

Scrabble!

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- What problem are you going to solve?

"Scrabble" is a crossword board game in which players score points by placing tiles with letters on it, onto a 15*15 game board. The tiles must form a valid word that can be found in a dictionary. Each tile has a different score, and the goal of each player is to get max score. Each player gets 7 tiles with a different score, and after placing a word, receives random tiles from the pile.

- How are you going to solve it?

1. Learning algorithm: MCST – Monte Carlo search tree:

We will calculate all possible moves from the given rack the player holds and score each one by using heuristics. Using the greedy approach, the best moves will be evaluated with monte-Carlo simulation, while considering each player will play the best move each turn. After the evaluation, the selected best move will be played.

2. Adversarial search (reflex agent):

Use static evaluation functions and simple heuristics (expectimax, alpha-beta pruning), considering the random factor, to calculate and score the best next move without a simulator.

- Why do you think that your approach is the right one?

Since the game is score-based, and we have limited tiles in hand and in the pile with score to each, we could calculate all possible moves the will yield the best score. Looking at a certain depth search, we could max the players score by choosing the most beneficial move each turn. Using monte-Carlo simulation our agent can predict the max-score move each time and evaluate best score.

- How are you going to test your results?

We will compare the results of both agents according to these criteria, in order to find the optimal approach to solve "Scrabble":

1. Success rate: what is the percentage of success in solving the game – to achieve the max score or overcome the component.
2. Runtime: how much time the algorithm takes to complete a game.
3. Learning Speed: for MCTS how much the learning pace improved through the learning episodes.