

Interactive Learning and Content Development on Android Platform for Data Structure

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Abstract: *Interactive Learning & Content Development On Android Platform is an application developed under android environment with the help of simulation and animation techniques for engineering students who suppose some subjects difficult to learn collectively. A benefit of using simulation in teaching learning application is useful to learn the subject conceptually. In this mobile based application, we are providing learning of Sorting, Tree, Linked List, Queues and stacks which are very important parts of Data Structure subject of Computer Science and Engineering.*

Simulation technique allow student to create their own diagrams & understand the behavior of every technique related to the subject. Also the animation part makes learning interesting & easier. We aggregate simulation for different subject so the algorithm is different for every subject it means that the algorithm of the particular concept in that subject. By using simulation & animation we are able to teach particular subject to the student in interesting & easier way. After learning the subject & getting some perfectness in subject we are giving chance to students to analyze their concepts about the subject by taking some test of their learning and skills

Keywords: *Android, Data Structure, Tree, Stack, AVL, Linked List*

1. INTRODUCTION

Understanding and interpreting a student's query is the first step in the project that must be taken to fulfill the user's needs. We were interested in finding out whether our students were keen on accepting the new way of studying with smartphones or tablet. As the survey shows, they feel they learn best when they do it home alone studying course literature (67%) with only 28% applying some form of collaborative learning. This does not come as a surprise considering half of the students are not satisfied with the formal lectures as they are currently done by the teachers in classrooms. This finding opens up a new space for curriculum innovation, but also cautions us as our students are generally not satisfied with the current learning and teaching system.

A benefit of using simulation in teaching learning application is useful to learn the subject conceptually. In this project we are providing learning of Sorting, Tree, Linked List, Queues and stacks which are very important parts of Data Structure subject of Computer Science and Engineering, we are giving chance to students to generate their own diagrams with their own inputs. Learning that is grounded in this way takes less time. Learners with appropriate tools for problem-solving do not have to memories information which becomes meaningless or is forgotten. In our approach students use Android (AAKASH) devices as a support in the process of learning. An early research conducted in England as early as in 2005 had shown that more than 95% of students possess at least one mobile device, which opens up a space for their use in the process of educating young people.

The objectives of developing this application are to:

- provide user friendly environment to students while learning.
- enhance the predicting skill and a behavioral of learning technique.
- make the student capable to answer at least basic questions .

2. LITERATURE SURVEY

M-learning is a natural extension to conventional e-learning practice through which mobile technology allows a greater degree of access to learning resources. Currently, most e-learning

experiences are based on learners accessing resources through fixed nodes such as desktop PCs, to which access is generally restricted by either location, time of day or both. Central to M-learning is the ideal of ubiquitous or ambient learning in which access to learning resources is truly independent of time and place[2].

Mobile e-Learning (sometimes called 'm-Learning') is a new way to learn using small, portable computers such as personal digital assistants (PDAs), handheld computers, two-way messaging pagers, Internet-enabled cell phones, as well as hybrid devices that combine two or more of these devices into one (Hunsinger, 2005). These technologies have enormous potential as learning tools[5].

Students are presented with a challenge (problem, scenario, case, news event, or common misconception presenting the targeted content in a realistic context) that establishes a need to know the content and master the skills included in the learning objectives for the module. The students then formulate their initial thoughts, reflecting on what they already know and think about the context of the challenge and generating ideas about how they might address the challenge. Perspectives and resources are next provided. Perspectives are statements by experts that offer insights into various dimensions of the challenge without providing a direct solution to it, and resources may include lectures, reading materials, videos, simulations, homework problems, links to websites, and other materials relevant to the challenge[8].

A benefit of using simulation in teaching learning application of our project is useful to learn the subject conceptually. In these projects we are developing along with techniques or formulae, we are giving chance to student to generate their own diagrams with their own input. Learning that is grounded in this way takes less time. Learners with appropriate tools for problem-solving do not have to memories information which becomes meaningless or is forgotten. In our approach students use Android (AAKASH) devices as a support in the process of learning. An early research conducted in England as early as in 2005 had shown that more than 95% of students possess at least one mobile device, which opens up a space for their use in the process of educating young people.

3. TECHNOLOGY AND SOFTWARE USED

3.1 Technology Used

3.1.1 ANDROID

Android breaks down the barriers to building new and innovative applications. Android has the potential for removing the barriers to success in the development and sale of a new generation of mobile phone application software[1]. Android is sophisticated platform whose parts all work together: drawing & layout, inter-process communication & data storage, search & location[3].

Android was built from the ground-up to enable developers to create compelling mobile applications that take full advantage of all a handset has to offer. It is built to be truly open. For example, an application could call upon any of the phone's core functionality such as making calls, sending text messages, or using the camera, allowing developers to create richer and more cohesive experiences for users [5].

3.2 Software used

3.2.1 ECLIPSE IDE

Eclipse is a vast extendable set of tools for software development. Here we are interested in Eclipse's Integrated Development Environment (IDE) component for writing Android software. Eclipse is an open source project of Eclipse Foundation. Eclipse was developed by software professionals for software professionals; it may seem overwhelming to a novice [4].

It is general purpose open platform that facilities and encourage the development of third party plug-ins. Eclipse also known as an Integrated Environment(IDE). Eclipse is written in java and will thus need JRE or JDK to execute. Eclipse configuration settings apply only to the current workspace and revert to defaults when you switch to a new workspace[6]. Theoretically it is possible to always use the same workspace, but as the number of projects in it grows, it may become unmanageable and the Eclipse performance may be degraded. Eclipse provides a way to export the preferences from the current workspace into a file (an .epf file) and import the preferences from a file into a workspace.

3.2.2 ANDROID SDK

The Android software development kit (SDK) includes a comprehensive set of development tools. These include a debugger, libraries, a handset emulator based on QEMU, documentation, sample code, and tutorials. Currently supported development platforms include computers running Linux (any modern desktop Linux distribution), Mac OS X 10.5.8 or later, Windows XP or later; for the moment one can develop Android software on Android itself by using [AIDE - Android IDE - Java, C++] app and [Android java editor] app [7]. The officially supported integrated development environment (IDE) is Eclipse using the Android Development Tools (ADT) Plugin, though IntelliJ IDEA IDE (all editions) fully supports Android development out of the box, and NetBeans IDE also supports Android development via a plugin[6]. Additionally, developers may use any text editor to edit Java and XML files, then use command line tools (Java Development Kit and Apache Ant are required) to create, build and debug Android applications as well as control attached Android devices (e.g., triggering a reboot, installing software package(s) remotely).

Enhancements to Android's SDK go hand in hand with the overall Android platform development. The SDK also supports older versions of the Android platform in case developers wish to target their applications at older devices. Development tools are downloadable components, so after one has downloaded the latest version and platform, older platforms and tools can also be downloaded for compatibility testing.

Android applications are packaged in .apk format and stored under /data/app folder on the Android OS (the folder is accessible only to the root user for security reasons). APK package contains .dex files (compiled byte code files called Dalvik executables), resource files, etc.

4. IMPLEMENTATION

The developed application for Data Structure consist of following module:

- UI Module
- Algorithm Module
- Animator Module

The sequence of this application is shown in the following diagram:

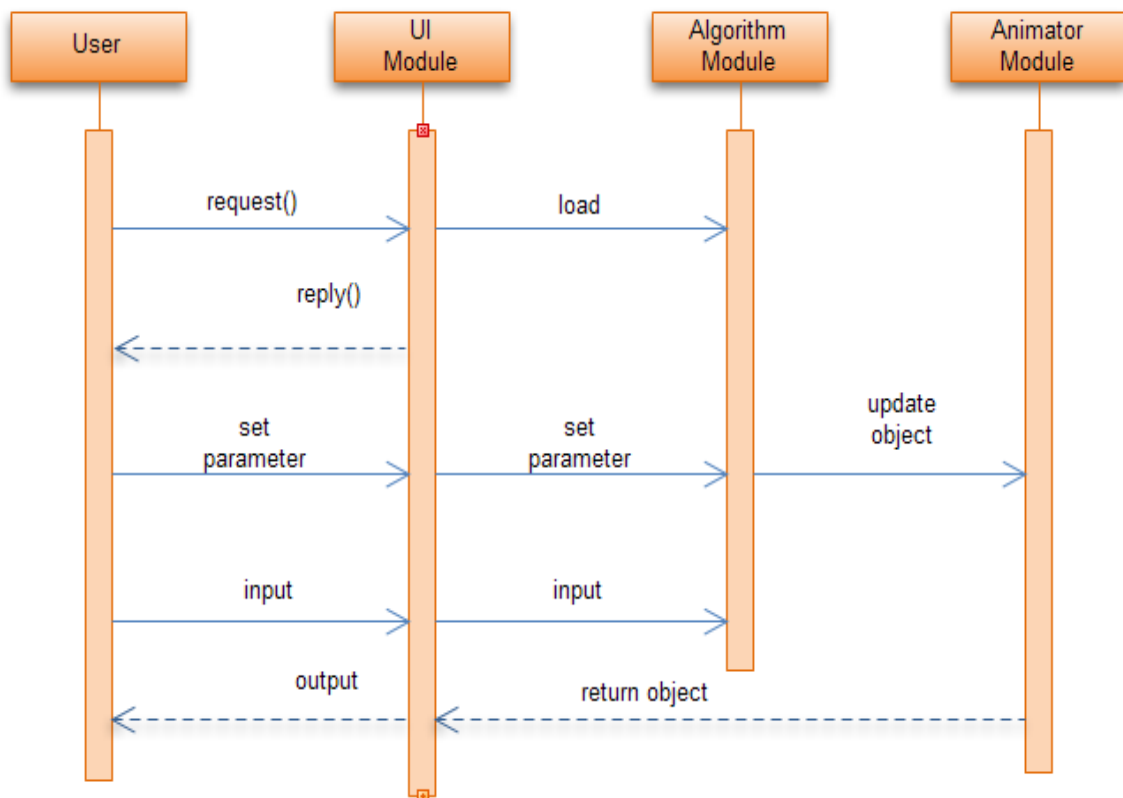


Fig1. Sequence diagram

4.1 UI Module

This is the module for selecting algorithm we are providing different tabs such as tree, graph, sorting, etc. Selected algorithm is then send to the algorithm module. After this we are providing text box to take input such as node elements for creation , deletion of the node in tree. After implementation of algorithm module UI module displays output of the particular operation.

4.2 Algorithm Module

After getting inputs from UI module, inputs are analyzed by algorithm module. If conditions are met by analyzing inputs, operations will be performed on these inputs which results in updation of objects. Result obtained from these operations is given to animator module for further processing.

4.3 Animator Module

Animator module takes updated objects from algorithm module .Animator module decides position of these objects and create bounding box for each object. If user wants any modification in any object animator allows to do it. Results obtained from animator module is returned back to the UI module.

Many algorithms of Data Structure are implemented in this application like all type of sorting modules like bubble sort, insertion sort, selection sort etc. Also other data structures such as Trees , Stacks, Linked List and Queues are also implemented.

Following are some diagram showing snapshots of implementation of Data Structure concept.

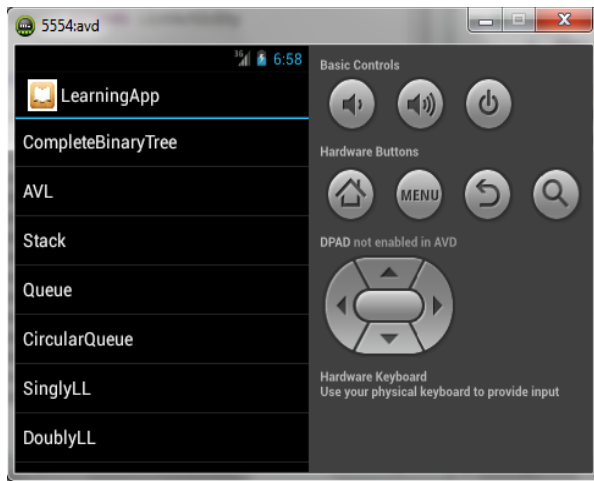


Fig2. Layout of the developed application



Fig3. Sorting example on this application

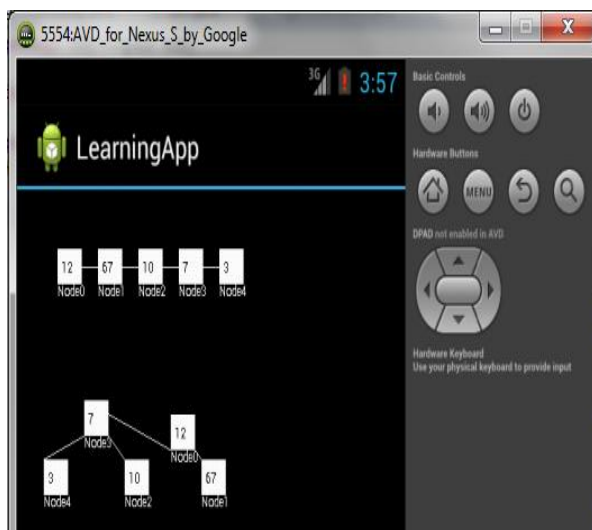


Fig4. AVL tree example on this application



Fig5. Linked list example on this application

5. CONCLUSION

The developed application presented in paper is for developing adaptive teaching learning application. This project studies the observation of animation module, algorithm module and UI module. Android

based learning application which teaches all difficult of DATASTRUCTURE subject for engineering students is developed. The use of simulation patterns as an empirical representation of user intent in teaching learning application is presented.

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