2023 Spring MD-DC-VA Section Meeting Student Poster Session

Wordle Difficulty Classification

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The game Wordle has taken the world by storm in the last year. Hundreds of thousands of people play every day just to guess one, five-letter word. Each day the New York Times goes on Twitter to ask players how many tries it took them to get the word of the day or if they didn't get the word at all. The New York Times compiled all the data from 1/7/22 to 12/31/22 and requested that we develop three models. The first model they requested is one that explains the variation of reported results and predicts how many people will report on March 1, 2023. The second is one that will predict the distribution of the reported results (i.e., what percent of people will figure out the word in x number of tries) on March 1, 2023. Finally, the last model requested is one that classifies the word difficulty and identifies what attributes make a word easier or harder. For the first model, we took the data points from June 13th to December 31st and made them into a scatterplot to find the trend in order to guess how many players will play on March 1, 2023. For our second model, we took the data from the previous year's distribution of tries and used multiple linear regression to predict the spread of results on March 1, 2023. For the last model, we created weighted difficulty factors that we believed were universal and ran every word through these factors. The factors could classify a word as more difficult than others. We then assigned each word a difficulty score. A word with a higher score represents a more difficult word.

Wordle Warriors: An Analysis of 5-Letter Word Complexity

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Wordle is a guessing game by the New York Times; the user is given 6 tries to guess a five-letter word in the English language. The New York Times has requested our group to analyze provided data on the popular word guessing game, Wordle. The data contains information collected over the year of a year from January 7th, 2022 through December 31st, 2022. We are given the data variables of every word and the number of users completing the Wordle of the day, including users who played in hard mode. Percentages of attempts of players who guessed the word (or did not) are also provided. Predicted what is to happen to Wordle over time, what is to happen by March of 2023, and what would happen on that date if the word 'eerie' was the word of the day.

We predicted the number of users who reported results over time and determined the difficulty of the given word of the day. We calculated our model with a basic polynomial curve fit of the provided Wordle data. This curve fit equation returns the coefficients for a polynomial of a degree that is the best fit for the data. The use of the total number of users per day and the percentages of each number of tries provided us with the end result of predicting future scores. We also analyzed the decline in the number of people playing. Lastly, we began integrating into our prediction model the word that was going to appear on March 1st, which is 'eerie.' We adjusted our data to only fit a model to words that are similar to 'eerie.' The word 'eerie' has all common letters, and on top of that, a triple letter. With the data provided by the New York Times, we would group the words

with similar characteristics and visualize how those words did with the users on that day. Overall, our model was able to predict users participating in Wordle over time, how many times users would guess a word, and all this predicting the future word of the day 'eerie' and its success with users.

Modulation and Modeling of Audio Signals in Analog Circuits

Kevin George
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We provide an introduction to generating and analyzing analog circuits through the means of instrument audio effects and their respective signal modulation characteristics, as measured through an oscilloscope. In addition, this poster outlines the cumulative work of a semester's-long research project on creating analog circuits through bread-boarding and then implementing many of those circuits onto perf boards. In so doing, we create common musical interfaces known as: audio effects pedals. When powered and receiving an audio signal from an instrument, such as an electric guitar, such an effects pedal modulates the frequency and voltage of an input audio signal to create unique sounds, many of which are prevalent in a multitude of musical genres. Using this modulation, we measure the voltage change over time using an oscilloscope to display the result of the circuit's effect on a simple audio input signal: a sine wave. After gathering data of the modulated signal, we work to model the modulated signal data using harmonic and time-series (ARIMA) analysis.

Predicting Wordle Results

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Green, Yellow, Grey squares; Five letters; 6 guesses: Wordle. This game owned currently by the The New York Times became very popular in 2022. The game involves an unknown 5-letter word, players must guess a recognized English word, and letters in their guess will be color-coded based on if they are in the word or not. Letters turn green if they are in the world and in the correct spot, letters turn yellow if they are in the word but in the wrong spot, and letters turn grey if they are not in the word at all. Along with this 'normal' mode, there is a hard mode. The hard mode requires players to use any correct letters (green or yellow) in the next guess. A lot of players then report their scores, or how many guess it took them, on Twitter. We have been given this data from January 7 2022 to December 31 2022 and have been asked to analyze it.