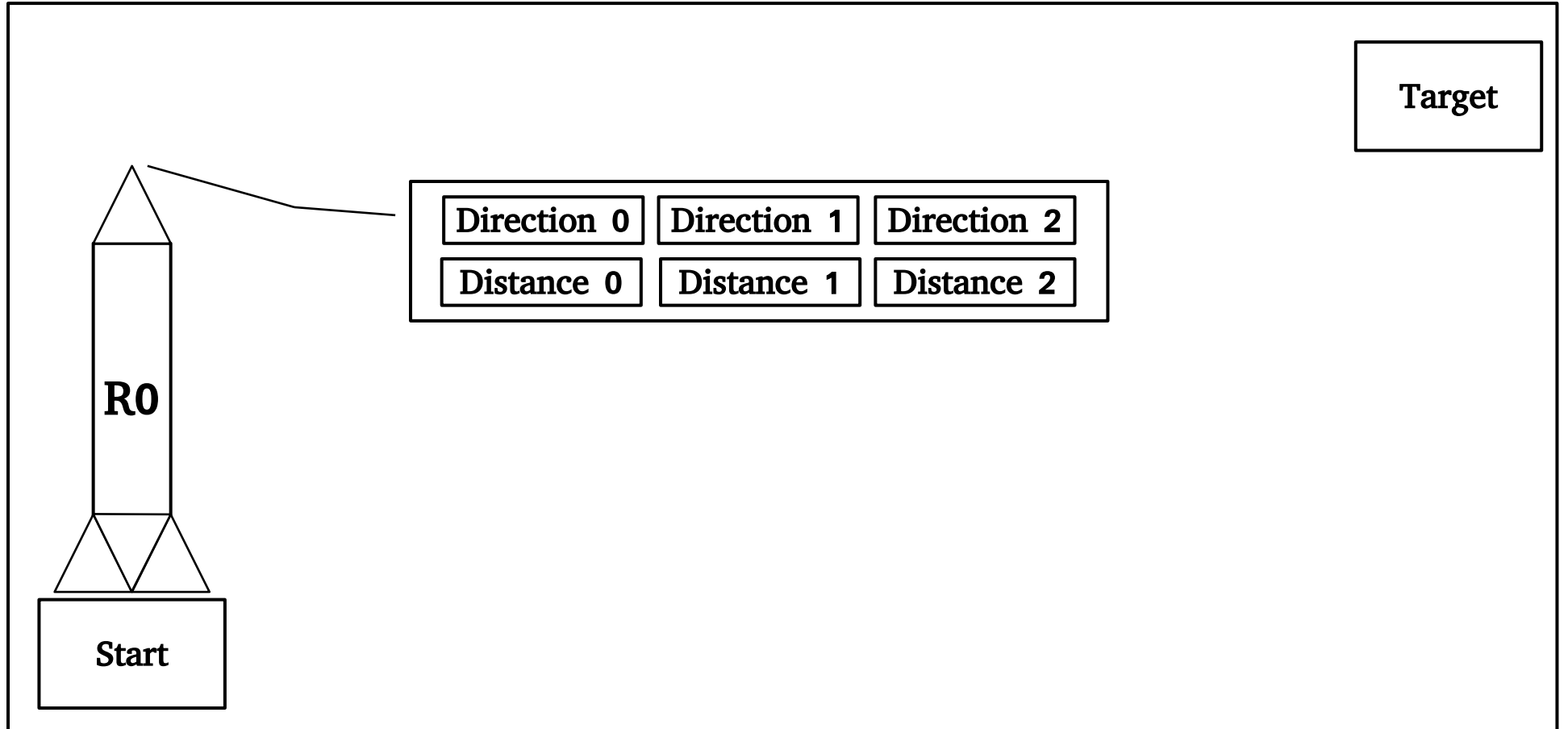
Introduction to the Smart Rockets



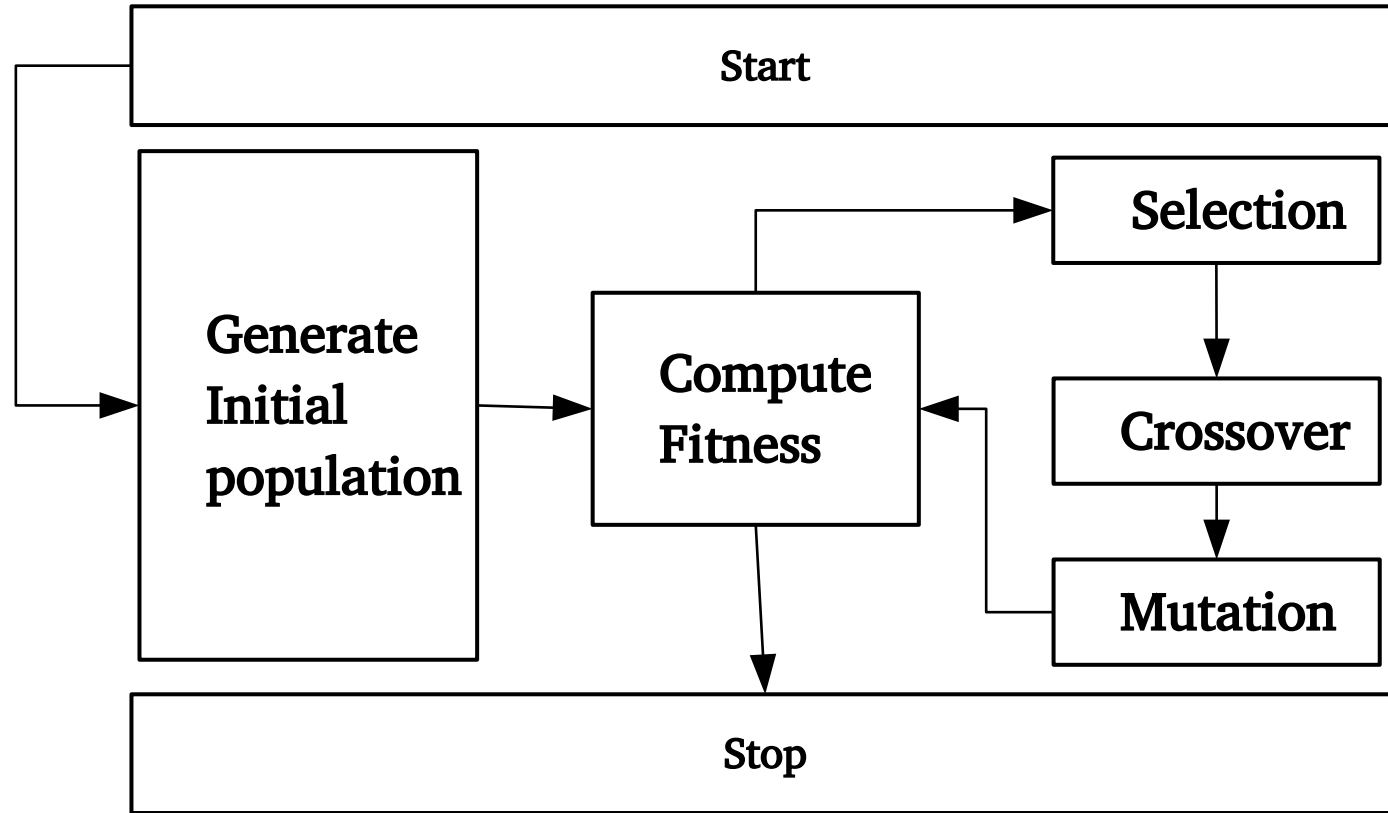
Introduction to the Smart Rockets



Introduction to the smart sockets



Work Mechanism Of Smart Rockets



Work Flow of Smart Rockets

Initial Population

Rocket

Rocket

Directions

Distances

Directions

Distances

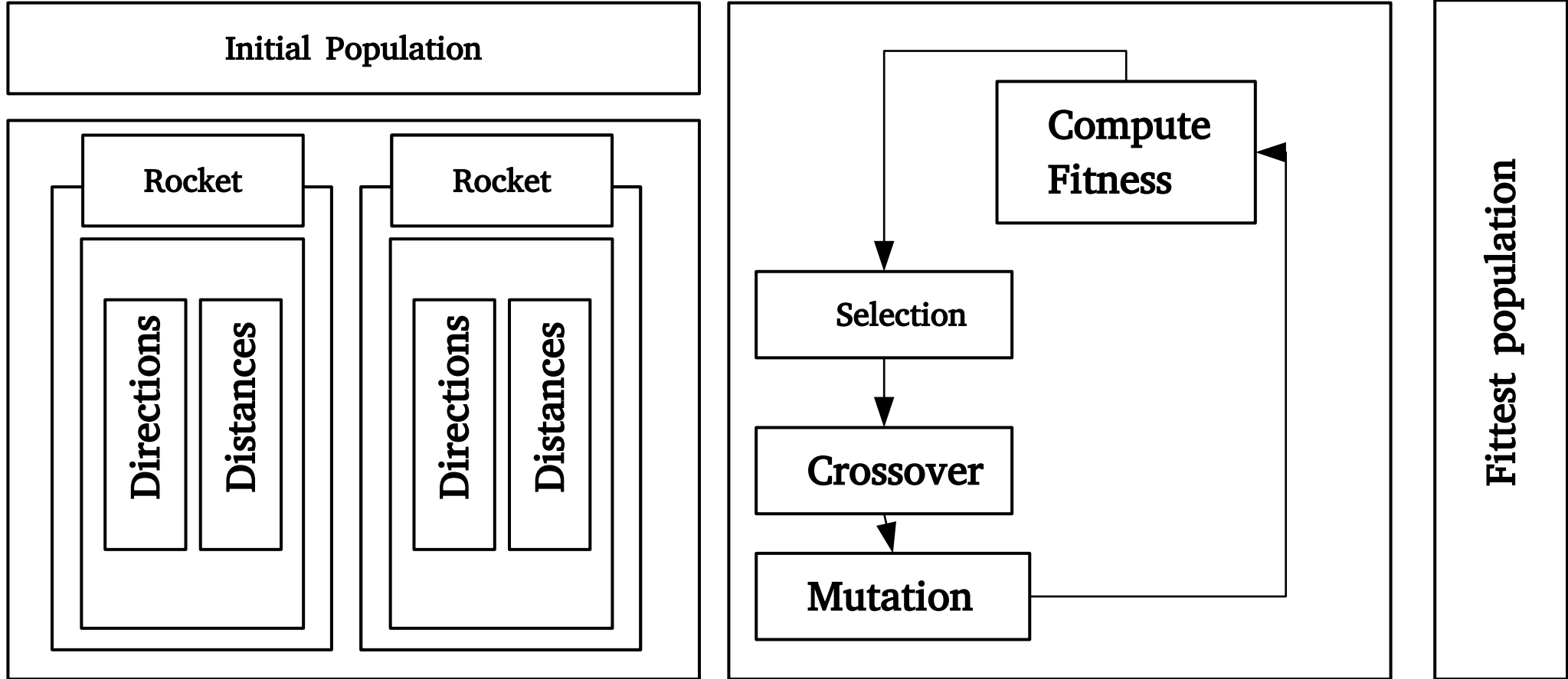
Compute
Fitness

Selection

Crossover

Mutation

Fittest population



Conclusion

- In summary, genetic algorithms (GAs) are optimization algorithms inspired by natural selection. They excel at exploring large solution spaces and finding near-optimal solutions.
- GAs are versatile, handle various problem types, and are less prone to getting stuck in local optima. However, they can be computationally expensive and require careful parameter tuning.
- Overall, GAs are valuable for optimization and continue to be an active area of research.

References

- Chapter(9): The evolution of code "The Nature Of Code Book"
- Introduction to Genetic Algorithms — Including Example Code
- Optimization | Definition, Techniques, & Facts
- A review on genetic algorithm: past, present, and future
- BBC Sport : Al Ahly humiliate Zamalek 6-1