CS 4300 - WordGuess PEAS Assessment - Yousof Abusamra

The game of Wordle has a system for deducing a hidden five-letter word through strategic guessing. The guessing system uses letter placement and feedback to advance toward the solution. Feedback can only be obtained by submitting valid five-letter words as guesses, with each guess revealing which letters are correct (green), present but misplaced (yellow), or absent (gray). A useful AI agent would help plan which words to guess based on the accumulated feedback, optimizing the information gained from each attempt. The optimal result would be identifying the target word in the minimal number of guesses, given constraints on the valid word list and the six-guess limit.

The Performance Measure:

The following elements will be added together and then the negative of the sum will be used to produce the performance measure. The best agent will have the greatest performance measure. Note that the perfect score is 1, which is unobtainable, unless the target word is guessed on the first try.

- `1*(number of guesses used to find the word)`
- `10*(number of letter locations that reveal no new information)`
- `20*(number of guesses that reveal no new information)`
- `+1000 Penalty if word is not guessed in the six guesses limit`

Additionally the following measure is used in the search process to best guide towards a solution. But because it is too large and unpredictable it would not provide the user with much information if used in the performance measure.

- `1*(number of possible words given the available knowledge)`

The Environment is:

- Observability: Partially observable. The puzzle starts with zero information given about the words other than the letter count. And information is obtained through exhausting guesses.
- Uncertainty: Stochastic. The actions are deterministic. However, the result of the actions and which guesses will reveal new information is unknown until a guess is submitted.
- Duration: Episodic. Each word is a separate game, and resets all counters.
- Stability: The game is dynamic, the raid bosses change with time. The pokemon mega energy countdown proceeds with time and with no action from the agent.
- Granularity: Discrete. All values are discrete. All values are incremented in whole numbers
- Participants: Single-agent.
- Knowledge: Known. The game system is known and the progression and duration of the game is known, the word is unknown but that falls under observability.

The Actions (Actuators):

- Submit a word guess. This will provide feedback on letter correctness if the word is in the valid dictionary. It consumes one of the six available guesses.

The Percepts (Sensors):

- Current feedback pattern for each position. This is a value in the set [correct, present, absent, unknown].
- Current list of eliminated letters. This is a set of letters known not to appear in the word.
- History of previous guesses and their feedback. This is an ordered list with up to 6 entries.
- Remaining number of guesses. This is an integer in the range [0, 6].
- The valid word list that can be used for guesses.
- The possible solution words that match all current feedback.

Intended Search Strategy:

A policy search agent would be ideal for this environment.