Poker: Genetic Algorithm

Jason Choi, Isha Bhandari, Shashank Bandaru

Introduction

In this project, we explore the evolution of strategic behavior in poker through **biologically inspired computation**. By simulating a population of AI poker players with varying behavioral traits, we apply a genetic algorithm to evolve players over generations, hoping to figure out the **best traits to use to win games of poker**.

Methods

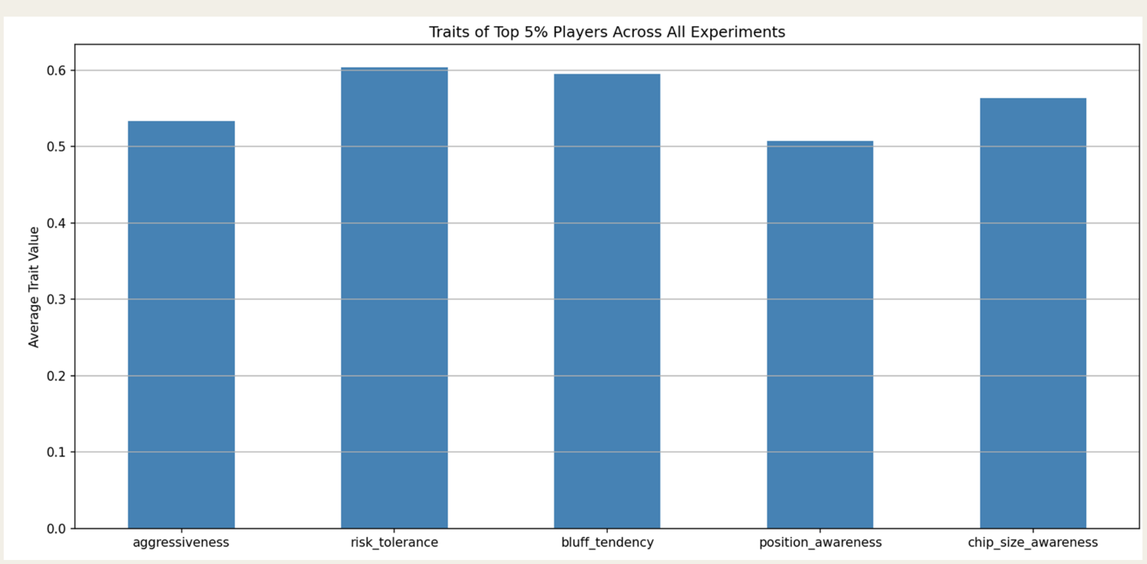
Fitness Function

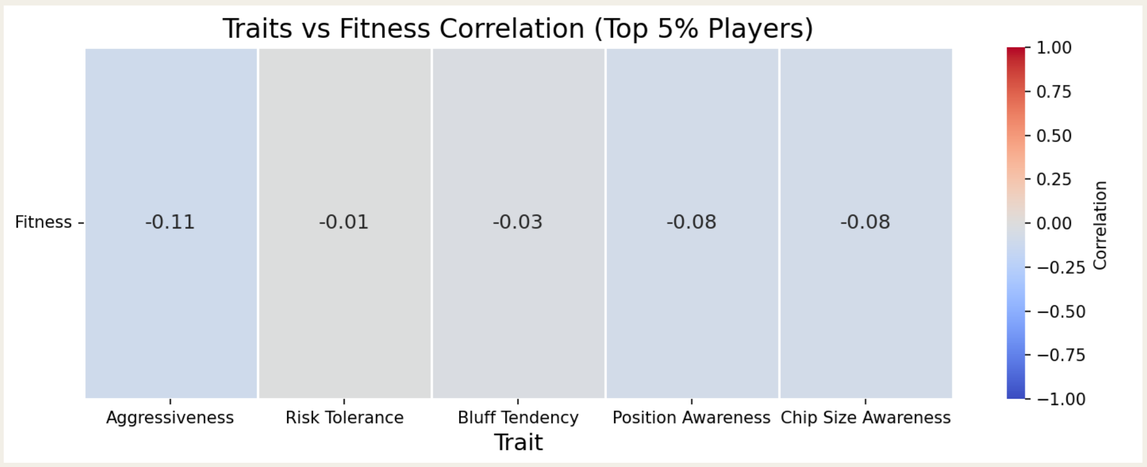
We reward players based on 3 factors:

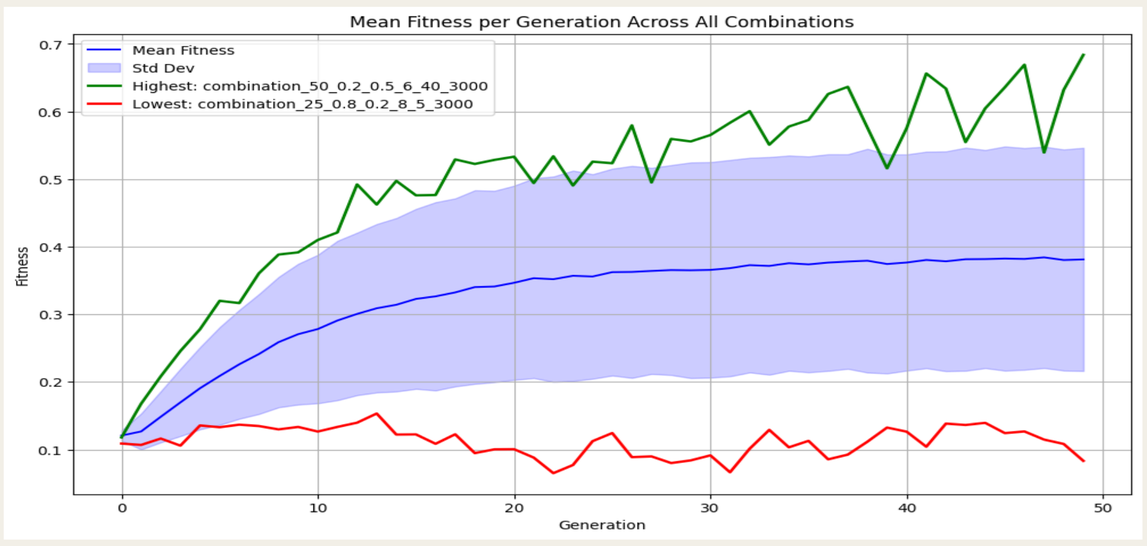
- How did the player place within the table
- Rate of their chips growth/loss
- Maintaining performance over time

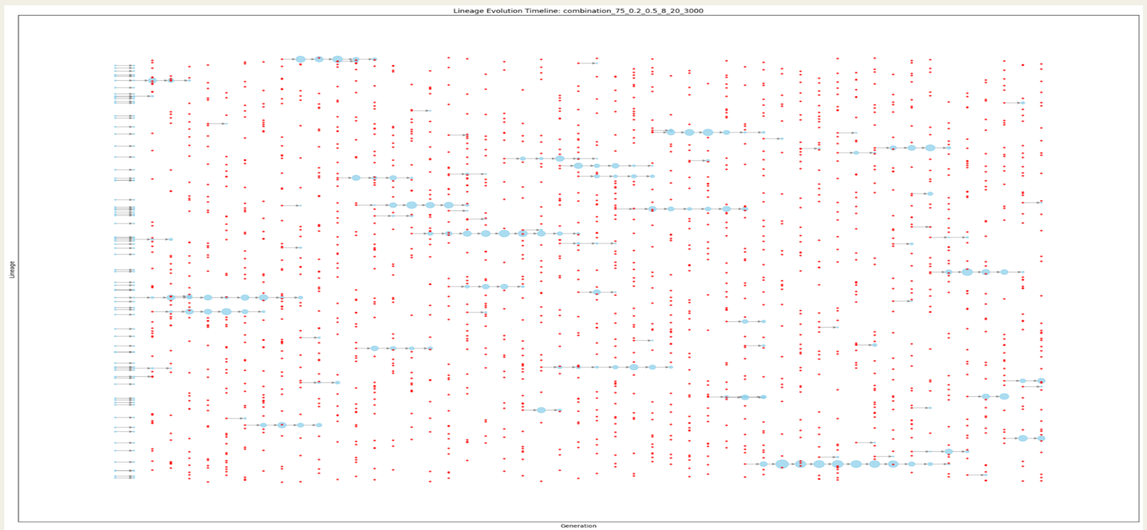
$$N = \text{Number of players at the table}$$
$$w_1 = 0.1, w_2 = 0.3, w_3 = 0.2, d = 0.9$$
$$\text{chips}_i = \text{final\_chips}_i - \text{init\_chips}_i$$
$$c_i = \frac{\Delta\text{chips}_i}{\max(1, \text{rounds}_i) \times \text{init\_chips}_i}$$
$$r_i = \frac{N - \text{table\_rank}(i) - 1}{N - 1}$$
$$\text{player\_score}_i = (r_i + w_2) + (c_i \times w_i)$$
$$L_i = (d \times L_i) + ((1 - d) \times \text{player\_score}_i)$$
$$F_i = (L_i \times w_i) + (r_i \times w_3) + (c_i \times w_2)$$

Results









Conclusion

- Risk tolerance and bluff tendency seem to be the most effective traits.
- No traits seem to definitively suggest a higher fitness score, with all having negative correlation.

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