Harderdl: Yet another Wordle variation for those who like challenges

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https://helq.github.io/harderdl

ABSTRACT

Very few indie games manage to concurrently become staple names and attract hordes of computer scientists as Wordle has. Given these incredible strengths, one might mistakingly imagine that playing Wordle remains as entertaining for experts as it is for beginners. This is far from the truth. Wordle becomes stale and boring. Even more disappointing is the very obvious fact, for any Wordle enthusiast, that most variations of Wordle feel like a rehash and very rarely make the game substantially harder. We propose to hide information from the original Wordle game to increase its difficulty. We change the amount of information given after each guess from 7.9 bits (243 different cases) down to 4.4 for the Harder mode, and 2.6 bits for the Hardest game mode (21 cases, and 6 cases, respectively). The game is aptly nicknamed Harderdl. The game works as intended, meaning, it is much much harder (for humans). We are unable to beat the game consistently in less than 8 attempts, which means that instead of 6 attempts like in boring, vanilla Wordle, our Harderdl allows for 14 attempts. Attentive readers and players will notice that 2.6 bits is still too much information. We implement one more variation in which almost no information is given to the player (about 0.0001 bits per guess). In this Impossible mode, even the most advance of algorithms fail to perform better than humans.

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1 INTRODUCTION

The phenomenon that took as a storm in the English speaking world, or just the US, idk, Wordle has become too easy to solve for us. Wordle is not only a matter that computer scientists care, but it is mostly computer scientists who have come up with solutions to the game [15]. Wordle has proven to be NP-hard [11, 14] (CS lingo to say that it is very hard to know if your specific strategy will allow you to win at wordle. Still, there are some strategies that seem to always win).

Even though Wordle has been throughly studied [3, 5–10, 13, 16] (for sucks sake, there are even Deep Learning attempts to Wordle [2, 4]), people keep on building more and more knock-offs. We[1] do the same but we are better. We could reference all other Wordle variants, yet we do not do it as a matter of pride[2]. We barely recognize their existance. Every single variation is of no importance, except of course to... A special shoutout to Worldld! (Yeah, it's all about geography. You can play and learn at the same time.)

In this semi-inteligible[3] paper, we present a novel family of Wordle variations.

Figure 1: An almost completed game of Harderdl in Harder mode (game date: March 27th, 2023). No information regarding the position of the hints is given.

Two trivial generalizations of Wordle are increasing the length of the words to six or more letters, or extending the available words by including more languages than the mothership English. We want something a bit harder still. We propose a change on the hints given in the game. Instead of highlighting which letters are in the word to guess, this variation tells the player how many letters from a guess are in the word (and how many of those are in the same place). We present this new strategy with a botchered implementation and also explore a different game, breaklock, which is basically wordle but with patterns and a much smaller character set (9 letters, instead of 26).

[1] As in most other papers with a single author, we make use of *pluralis modestiae, i.e.* instead of saying "I wrote this entire paper!", we humbly accept the "We wrote this entire paper!"
[2] And Lazyness. Finding references is hard.
[3] We are very proud to report that, in the highest academic fashion, this paper was written in two days and was finished just a little *after* the deadline. The reader might pardon all the horrorimmatical typos and weird sentences as we are sleep deprived and in a crunch.

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2 BACKGROUND AND RELATED WORK

Here we talk about Breaklock [12] and how it is similar to Wordle. We also talk about Cowbull [1]. Or that is what this section is supposed to be. Go, check out Breaklock. It is very similar in conception to Wordle. Both game belong to the same class of games. Cowbull on the other hand is an (allegedly) Indian game that students play in class under their teachers noses. Not surprisingly, word games and puzzles have existed long before Wordle. Both Breaklock and Cowbull predate it by years.

3 IMPLEMENTATION

The methodology used to reduce the information present in Wordle was to hide where and which letters are correct or present (green and yellow, respectively, if you have no color blindness). As it can be seen in Figure 1, this makes for indeed a harder game.

Once the game is won (or lost), the actual hints are displayed as seen in Figure 2.

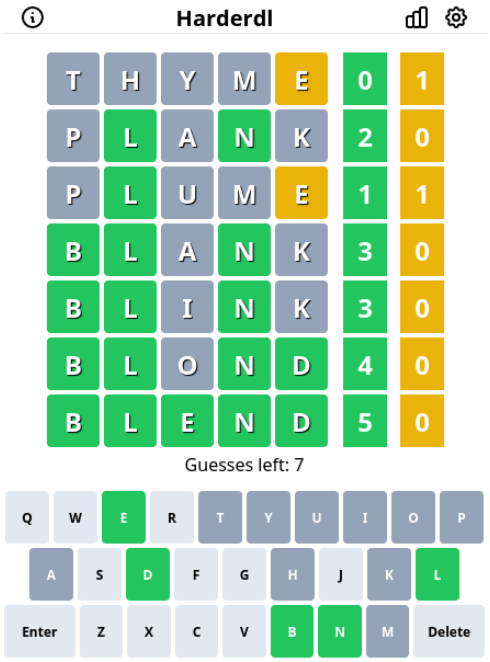

Figure 2: Completed game of Harderdl in Harder mode. All information is given explicitely.

For the adventurer, the puzzle solver, who loves challenges, these two pieces of information might be too much. After all, there are 21 possible cases for the numbers in the green and yellow hint boxes, which amounts to 4.4 bits of information per guess. Thus, we have implemented the Hardest mode as seen in Figure 3.

The Hardest mode is not properly named as it is not the hardest game mode possible. We can drop all hints altogether! This is the Impossible mode. The player only gains $log_2(1 + \frac{1}{13112-n})$ bits of information on their n-th guess. That means, about 0.0001 bits of information on the first couple hundred attempts. An example of this mode can be seen in Figure 4.

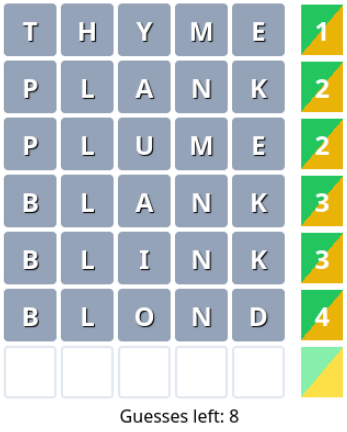

Figure 3: An almost completed game of Harderdl in Hardest mode. Only the number of letters that coincide with the target, hidden word are shown.

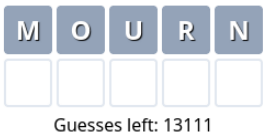

Figure 4: An example of the Impossible mode with a randomly selected word as example.

Harderdl can be found on the internets[4] at https://helq.github.io/harderdl. Harderdl took about 20 hours of work[5], not including the 20 hours spent writing the solver (which came first).

3.1 Solver

Like in that one video from 3Blue1Brown [15], we can apply the entropy trick to determine the best guess at every step. This method proves to be better than humans even when the entropy is only calculated in the simplest of fashions, *i.e*, not going deeper than one level in the entropy calculation will show a better starting word and most probably a faster solution (on average). An example of a solution given by the method can be seen in Figure 5.

4 CONCLUSION AND FUTURE WORK

As throughly explained in the paper just before we have made it possible what we said we were going to do in the abstract. Nothing else needs to be said more than:

Future work will focus on the next stage of information reduction, namely negative information. Fortunatelly, society seems to have speed up the creating of negative information research in the last

[4]Or it might not. Everything is ephemeral in the internet :S. If you are reading this on paper, well, it was never intended to be read that way, which probably means that the end of things arrived and you are just an archeologist confused on what the heck is this. This, to make it clear, is a footnote on a paper for a faux conference. Conferences where places where ego was measured and apparently people networked, but after the 2020 pandemic such things have been disposed of. I could rant for hours, but dear archeologist (or weirdo who just printed this for fun), I just wanted to say. Thank you! Thank you for reading and for existing.

[5]don't tell my advisor

Figure 5: An example of solving Harderdl using a sub-optimal entropy-based solver. Still better than humans.

few decades. In applying these methods, and others known for centuries we predict a reduction on the number of bits to levels so negative that it will be virtually possible to reverse Wordle and bring world peace.

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