Gods of Capture

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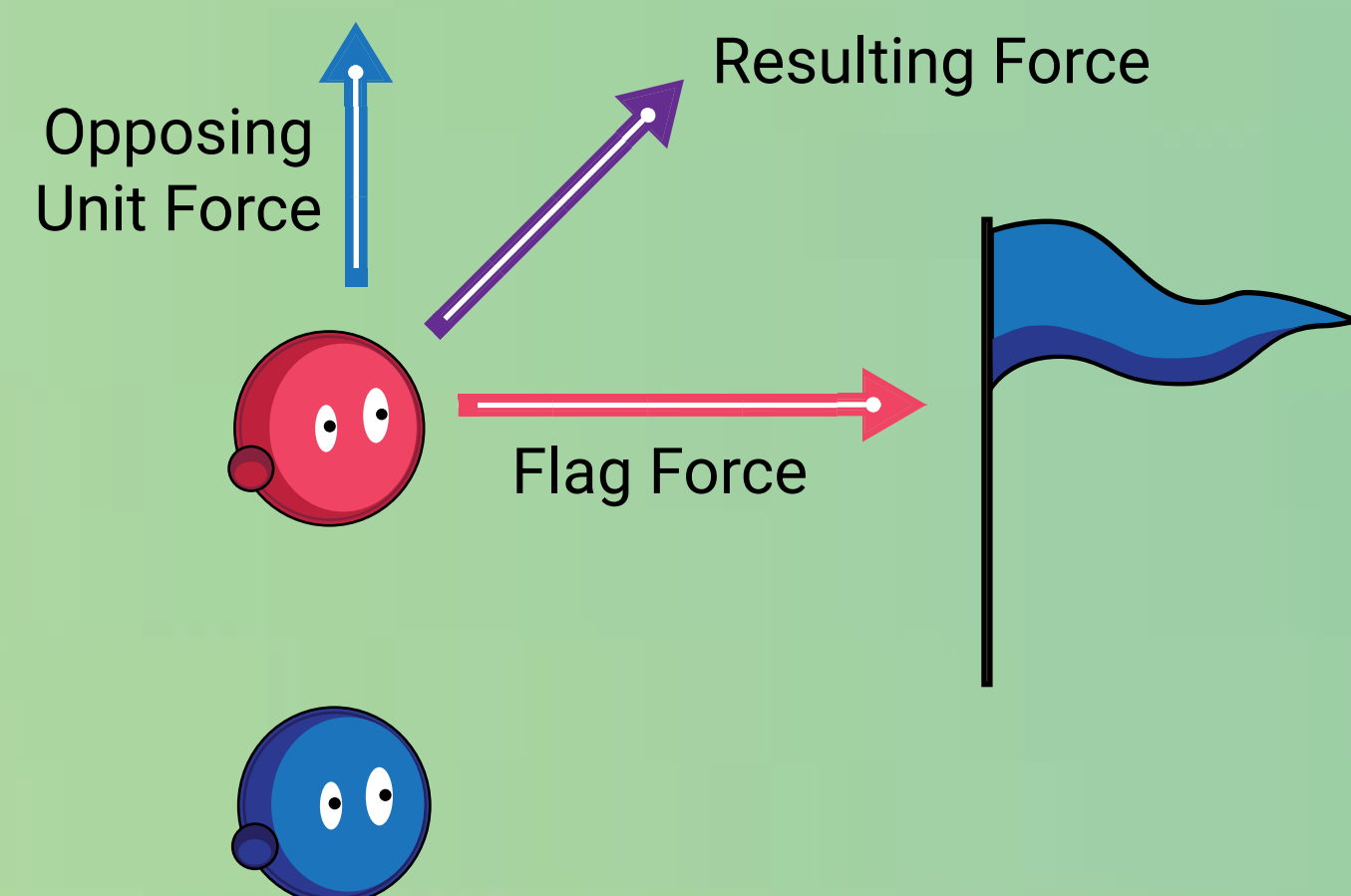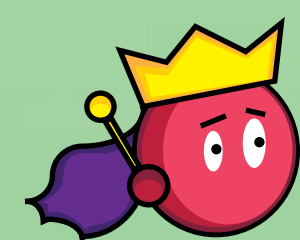
AI

Our AI makes decisions about individual movement by thinking about effects of other objects as exerting forces for or against the unit. The unit's direction of movement is the sum of these forces.
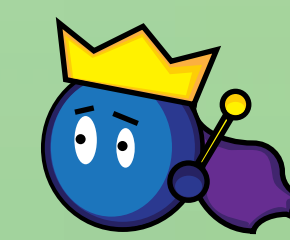
Opposing Unit Force

Resulting Force

Flag Force

The AIs are structured using an if-tree style logic using weights to make decisions. The weights control how each AI reacts to the information provided.

Decisions are made mathematically by making a hypothetical force for each other object that should effect the path of a unit. The weights contain information for the AI's offense/defense ratio, unit production preferences, and path-finding preferences for each unit type.
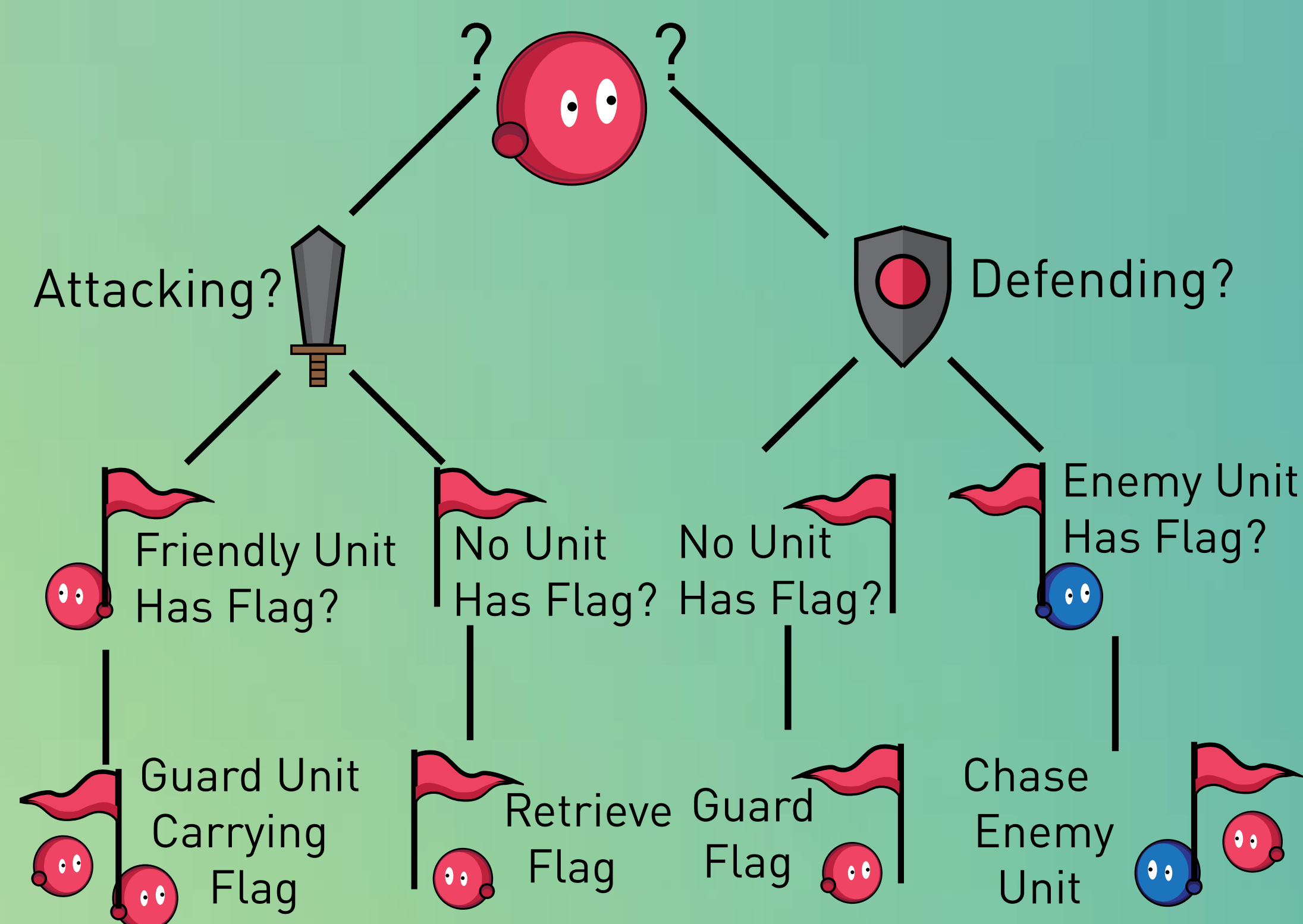
Purpose

We built a Capture the Flag game where both sides are controlled by an Artificial Intelligence. We chose this project to learn more about evolutionary algorithms and fully understand how the AI works by designing the mechanics of the game. We built the AIs to encompass a range of playing styles such as defensive or offensive. We first evolved the AIs to learn how to win the game and then evolved them to have different playing styles.

If-Tree

?   ?

Attacking?

Defending?

Friendly Unit Has Flag?

No Unit Has Flag?

No Unit Has Flag?

Enemy Unit Has Flag?

Guard Unit Carrying Flag

Retrieve Flag

Guard Flag

Chase Enemy Unit

Evolution

We evolved the AIs by changing their set of weights that dictate their actions. An AI is selected by being the most "fit" which is when it wins the game in the shortest amount of time.
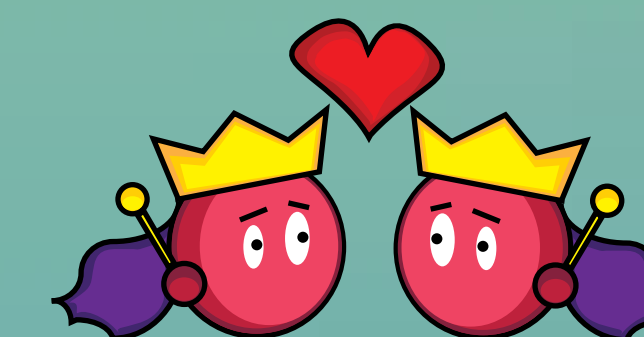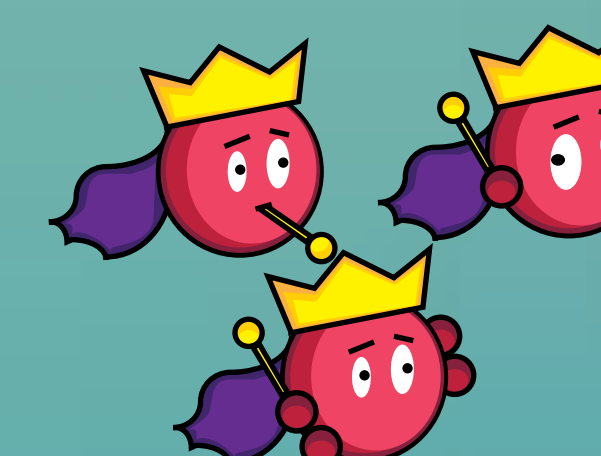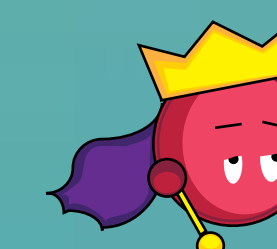
Initialize Population
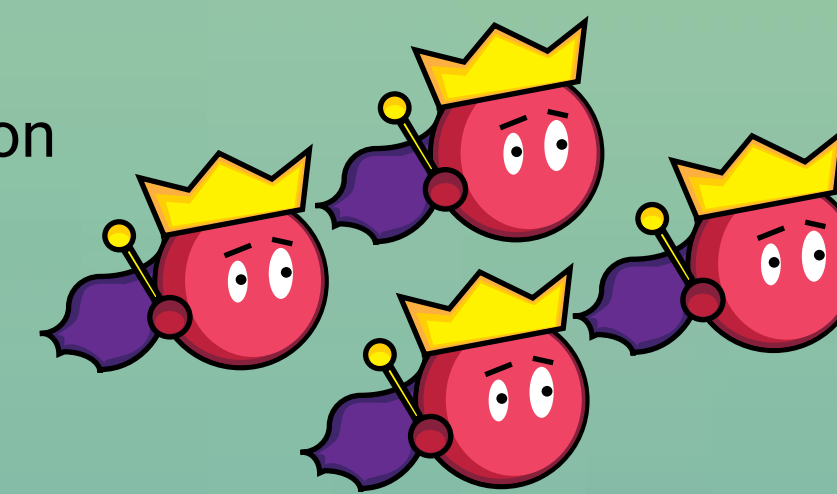
Select

Mate

Mutate

Repeat

Currently the algorithm runs through a population of 20 AIs for 20 generations to evolve the most fit AIs. We then store the five most fit to play the new AIs against them, thus increasing the specialization of each AI.