Homework 8 Warmup

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Google Drive

Drive Link: https://drive.google.com/drive/u/1/folders/1xUIdaCX8Zf8I7FbsHwxFPIEarevaYqtu

Domains

1. Board / Card Games
2. Sports
3. Algorithms
4. Neural Networks
5. Learning a languages

Specific Topics

Board Games

1. Scrabble
   a. Media used - Images and GIFs to show examples of each rule and how scores are calculated
   b. Quiz - Ask users to play a few turns starting from a given board configuration and also ask them to calculate scores.
2. Chess - Creating checkmates
   a. Media - Videos and text to show the strategies in action
   b. Quiz - Give the users a board configuration and ask them to employ the given strategies to deliver checkmates
3. Rummy basics
   a. Media - Videos and text showing rules visually
   b. Quiz - Games starting from different points and users are asked to choose how to play their next move from given options
4. Sudoku strategies
   a. Media - Images and GIFs/Videos to teach good strategies to play sudoku
   b. Quiz - Ask users to play from a given sudoku board and give feedback if they make illegal moves
5. Checkers
   a. Media - Videos and text to present the rules of the game
   b. Quiz - Ask user to select best move / legal move from given options

Sports

1. Cricket - batting rules
   a. Media - Videos explaining batting rules with examples
   b. Quiz - Multiple choice questions testing the user's ability to recollect the learned rules and apply it to an example text or video situation.
2. Cricket - bowling and fielding rules
   a. Media - Videos explaining bowling and fielding rules with examples
   b. Quiz - Multiple choice questions testing the user's ability to recollect the learned rules and apply it to an example text or video situation.
3. Cricket - rules in different formats (T20/ODI/Test matches)
   a. Media - Videos and text explaining different formats of the game and the differences in rules among them.
   b. Quiz - Multiple choice text-based questions testing the user's ability to recollect the learned information.
4. Soccer rules
   a. Media - Videos and text explaining rules with examples

b. Quiz - Multiple choice questions testing the user's ability to recollect the learned rules and apply it to an example video.
5. Tennis rules
    a. Media - Videos and text explaining rules with examples
    b. Quiz - Show videos and ask multiple choice questions to users to apply the learned rules on the video.

Algorithms

1. Depth First Search in graphs
    a. Media - Video / GIFs visualizing the steps involved in DFS.
    b. Quiz - Ask users to label white, gray and black nodes in the graph according to order of visit and finishing.
2. Breadth First Search in graphs
    a. Media - Video / GIFs visualizing the steps involved in BFS.
    b. Quiz - Ask users to label white, gray and black nodes in the graph according to order of visit and finishing.
3. Master theorem for time complexity
    a. Media - Text and video examples of using master method to find time complexity given a recurrence relation.
    b. Quiz - Ask users to solve a given recurrence relation, with feedback and hints along the way such as which case the problem belongs to.
4. Merge Sort
    a. Media - images and videos showing how it is done for an example
    b. Quiz - Multiple choice questions asking how the next step will look for a given example
5. Binary heap
    a. Media - Videos and text explaining the operations to build heap and heapify operations on an example
    b. Quiz - Multiple choice questions showing the initially array and asking the user to choose the heapified form

Neural Networks

1. Backpropagation
    a. Media - Videos and Images explaining the concept and computing gradients on an example neural network.
    b. Quiz - Ask users to compute gradients given a neural network
2. Number of parameters in a Convolutional Neural Network
    a. Media - Videos and text explaining the concept and showing the computation on an example network.
    b. Quiz - Ask users to compute the number of parameters for an example network and choose from among the given options. Feedback shows if the calculations in each layer (step) are correct.

3. Backpropagation through time in Recurrent Neural networks
   a. Media - Videos and text explaining the concept and computing gradients on an example RNN.
   b. Quiz - Ask users to compute gradients given a RNN and provide options for the user to choose from.
4. Activation functions in neural networks
   a. Media - using text and plots, show why activation functions are needed
   b. Quiz - Multiple choice questions which ask users to choose an activation function to model a particular function using a small neural network.
5. Vector derivatives
   a. Media - Text and videos which explain how to take vector derivatives, which are useful in backpropagation. Users can interact by filling in the derivatives and checking if they entered the correct values based on feedback.
   b. Quiz - Multiple choice questions asking users to compute vector derivatives

Learning languages

1. French - verbs in grammar
   a. Media - Text and GIFs / animations to show how different types of verbs are conjugated, along with their meanings in English.
   b. Quiz - Multiple choice questions testing the user's understanding
2. French - nouns, articles, gender and plural
   a. Media - Text and GIFs / animations to illustrate the rules with some examples, along with their meanings in English.
   b. Quiz - Multiple choice questions testing the user's understanding.
3. French - Pronouns
   a. Media - Text and GIFs / animations to illustrate the rules with some examples, along with their meanings in English.
   b. Quiz - Multiple choice questions testing the user's understanding.
4. Tamil - alphabets and words
   a. Media - Video along with audio to show the different alphabets in the script of the Tamil language and how they are pronounced.
   b. Quiz - Multiple choice questions like in Duolingo to associate pronunciation with alphabet / word and vice versa.
5. Hindi - alphabets and words
   a. Media - Video along with audio to show the different alphabets in the script of the Hindi language and how they are pronounced.
   b. Quiz - Multiple choice questions like in Duolingo to associate pronunciation with alphabet / word and vice versa.

Favorite Topics

1. Domain: Board/Card games, Topic: Scrabble

2. Domain: Algorithms, Topic: Depth First Search in Graphs
3. Domain: Neural Networks, Topic: Backpropagation
4. Domain: Learning languages, Topic: French - nouns, articles, gender and plural

Group Topics

1. Domain: Options Trading. Topic: Understanding how options work and when to buy/sell/call and put options.
2. Domain: Neural Networks, Topic: Backpropagation (Videos and Images explaining the concept and computing gradients on an example neural network)
3. Domain: Cryptocurrency, Topic: blockchain, 3d animation, explaining how blockchain works
4. Domain: Figure Skating, Topic: How to distinguish all the jump categories
5. Domain: Cooking, Topic: Making pizza