Project Presentation

CSCE 631-600, Fall 2025

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Topic & Motivation

Problem: Finding optimal team composition strategies in the stochastic auto-battler game Super Auto Pets (SAP)

- 9 starting pets $\rightarrow$ 729 unique team compositions
- Battles have stochastic outcomes due to randomness in abilities

Motivation

- No unbeaten first team compositions exist

Figure 1: Super Auto Pets Game

Problem & Model

Simulation: Python implementation of SAP

Assumptions:

- The player can pick any turn 1 team
- Turn 1 team composition only
- Abilities approximated through repeat simulation

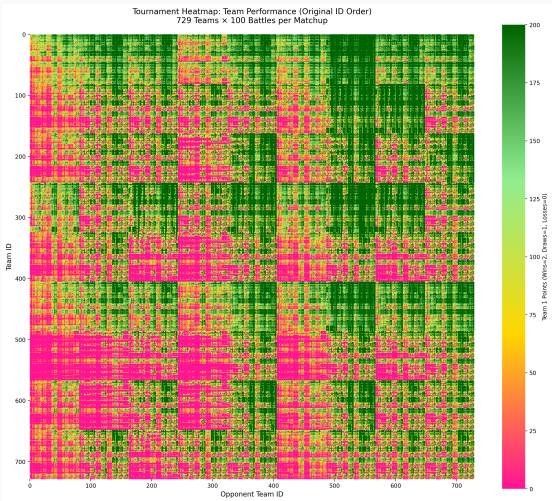


Figure 2: Battle Results

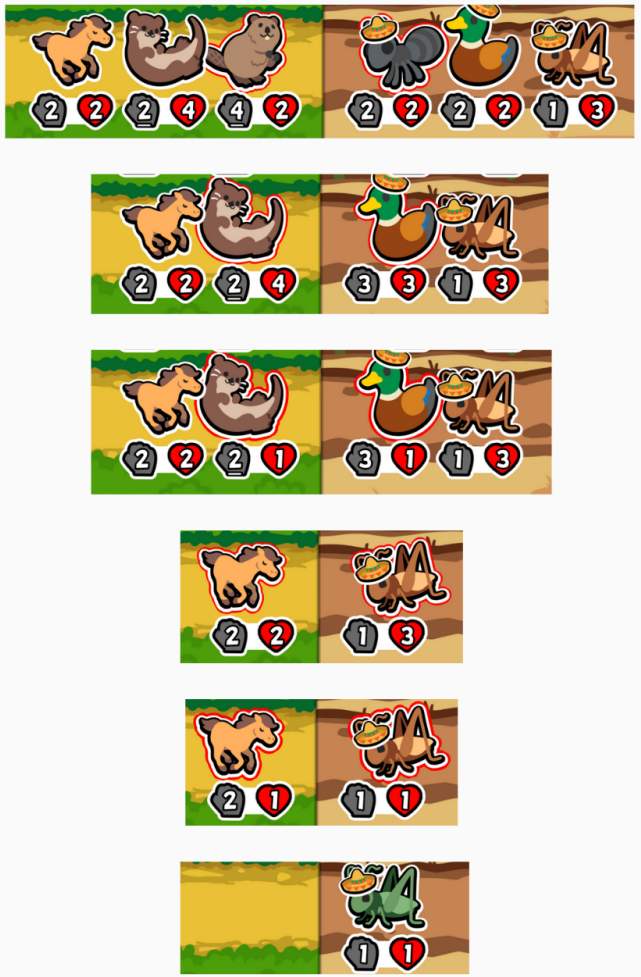


Figure 3: Sample battle

Approach & Results

Nash Equilibrium: Randomly select from these 3 teams with probabilities of

Team	(F, A, C)	(A, A, F)	(F, A, F)
Probability	38%	38%	24%

Strategy vs Random Opponent

- (A, A, F) is 3rd best vs random
- (F, A, F) is 5th best vs random

Lowest Unique Losses

1. $(F, A, F) \rightarrow 6$
2. $(A, A, F) \rightarrow 10$
3. $(F, F, F) \rightarrow 22$

Always have a win chance [1]

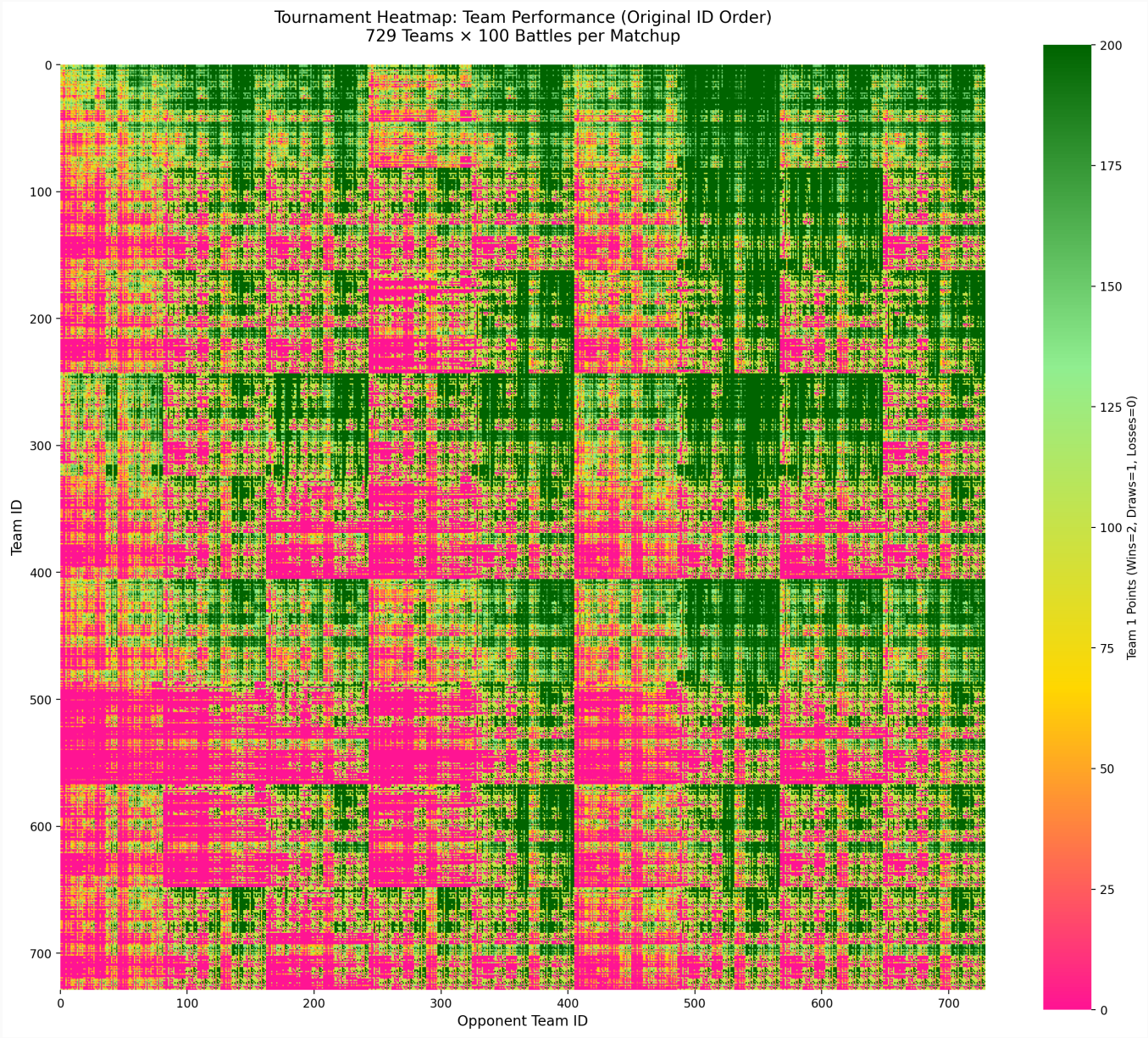
- (A, A, M)
- (A, M, C)
- (A, M, M)

Bradley Terry

1. (A, A, C)
2. (F, A, C)
3. (A, A, F)

[1] only 3 teams fit this criteria

Figure 2



(Figure 2)

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