Proposal
Pokemon

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November 9, 2021

1 Introduction

Pokemon is a video game series created by the Pokemon Company. The goal of the game is to not only catch pokemon, but also to train them and use them to battle other trainers. The task of battling optimally is quite interesting as there is an enourmous amount of possible combinations.

2 Prerequisites

Nintendo does not provide an API for the game, however, Pokemon Showdown is a free online tool that can be used to simulate battles. The tool is available at https://play.pokemonshowdown.com/. On top of that, the library poke-env is used on top of that. The library is written in python and provides an easy to use interface to Showdown. Additionally, the functionality to play games on a local server as well as the official Showdown servers is provided.

3 Battling

The focus of this thesis will be on batteling. Each player has a team of six pokemon. The pokemon are chosen randomly from the available pokemon in the game. Currently, there are 898 different Pokemon, some of them even have different forms. Each pokemon knows 4 different, also randomly assigned, moves. However, not every Pokemon can learn every move.
A move can either damage the opposing pokemon, heal the own pokemon, increase offence or defence, or add status effects like paralysis or sleep.
The game works based on a rock-paper-scissors-like system. Each pokemon has one or two types, each move has a type as well. Fire-Type moves are strong against Grass types, Grass types are strong agains Water pokemon and water pokemon are strong against fire pokemon. In total, there are 18 different types.
There are other aspects like weather, speed, base stats and level which heavily influence the outcome of a battle, they won't be discussed in this proposal, however they will have to be taken into account in the thesis.

4 Execution

This thesis will investigate multiple possible approaches to optimize battling. The first approach will be a rule based. Different complexity levels will be tested against each other.
Secondly, backpropagation will be used to train a neural network to play like a human player. The traning data was provided to me by the pokemon showdown team, it contains over 8 million replays of random pokemon battles.
Lastly, a reinforcement algorithm will be tested. The possibility to pretrain the network using either rules or replay data will be investigated as well.

5 Evaluation

The poke-env libary provides not only a random player, but also a max damage player that always chooses the move with the highest base damage. A simple reinforcement approach is given as well. These three agents will be used as baseline.

Pokemon Showdown also has an Elo-System similar to chess. The authors of Showdown allow bots to compete in ranked matches, so the approaches developed in this thesis will also be evaluated by playing ranked games against actual humans.

6 Example rulebased approach