

## **Allen Ramírez Ramírez - Genetic Algorithm - Adaptation Heroes Team**

With the numerous challenges present in space exploration, the discovery of information about this topic can have the capability to be diverse and dynamic.

For this challenge, and with the use of a game platform to inform, we present a solution using a genetic algorithm that allows the users to build a "Space Biology Superhero" by combining findings of research and studies on different types of organisms against the multiples risk of space exploration.

This genetic algorithm is used to find the best, or an approximate solution, for a combination of scores associated with a research and an organism. The process iterates over a collection of game cards with a score chosen by the user. A group of the cards forms different improved individuals that together creates a population.

For each individual in a population, a score of its cards is calculated representing the score for this specific individual. These values are stored in the case of the best and worst for the organism in a population, used to form a probability of the next generation of individuals having parents with a good or not so favorable score, simulating the processes of selection and crossover. For the process of mutation, we hope to implement it in future work.

Finally for the algorithm, the steps are repeated for each of the new generations of individuals, giving as an output at the end the best and optimized individual, the associated score and its related research cards.

In this challenge we use a set of assumed variables (similar to how this type of variables tend to work in global search heuristics), namely the genes distribution from parents to the next generation. In a future work, we would like to do more research about the distribution of genes in real life and how this could help improve our work and the information and research done in biology using computer science.

This method's inspiration on biology evolution and process as mutation, crossover and selection was an approach of great interest to us because of its thematic. We hope to bring information and understanding about space travel stresses and the adaptability that some organisms can have against those problems.

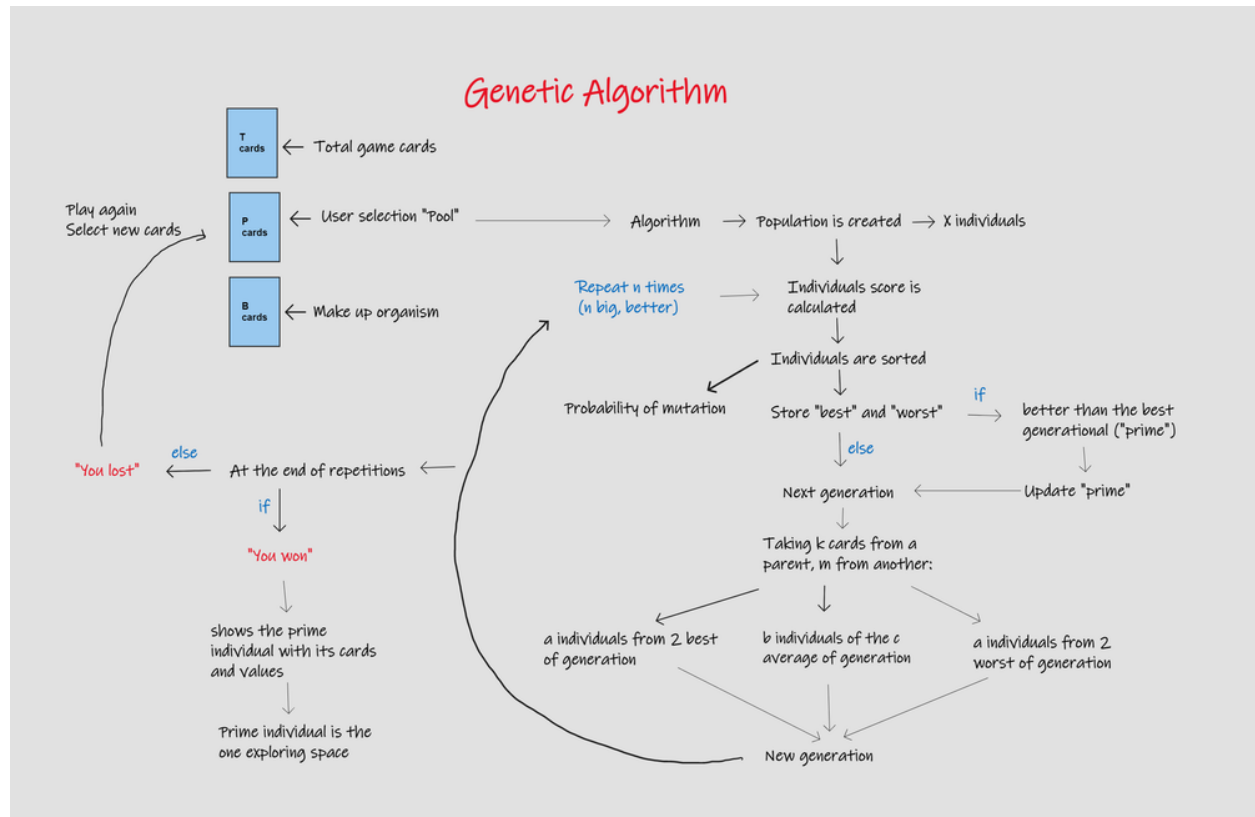


Fig 1. Genetic algorithm pseudocode diagram.

## References

Kumar, M., Husain, D., Upreti, N., & Gupta, D. (2010). Genetic algorithm: Review and application. *Available at SSRN 3529843*.