Algorithm Study Application Proposal

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1. Introduction

1.1 App Definition Statement

Algorithm Study is an application that is used to help study and improve different varieties of algorithms. Everything is related to IT and IT industries are growing really fast. Computer Science and Programming have placed into very important part of this world. Thus many students are studying computer science or related field. Mostly, we need to study for these algorithms to prepare technical interviews or developing software. However, there is abundant information for each algorithm and it is very easy to forget because not all algorithms are used daily. For example, it is easy to forget about the rare sorting algorithms 5 mins before the technical interview. Also, it is hard to choose which algorithm should be implemented when programmers are developing software, application. Algorithm Study will help those people who need to learn or recap different kinds of algorithms.

Algorithm Study will have Searching & Sorting algorithms, Greedy Algorithms, Dynamic Programming Algorithms, Divide and Conquer Algorithms, and Graph Algorithms. These 5 different categories will have specific algorithm information. For example, Searching & Sorting Algorithms will have Insertion Sort, Bubble Sort, and so on. These each specific algorithm will help users to learn Worst, Average, and Best cases, Space Complexity, Time Complexity, Real Life Example, and Animation of the algorithms. Additionally, it will have Quiz based on what user studied.

2. Features

2.1 Walkthrough

First, it is necessary to have Walkthrough before the application starts. It will help users to understand how the application works and how to use the application. Also, it will let users use the application best out of it.
Implementation: all walkthrough will have Walkthrough detail images on the center of the view and able to change the pages left or right.

2.1-1 Quiz

Description: It will show the types of question in the quiz and how to insert or choose the answer by giving the example problems to the user.

2.1-2 Study

Description: It will display how different categories of algorithms and its' algorithms are in table. Also it will help a user to what kinds of user's interaction functions are in the table.

- o Tapping on the section title to collapse the row
- o Tap on the row to study detail information
- o How buttons work for the animation of the algorithms
- o More information to direct users to the website to read more about the algorithms

2.2 Study

Study will have Table of algorithms that are separated by different sections: Searching & Sorting algorithms, Greedy Algorithms, Dynamic Programming Algorithms, Divide and Conquer Algorithms, and Graph Algorithms. Each section can be collapsed/expanded by user's interaction on section title.

Each algorithm in categories will have the name of the algorithms as its' title. Also, it will have user's interaction on each row that will change the view that has information of the algorithm.

To enhance the user's experience, this page will support SplitView that helps a user to see the two different view (Study View, Information View that contains information of selected algorithm).

Implementation: TableView would be a perfect candidate for this view. Section name would be a category of the algorithms and each row will have all the algorithms that are corresponding to its category. It will have user interaction on the section title to support collapse/expand the rows in the section.

2.3 Information of Algorithm

Description: This view will contain Worst, Average, and Best cases, Space Complexity, Time Complexity, Real Life Example, and Animation of the algorithms.

1. *Worst, Average and Best cases*: It will display the different cases of performance and the example of then it falls for each case.

2. *Time complexity & Space Complexity*: It will display the different cases of time/space complexity in aspects of O and V.

3. *Real Life Example*: It will help an user to understand when to use this selected algorithm by giving the example of how it's been used in real world.

4. *Animation of the Algorithm*: Step by step explanation of how this algorithm works by moving, highlighting, removing the animation materials. It will also have 4 buttons. It will be able to move reset, forward, back, and solve to the end of the steps.

Implementation: I will have a title as its' name on top of the view. It will have a brief description of the algorithm and real world example to help an user to understand better. Worst, Average, and Best case would be displayed with Time & Space Complexity since they are strongly related to each other. Animation of the algorithms would be step by step how algorithm works. For example, in a sorting algorithm, it will have 4 different blocks that will change corresponding to its algorithms. It will have 4 buttons on the bottom of the animation that would reset, forward, back, and solve the animation.

2.4 Quiz

Description: User can take a quiz base on what user learned from the "Study." In Quiz there are Short Answers, Multiple choices, and User Interaction Problem. On Short Answer problems, a user can input time/space complexity, and worst, normal, best cases based on the given algorithm name. Also, insert algorithm's name by given animation of the algorithm. Multiple choice problems, user can choose the algorithm's name and what would be the next step of the animation by given animation of the algorithm. Lastly, a user can move, highlight, select the images to solve what would be the next step of the animation of an algorithm by given only a few steps of the algorithms with a name.

Implementation: This view will generate ViewController for each problem. When user solves the first problem, he or she can press the "next problem" button to solve the next problems. Also adding the ScrollView to expand the User Interface when it's needed. Each input text will be textfield and multiple choice will be Button to check which one is highlighted among all choices (first responder when user select the button and resign to change the answer).

3. Determine users

This application is for anyone who wants to study for computer science algorithms. Specifically, it would be perfect for right before the computer science technical interview because it displays how algorithms work and major information (time complexity, memory) to a user.

4. Users Experience
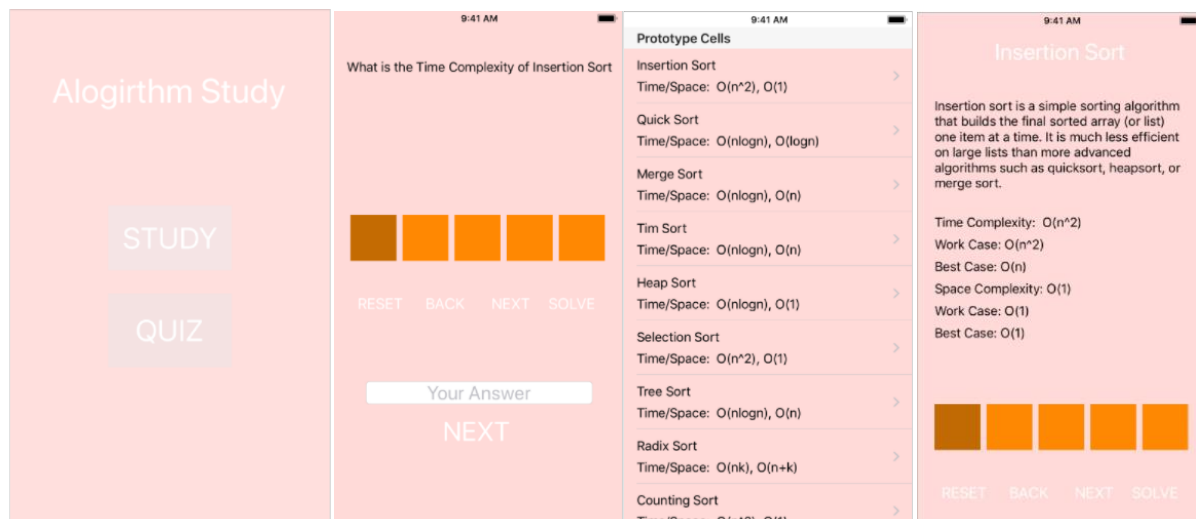
When a user starts an application "Algorithm Study" it will first appear with walkthrough page that will explain how this application will work. It will explain there are two different menus (Quiz and Study). In Study menu, it will explain how to collapse the section with rows. Also, it will explain it will go to the information page that will explain each algorithm. In the Quiz menu, it will have multiple choices, short answers, tapping and dragging questions that will test the users' knowledge about the algorithms.

After the walkthrough demonstration, a user can either select a quiz or study to use the application. In Study menu, it will have different kinds of algorithms and separated by the categories of the algorithms (sorting, graph, search, etc.). A user can study by selecting the row of what a user wants to study.

Each algorithm will contain time complexity, memory, and animation to help a user understand the algorithm better.

On Quiz menu, it will contain multiple choices, short answer question base on the algorithms he or she studied from the Study menu.