Leveled Wordle Game

Deniz Bora KÜÇÜK[1], Sarp ÇOBAN[2*], Nurettin ŞENYER[3] and Recai OKTAŞ[4]

[1] Software Engineering Department, Samsun University, Turkey
[2] Software Engineering Department, Samsun University, Turkey
[3] Software Engineering Department, Samsun University, Turkey
[4] Computer Engineering Department, Samsun University, Turkey

[*](sarp.coban@samsun.edu.tr) Email of the corresponding author

Abstract – Wordle is a word game which is a combination of Jotto, Hangman and Mastermind games. The game is in English and there is no difficulty level. In this study, the Wordle game was translated into Turkish and the difficulty level was added. Five-letter Turkish words were obtained and immoral words were removed from the data set. It was examined how often the words in the filtered data set were searched through Yandex Wordstat. Frequently searched words are grouped as easy words and rarely searched words are grouped as difficult words.

Keywords – Game, Word Game, Wordle, Yandex Direct, Yandex Wordstat

I. INTRODUCTION

A video game, is a digital entertainment in which the player encounters various difficulties by interacting with a digital interface. When video games were first developed, only one type of game could be developed due to hardware constraints. Today, since multiple game mechanics are used, there are many types of games [1], [2].

Jotto is a word game played with two players. There are many variations of the game played with different rules, but in general the rules are as follows. One of the players picks a secret five-letter word, the other player tries to guess the word. For each correctly guessed letter, the player says a number. It doesn't matter whether the letter is in the right place or not [3].

The Hangman game is a word game represented by hyphens as many as the number of letters in the word. It can be played with two or more people. One of the players chooses a hidden word, while the other players try to guess the word. The player who chooses the word gives the other players the adjective, noun, etc. of the word. gives clues about it. If the player guesses correctly, the hyphen is replaced with a letter. In the wrong guess, a limb of the human body is drawn [4].

Mastermind is a puzzle game where one of the players sets a password consisting of symbols or colors, and the other tries to solve this password. While the player tries to guess the password, the other player gives clues as to how many symbols are in the right place and how many symbols are right but at wrong place. When the password is deciphered, the player gets points based on the number of guesses. If the password cannot be deciphered, the player who prepared the password wins the game [5].

Wordle is a web based word guessing game. It is a combination of classic games such as Mastermind, Hangman and Jotto. It was developed by Josh Wardle et al and published in October 2021.

Millions of people play Wordle every day. Five letter English words are guessed in Wordle game. The player is expected to guess the five letter word in six tries. After each guess, the player receives feedback on whether the letter was found and the correct position of the letter [6] - [8].

Games can be developed and played for many different purposes. For example, games can be developed for the dyslexia patients. The mobile game Dyseggxia was developed by Luz Rello et al. Juan Haladjian et al. developed Legaframework for vocabulary exercise applications [9], [10].

Games can also be developed for educational purposes. For example, Smitha Padjyar and Sanjay Singh developed the word game which is teaching Indian mythology, Chattraphon Pinkaew and Rattapoom developed Waranusast the concrete wordplay in which graphical objects are projected onto the surface and plastic characters are placed on that object, and Dedy Prasetya Kristiadi et al. developed a religious education mobile game that includes a true-false game, a word game, and a multiple-choice test game [11] - [13].

Since Wordle is a popular game, variants of Wordle have also been developed. Israa et al. developed a Wordle-style Arabic word game for Iraqi 1st and 2nd grade students, William Strong added the words used in the Texas dialect to the Wordle game and developed an application called Wordalin [14], [15].

In the current Wordle game, the words come randomly, so the frequently used word can come, or the infrequently used word can come. In this study, the Wordle game was translated into Turkish and leveled. As the level increases, the frequency of use of the incoming word decreases.

II. MATERIALS AND METHOD

A. *Data Set*

In the application, Turkish-specific words in [16] were used as the data set. There are 5535 Turkish-specific words in the dataset. Some of these words are used frequently in our Turkish, while others are rarely used. Table-1 contains sample words from the data set.

Table 1. Sample Words from Data Set

Sample Words
Acele
Kitap
Padok
Üğrüm
Orman
Jüpon
Forma
Hulul
Fahte

The word "Acele" in Table 1 is one of the frequently used words, and the word "Üğrüm" is one of the rarely used words.

B. *Word Filtering*

While obtaining five-letter Turkish words, some immoral words were also obtained. At this stage of the study, immoral words should be filtered out. For this purpose, the database of immoral words (Turkish Swear Filter) was used. By checking whether the words in the data set we have are in this immoral word pool, the ones were filtered and the remaining words formed the main data set. There are 1561 words in this filter. Not all words in this filter are 5-letter, and not all 5-letter immoral words in the filter are in the dataset. There are 46 words in both the dataset and the filter. When these words are removed from the data set, 5481 words remain.

The flow chart of the word filtering process is given in Fig. 1. According to this flowchart, the word selected from the general data set is compared with the words in the data set for immoral words. If the selected word is in the dataset of immoral words, the word is removed, otherwise it is added to the original dataset.
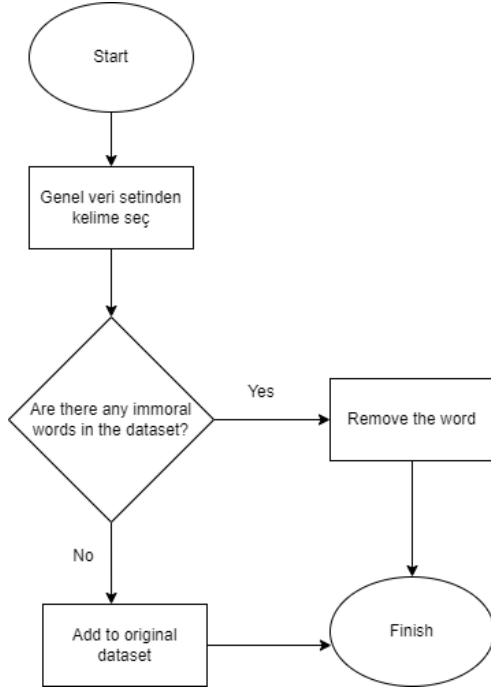
Fig. 1. Word Filtering Flowchart

C. Determining the Word Difficulty Level

The main data set was obtained as a result of filtering the general data set, immoral words. There are 5481 words in the original data set. While some of the words in this dataset are frequently used in our daily life, some of them are rarely used. The standard Wordle game looks at all words at an equal distance. In this study, it was tried to determine the difficulty level by looking at the difficulty levels of the words. Yandex Wordstat was used for this.

Yandex Wordstat gives an idea about the estimated number of times the words or phrases written on the Yandex search engine are viewed by looking at the search history from [17].

Yandex Direct is a platform developed for the placement of contextual ads. Yandex Direct presents ads to target audience interested in products or services. Ads can be managed using the Yandex Direct API. Yandex Direct API allows for increased account management efficiency. The API is the right choice when big data processing, independence from the browser interface, and adjustments to advertisements are required [18].

After the words obtained from [16] are passed through from [19], the search statistics of the words are checked from Yandex Wordstat via Yandex Direct. Yandex Wordstat does not only look at how many searches the word is. It is also checked how much the word group in which it is included is searched. This situation can be seen in Fig. 2.

Fig. 2. Yandex Wordstat word search statistics

Yandex Wordstat has statistics on how many words are searched on which device. Fig. 3 shows the search statistics on desktop devices, and Fig. 4 shows the search statistics on mobile devices.

Fig. 3. Yandex Wordstat word search statistics on desktop devices

Fig. 4. Yandex Wordstat word search statistics on mobile devices

The developed application is like the Wordle game. The difference from the Wordle game is the use of Turkish words and the difficulty level. A score of 0 to 25 indicates level 1, a score of 26 to 50 indicates level 2, a score of 51 to 75 indicates level 3, a score of 76 to 100 indicates level 4, and a score of 100 or higher indicates level 5. While determining the words, the previously used words are removed from the pool and the remaining pool is divided into 5 parts and the word suitable for the level is chosen randomly and sent to the user. The user has six chances to guess the word. After each guess, information is given about the existence of the letter and the correctness of its location. If there is a letter and its position is correct, it is marked with green. If there is a letter but its position is incorrect, it is marked in yellow. Scoring is done at the end of the game. If the first guess is correct, the user gets 6 points, 5 points for the second guess, 4 points for the third guess, 3 points for the fourth guess, 2 points for the fifth guess, 1 point for the sixth guess.

III. RESULTS AND DISCUSSIONS

A video game is a digital entertainment device in which the player interacts with an interface. Wordle is a word guessing game. It is a combination of Mastermind Hangman and Jotto games.

In this study, it was created by obtaining the data set from [16]. Some of the obtained Turkish words are immoral words. Therefore, word filtering was applied. The filtered data set is passed through

Yandex Wordstat via Yandex Direct. Statistics on how many words are searched through Yandex Wordstat are examined. Frequently searched words are grouped as easy words and rarely searched words as difficult words.

As a result of these processes, the Turkish Wordle game was developed. Five letter Turkish words are guessed in the game. Information is given about the position and presence of the letters in the guessed word. If the letter is in the word and its position is correct, it is marked green. If the letter is in the word but its position is incorrect, it is marked yellow. If the letter is not in the word, it is marked red. The screenshot of the game is shown in Fig. 5.
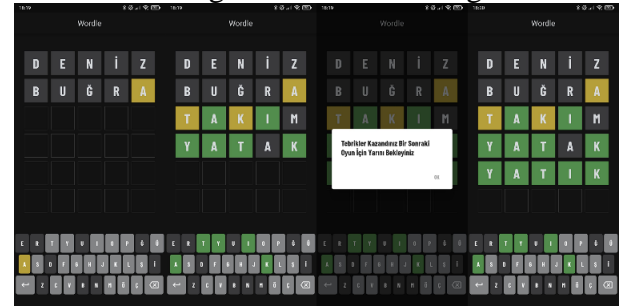

Fig. 5. Screenshot of the Turkish Wordle Game

REFERENCES

[1] Nacke, L. E., Bateman, C., & Mandryk, R. L. (2014). BrainHex: A neurobiological gamer typology survey. Entertainment Computing, 5(1), 55–62. https://doi.org/10.1016/j.entcom.2013.06.002

[2] Zackariasson, P., & Wilson, T. L. (Eds.). (2012). The video game industry: Formation, present state, and future. Routledge.

[3] Ganzfried, S. (2011, November). Computing strong game-theoretic strategies in jotto. In Advances in Computer Games (pp. 282-294). Springer, Berlin, Heidelberg.

[4] Tanjung, S., Rahmansyah, H., & Siregar, S. R. (2019). The Effect of Hangman Game on Students Vocabulary Mastery. Jurnal Liner, Institut Pendidikan Tapanuli Selatan, 2(3), 77-89.

[5] Merelo-Guervós, J. J., Castillo, P., Mora García, A. M., & Esparcia-Alcázar, A. I. (2013). Improving evolutionary solutions to the game of mastermind using an entropy-based scoring method. Proceeding of the Fifteenth Annual Conference on Genetic and Evolutionary Computation Conference - GECCO '13. https://doi.org/10.1145/2463372.2463473

[6] Brown, K. A. (2022). Model, guess, check: Wordle as a primer on Active Learning for Materials Research. Npj Computational Materials, 8(1). https://doi.org/10.1038/s41524-022-00787-7

[7] Hamkins, J. D. (2022). Infinite Wordle and the Mastermind numbers. arXiv preprint arXiv:2203.06804.lılış

[8] Lokshtanov, D., & Subercaseaux, B. (2022). Wordle is NP-hard. arXiv preprint arXiv:2203.16713.

[9]   Haladjian, J., Richter, D., Muntean, P., Ismailovic, D., & Brügge, B. (2013). A Framework for the Creation of Mobile Educational Games for Dyslexic Children. International Association for Development of the Information Society.

[10] Rello, L., Bayarri, C., & Gorriz, A. (2012). What is wrong with this word? Dyseggxia. Proceedings of the 14th International ACM SIGACCESS Conference on Computers and Accessibility - ASSETS '12.

[11] Kristiadi, D. P., Vindy, Sambera, R., Julianto, A., Warnars, H. L., & Hashimoto, K. (2019). Mobile Game Application for Religion engagement. 2019 International Congress on Applied Information Technology (AIT).

[12] Padiyar, S. S., & Singh, S. (2017). Word based thematic game on Indian mythology. 2017 International Conference on Advances in Computing, Communications and Informatics (ICACCI).

[13] Pinkaew, C., & Waranusast, R. (2014). Interactive tangible word game. 2014 Third ICT International Student Project Conference (ICT-ISPC).

[14] Israa, M. A., Afaf, B. J., Zeina, S. J., & Abeer, A. D. (2015). Game Programming: Arabic Words Puzzle. Iraqi Journal of Science, 56(1B), 499-505.

[15] Strong, W. F. (2022). Givin'Wordle a Texas twang (Wordle For Texas).

[16] 5 Harfli Kelimeler. Kelimetre.com. (n.d.). Retrieved June 30, 2022, from https://www.kelimetre.com/5-harfli-kelimeler

[17] Kelime istatistikleri. (n.d.). Retrieved June 8, 2022, from https://wordstat.yandex.com.tr/#!/?regions=983

[18] Lesson 1. what is Yandex Direct API. yandex direct API. version 5. . Yandex Direct API. Version 5. (n.d.). Retrieved August 4, 2022,

[19] d35k. (2018, January 30). Turkish-swear-words/swears.txt at master · D35K/turkish-swear-words. GitHub. Retrieved July 1, 2022, from https://github.com/d35k/Turkish-Swear-Words/blob/master/swears.txt