— GUIDE —

Assignment 4: Guess the Word

AI-2 Systems Project (Winter Semester 2024/2025)

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This document is intended to help you solve the assignment "Assignment 4: Guess the Word" [AS]. You do not have to read it, but we do recommend to at least take a look at the tips and common issues.

1 A few tips

1. It might not be helpful to think about decision trees explicitly (and the problem does not exactly match the lecture's definition of a decision tree), but using the idea of information gain should be helpful. Make sure you understand the idea behind (expected) information gain and using it in decision trees.

2. The standard rules are noticably simpler than the advanced rules, which have hidden complexities. For example, consider a game with only two (equally likely) words: `DOG` and `DAD`. After the letter guess `D`, the feedback is `D-`. Given this feedback, the word is now more likely to be `DOG` than `DAD`.

3. You can improve the performance by caching results (e.g. the best initial guess for each word length).

4. It can be useful to make a word guess before you know the actual word with certainty.

2 Common issues

1. Always picking the most frequent letter. This strategy works to some extent, but it is not optimal.

2. Always picking the letter that is in approximately half of the words. This strategy corresponds to maximizing the expected information gain for the question "Is the letter in the word?". But we actually get more information from the feedback.

3. Ignoring "wrong guesses", i.e. letter guesses that are not in the word. Actually, this information also helps us to eliminate words.

4. Ignoring that the word distribution is not uniform.

References

[AS]   *Assignment 4: Guess the Word.* URL: https://kwarc.info/teaching/AISysProj/WS2425/assignment-2.4.pdf.