User vs. Computer Tic-Tac-Toe

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Project Overview/Objective

- Creating an interactive game of User vs Computer Tic-Tac-Toe
- Having different levels of difficulty in the game
- Implementing it without the generic algorithms that are out there
- Testing the Computer player’s algorithm with every permutation

Techniques and Tools (Game Code)

- Raw technique of basic if-else statements to predict the User’s next move and the Computer’s move to either make itself win the game or block the User’s winning move
- Predicting the fork move involved understanding list data and its manipulation
- Implemented different levels of difficulty by
  1. Having the Easy function make the Computer play random moves using the random library
  2. Predicting and blocking the User’s fork moves in the medium difficulty
  3. Having the Computer itself play a fork move at the Hard level

Results and Findings

- To test the program we decided to conduct many trials on each level
- For each level we tried to exhaust all the possible games that could be played to get an accurate statistic of win percentage at each level
- For each level we were sure to have at least 40 trials to estimate an accurate win percentage
- Our findings showed win percentages of:
    - Easy: 90%
    - Medium: 37%
    - Hard: 12%

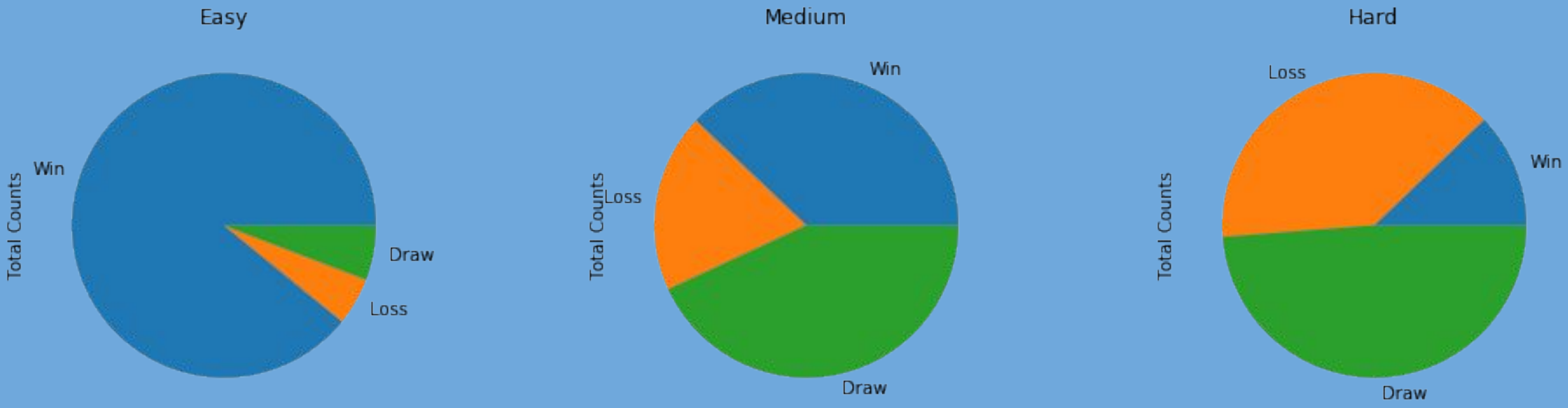
Trials

Specifically with the Medium and Hard Levels

Techniques and Tools (Graphs)

- To create our graphs we totaled our numbers for wins, losses, and draws for each difficulty going first and second.
- We created a 3 number series, indexed the series, and used the pandas plot to make pie chart.

Cumulative Total Pie Charts



Challenges Faced

- Turtle graphics, interactivity working with code, tap function
- Trying to program the “checkmate in 1”/fork move for the computer player
- Differentiating between the levels of difficulty
- Finding ways to beat the algorithm for each level of difficulty and learning how the Computer plays the game

What we Learnt / Expertise

- Writing a brute force code for the Computer player
- Extensive use of lists and functions
- Creating a modular program so that the code is easy to read and understand
- Converting the raw data of the trial into panda graphics for better representation of trial data

THANK YOU!!