Dice Game
Project ID:22MPA165
Final Review

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May 10, 2022

Comment

In my Review-3, I was asked to
1) Work on my Project Report

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Objective

The proposed Dice Game, is a standalone multiplayer game created using MATLAB App. Each player will roll the dice and player having bigger number in each roll will get a chance to perform action of choice (heal action or attack action).

GUI and animations are created using MAT-LAB and machine learning model is built using Python programming language. The objective of machine learning model is to predict the winning probability of each layer. The variables are exchange between MATLAB and python language with the help of Application Programming Interface (API), which is built using Flask (Python library). The model will be using Random Forest Regressor to predict the outcome based on the variables passed. Due to the nature of the game, the graphics will be in 2D and offer a layout and feels like that of a board game.

Literature Survey

Author	Title	Summary
M. Prist, A. Monteriù, A. Freddi, E. Pallotta, L. Ciabattoni, P. Cicconi, F. Giuggioloni, E. Caizer, C. Verdini	Machine Learning-as-a-Service for Consumer Electronics Fault Diagnosis: a Comparison between Matlab and Azure ML (2020) [[21]]	The purpose of this paper is to perform a preliminary comparison of ML algorithm performances provided by two software, namely Microsoft Azure (cloud solution) and MATLAB (on premise solution), on a study case.
Ahmed A. Elsayed, Waleed A. Yousef	Matlab vs OpenCV: A Comparative Study of Different Machine Learning Algorithms [6]	This paper presents a comparative study using 20 different real datasets to compare the speed of Matlab and OpenCV for some Machine Learning algorithms. The paper concluded that Matlab is more convenient in developing and data presentation. The best of two worlds can be achieved by exploring using Matlab to select the most successful algorithm; then, implementing the selected algorithm using OpenCV to gain a speed factor.
Moises Levy, Daniel Raviv, Justin Baker	Data Center Predictions using MATLAB Machine Learning Toolbox (2019)[13]	This paper describes a predictive model using MATLAB machine learning tools for nonlinear regression, support vector machine and neural network. Predictive analytic enables evidence-based decision making in the case of uncertainty and risk, and helps to evaluate areas of improvement in Data Center.
Karel Perutka, Michal Vymazal	APPLICATION OF GAME-BASED LEARNING IN MATLAB USING OBJECT-ORIENTED PROGRAMMING (2021) [20]	This paper focuses on game-based learning as a modern method of education, which is used by many experts from practice and confirms the benefits of its use in teaching. Furthermore, practical part deals with the design of the original game, designed primarily to teach MATLAB. The game was created using object-oriented programming in MATLAB.

Litrature Survey

Harsh Patel and Purvi Prajapati	Study and Analysis of Decision Tree Based Classification Algorithms [18]	This paper includes three different algorithms of Decision Tree which are ID3(Iterative Dichotomiser 3), C4.5 and CART(Classification and Regression Tree).
Nilesh Patil, Bevan Sequeira, Neil Gonsalves, Abhishek Singh	CRICKET TEAM PREDICTION USING MACHINE LEARNING TECHNIQUES (2020)[19]	In this paper, authors have used Random Forest Algorithm and Decision Tree classifiers to produce the problem's prediction models. The conclusion was drawn that Random Forest classifier is the most reliable for the problems proposed.
Jimbo Henri Claver, Jawad Azimi, Takeru Suzuki	New Prospective on Multiple Dice Rolling Game and Its Statistical Implications claver2017new	This paper uses an extended version of the well-known Chapman-Kolmogorov Equations (CKEs) to model the state transition of the probability mass function of each side of the dice during the game.
Hunter Wimsatt, Aarohi Panzade, Kaaustaaub Shankar, Warren Campbell	Using Machine Learning to Interpret Dice Rolls (2021) [4]	The goal of this project was to develop a machine learning and computer vision solution for the interpretation of dice rolls. When combined with an automated dice roller it would facilitate the study of dice unfairness.
Ajan Kumar and Jay Gandhi	A Survey on Sports Prediction using Machine Learning (2019)[11]	The paper has discussed some of the methods for Sports Prediction and their limitations. And presented the comparison of all these methods.
Roshan Kumari and Saurabh Kr. Srivastava	Machine Learning: A Review on Binary Classification (2017) [12]	This research synthesizes binary classification in which various approaches for binary classification are discussed.
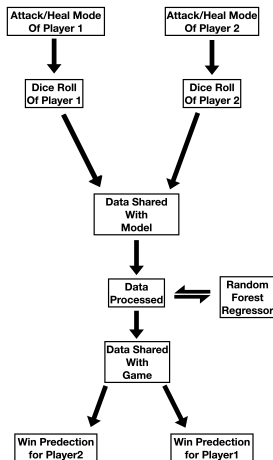
Data-Set Specification

My data-set consists of 1,000 matches of game-play with columns:

- healthcond1: This column stores the value of health of player one after each roll
- healthcond2: This column stores the value of health of player two after each roll
- roll_of_p1: This column stores the value of each roll of player 1
- roll_of_p2: This column stores the value of each roll of player 2
- mode_of_p1: This column stores whether player 1 is attacking or healing
- mode_of_p2: This column stores whether player 2 is attacking or healing
- abs_diff: This column stores absolute difference of the rolls
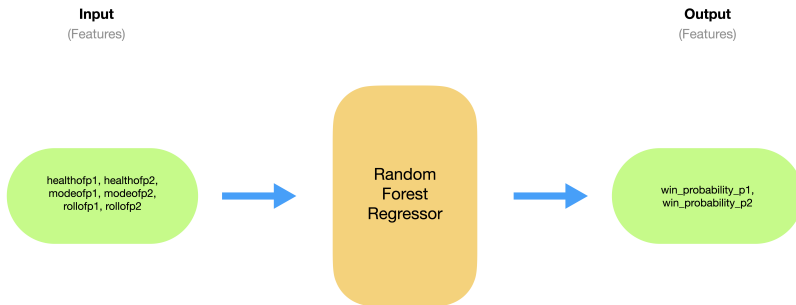- p1_win_or_lose: This column stores 1 if player 1 wins otherwise stores 0
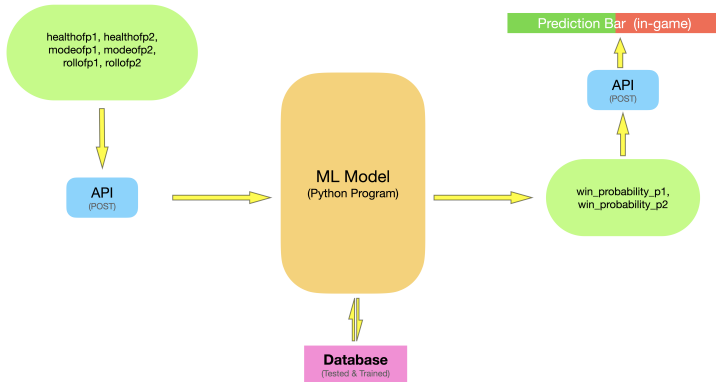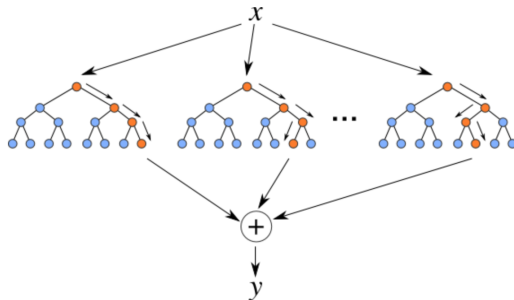
Figure: Workflow of Game

Figure: **Working of ML Model**

Figure: **Working of Random Forest Regressive Tree**

Pseudo code for Random Forest:

1.Pick at random k data points from the training set.

2.A decision tree is created.

3.Select N number of trees to rerun steps i and ii.

4.For a brand new information factor, make every N-tree tree expect the price of y for the information factor in query and assign the brand new information factor to the average throughout all the expected y values.

Figure: **Pseudo code for Random Forest**

Re-scaling

Re-scaling also known as min-max scaling. Re-scaling is a method in which the range of features are adjusted between the rang of either 0 to 1 or 1 to 1. The formula for re-scaling of [0, 1] is given as:

$$x' = \frac{x - \min(x)}{\max(x) - \min(x)}$$
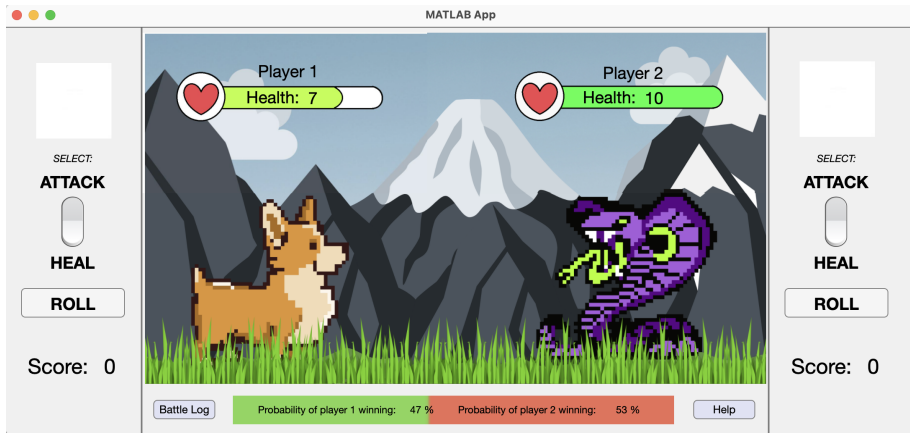
(x is original value and x' is normalized value)

Figure: Game-play with prediction bar

Figure: Graph of TNR and TPR.

Figure: Graph of TNR and TPR.

Implementation

- I am done with the game-play and the AI Analyser to predict winning.

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