



# **Genetic Algorithms: A Different Approach**

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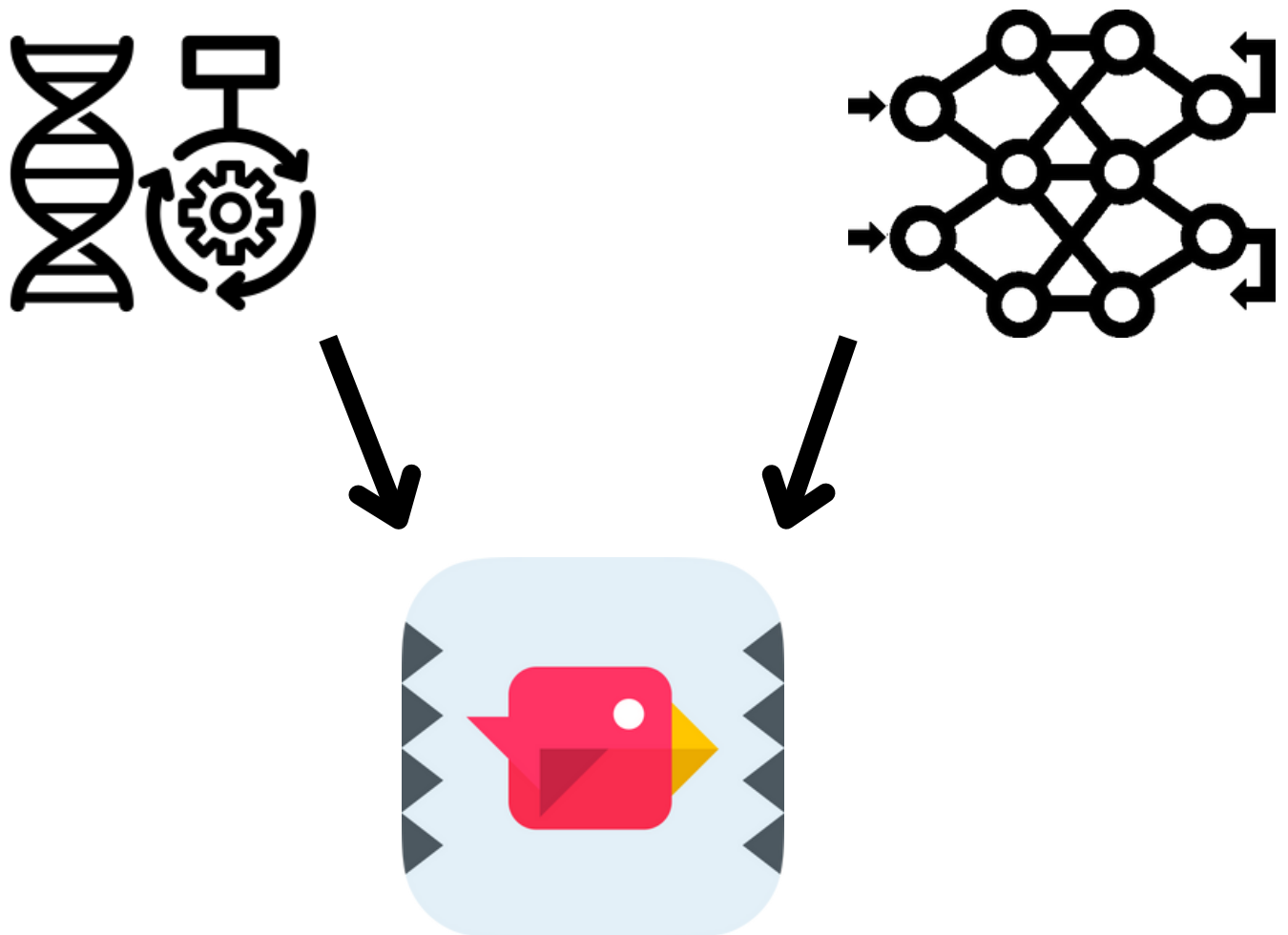
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# Introduction

This project aims to compare the effectiveness of two machine learning approaches, the backpropagation algorithm, and the genetic algorithm, in the specific context of the game "Don't Touch the Spikes." Both methods will be evaluated using the same input data from the game to determine which is more suitable for solving this particular problem.



# Approaches

## **Backpropagation Algorithm**

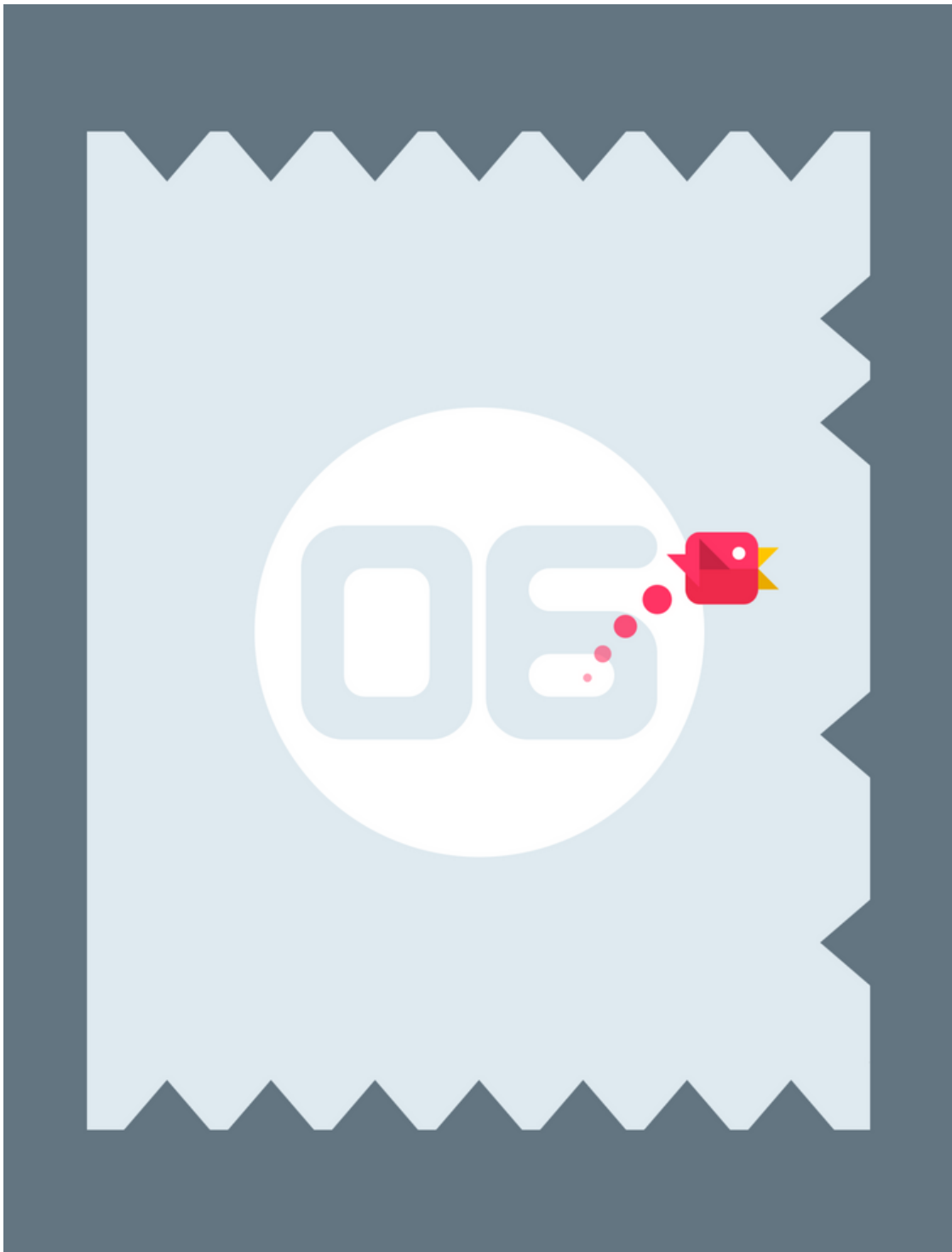
The backpropagation algorithm will be used to train a neural network to solve a specific problem. This approach is suitable when input data is available in large quantities, and the relationship between inputs and outputs is complex.

## **Genetic Algorithm**

The genetic algorithm will be employed to optimize a solution to a given problem. This method is particularly suitable when the solution's topology is not known in advance, and the search space is complex.

# Problem to Solve

The chosen problem for this comparison is a mobile game:  
"Don't Touch the Spikes."



## **Game Description**

"Don't Touch the Spikes" challenges players to guide a small bird through a perilous environment filled with spikes.

The bird is subject to gravity, and the player must tap the screen to make it jump (or not) to dodge the spikes. The bird is positioned between two walls, and each time it touches one, it bounces back, and new spikes are generated on the other wall. The bird cannot go too low or too high because the floor and ceiling are entirely made up of spikes. Each time the bird touches a wall while avoiding the spikes, it earns a point. The goal of the game is to score as many points as possible without touching any spikes.

As the game progresses, the difficulty increases:

- more spikes are generated on each wall
- the bird's speed increases
- the spikes start moving and more and more quickly.

## **Implementation of AI**

A neural network is associated with the bird, with a single hidden layer of 4 neurons to simplify calculations and a single output neuron.

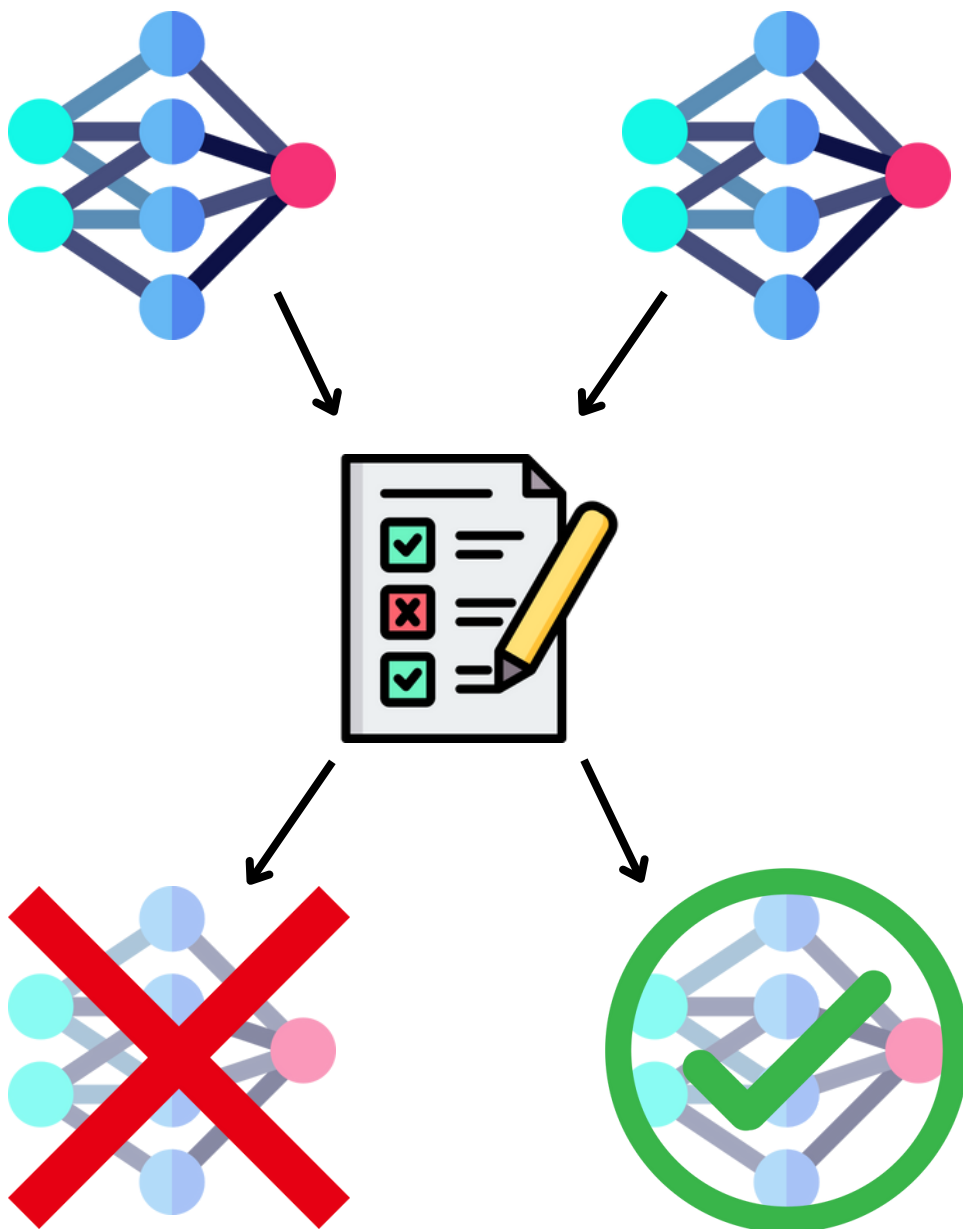
The higher the value of the output neuron, the more likely the bird is to jump.

The input data will be the same for both approaches, including the following elements:

- bird position
- spike positions
- ceiling and floor positions
- the bird's horizontal speed.

# Evaluation

The performance of each approach will be evaluated based on the maximum score achieved and the time required to reach it.



# Conclusion

This project will provide valuable insights into situations where the use of the backpropagation algorithm is more appropriate compared to the genetic algorithm, and vice versa. The results obtained will contribute to informing the choice of the algorithm based on the characteristics of the problem to be solved.