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Design of an Offline Computer Engineering Terminologies Glossary for Android Devices – A Learning Tool

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Abstract

Technology has been implemented in the educational sector to improve the learning capabilities of the students and efficient methods for teaching. This is done through the integration of Information, Communication and Technology (ICT), into traditional teaching methods leading to the development of a technology-based teaching and learning tools. Development of the internet has provided people with access to a vast amount of information and with the current status of technology worldwide, its use has been implemented in various fields including education through mobile devices and other forms of interactive technology to aid practice. Through mobile devices with internet accessibility functions, individuals especially students are provided with access to information encompassing a growing number of fields. These devices are also used by students for social media and entertainment, serving as a source of distraction. Other disadvantages associated with the use of internet for educational purposes include; unreliable information, technical issues e.g unavailable or poor internet connection. This paper contains details on the development of an offline glossary of computer engineering terminologies for android devices. This solution provides a way to use technology to provide standard definitions of terms used in the computer engineering field, without an internet connection. This application is designed to address unreliable information by providing definitions to the contained terms as defined by IEEE and the technical difficulties involved with internet connections.

1. Introduction

In this 21st century, the term "technology" is an important issue in many fields including education. This is because technology has become the knowledge transfer highway in most countries. Technology integration nowadays has gone through innovations and transformed our societies that has totally changed the way people think, work and live [1]. Integration of ICT in education is described as the use of computer-related methods that affect the education process between a tutor and a student. This is as a result of ICT being able to provide dynamic and proactive teaching-learning environment [2]. The process of adoption of ICT is not a single step, but it is

ongoing and continuous steps that fully support teaching and learning and information resources [3]. ICT integration in education can range from the use of computer and hardware in the teaching and learning process or the development and implementation of a tool that uses the basis of ICT in its delivery during the teaching-learning process, such as the one described in this paper or the use of the internet facilities during the teaching-learning procedure.

The internet plays a major role in the lives of young people today. Children and youngsters engage in online activities both inside and outside the classroom [4]. At school, students are expected to use the internet for educational purposes such as completing assignments and tests. The internet can also be used by the same set of students for social media and entertainment purposes [5].

The internet is a very convenient way to practice ICT integration in education as all it requires in its utilization is the presence of an internet accessible device such as a smartphone. Nowadays majority of students use a smartphone during their day to day activities. These smartphones can access the internet depending on the capability of their internet Service Provider (ISP) at any given point in time. According to the Council of Europe, the internet is a worldwide network of computers linked together through servers which function as connection nodes. it is an interconnection of various networks of which many users can read or write into the vast database created as a result of this interconnection. With the development of the internet, students can access a vast amount of data and information regardless of the distance from the source. A result of this large size is that when an information is being searched for, a great number of results are displayed to the user with no means of verifying the authenticity of the information or what context does a piece of information to refer to. This means of gathering information also depends on the availability and strength of the ISP of a user. The tool termed "CPE Glossary" is a glossary of computer engineering terms. It contains in its database terminologies used in the field of computer engineering and their respective definitions as defined by the Institute of Electrical and Electronics Engineers (IEEE), designed for android devices. IEEE an association dedicated to advancing innovation and technological excellence is the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity [6]. Its mission, vision and experience has made it one of the recognized standards in the computer engineering field.

A glossary is an alphabetical list, with meanings, of the words or phrases in a text that are difficult to understand [7]. It is a list of terms in a special subject, field, or area of usage, with accompanying definitions. It can be described as a documental piece, that contains a list of words in a particular field as well as their respective definitions. Often used synonymously with the term dictionary, difference between **Dictionary** and **Glossary** is that the **Dictionary** is a collection of words and their meanings and **Glossary** is an alphabetical list of terms relevant to a certain field of study or action [8]. In past time, a glossary would exist in the form of an encyclopedia set of voluminous individual size. The individual size and number of books contained in a set, made these glossaries expensive and due to their large size, greatly immobile. It would also take considerable time to go through the volumes in search of a word and its corresponding definition. These characteristics make the use of this form of glossary inconvenient to use. With the advancement of technology, glossaries have been developed into softcopy formats, which can be accessed through electronic devices, depending on the type of format used. However, it does not eliminate the inconvenience involved with searching through the document formats. Making a glossary into an application, makes it possible for a user to have a mobile, easily accessible and convenient way to browse through the available words in search of terminologies relating to the computer engineering field.

Android is a Linux-based operating system for Android devices like smartphones and tablets. It is an open source platform available for users to develop Android applications using Android SDK (Software Development Kit) [7]. Due to its open-source nature, it is a commonly used operating system by smartphone manufacturers in the development of smartphones. According to google io , as at May 2019, there were 2.5billion active android users. This figure signifies the huge amount of market share which the android OS possesses and for this reason, it was chosen as the platform for which glossary application was developed. The cost of the devices which use this OS also played a huge role in deciding what smartphone brand the application would be designed for. The tool developed and discussed in this paper is aimed at resolving these issues mentioned above for students in the field of computer engineering.

1.1 Related works

Guragain, Dahal, Prajapati and Poudel designed and implemented an android application called "Learning Dictionary". This application is an offline android application that finds the Nepali meaning of English words contained in the database. The application functions as a bilingual dictionary that can find the Nepali meaning of an English word and vice versa, then displaying the words to a querying user. The scope of this application involved the two languages mentioned earlier and would not be useful to a user looking to find the definition to a computer engineering terminology.

A developer with the identification inducesmile.com designed an application called complete biology, which is available on the google playstore. The application contained an offline glossary of O'level biology terms and their respective definitions, equipped with speech-to-text capabilities and diagrammatic illustrations for corresponding terms. However, the focus of the glossary designed was for O'level biology and would only be useful to students in the field of biology and interested parties. The IEEE organization also has a series of journals of computer engineering terminologies and their respective definitions. These journals require a membership status to be accessed by an interested party, which can be a hindrance for a student to attain. The documents available on this topic are often scanned and hence, a term cannot be found by using the search function on a document editor.

These works mentioned above have presented an idea for which CPE Glossary was designed i.e an offline method to acquire definition to computer engineering terms with standard definitions. The purpose for which this application was created are;

[1] To contribute to the integration of ICT in education
[2] To provide interested parties with standard definitions of terms within the scope for which it was designed without the need for an internet connection.

2. Methodology

The Unified Modelling Language (UML) was used in the design of the application. This enables the developer to visually represent the operation of a software system.
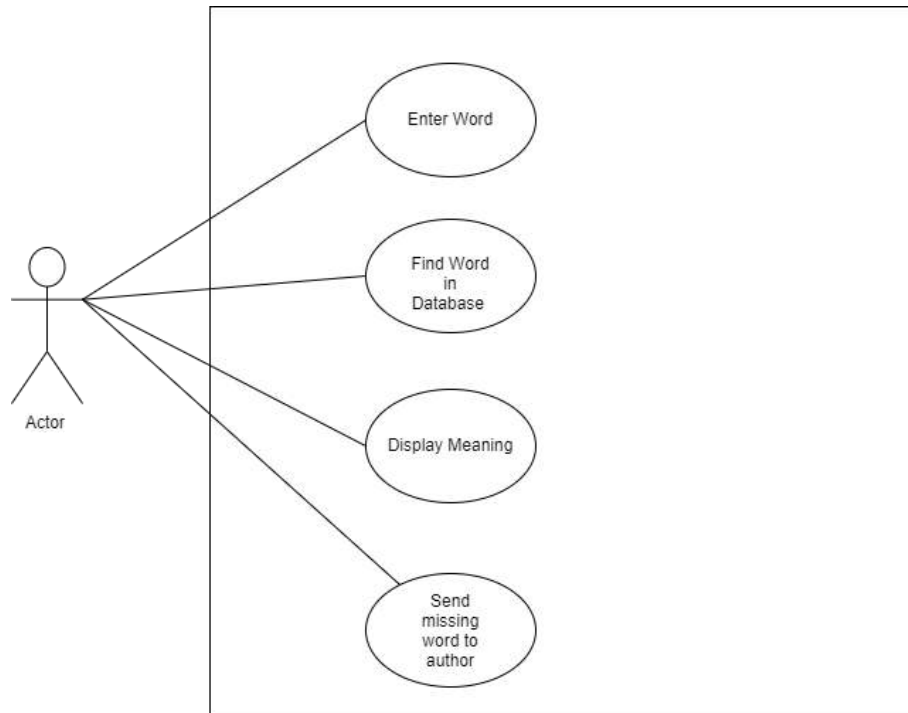
Figure 1: Use case diagram

Figure 1 represents the use case diagram which describes the actions a user can perform while using the application. It was used in the development process to highlight the basic functional units of the application. The use case diagram was used to represent the scenarios in which the application interacts with users and the goals the application helps to achieve.
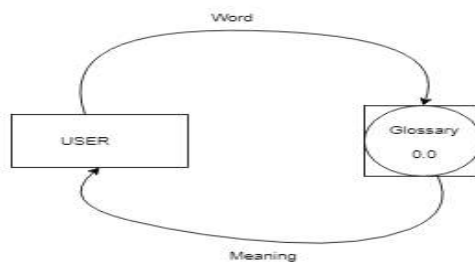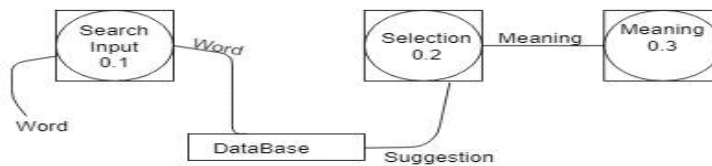

Figure 2: Data flow Diagram

The data flow diagram as shown in Figure 2 describes a graphical representation of how data moves between the various processes take place within the application. Two levels are used to represent the data flow; level 0 shows the flow of data from the user to the glossary application

and level 1 shows how data flows within the glossary application, from the search process to displaying the meaning of the searched process.
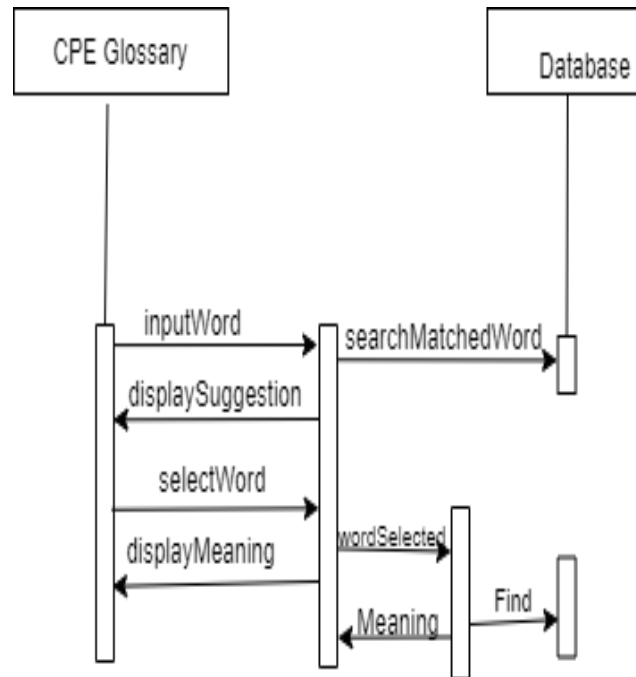

Figure 3: Sequence diagram

The sequence diagram as shown in Figure 3, models a static view of the application processes. This diagram shows the sequence of events that take place between the application "CPE Glossary" and the database.
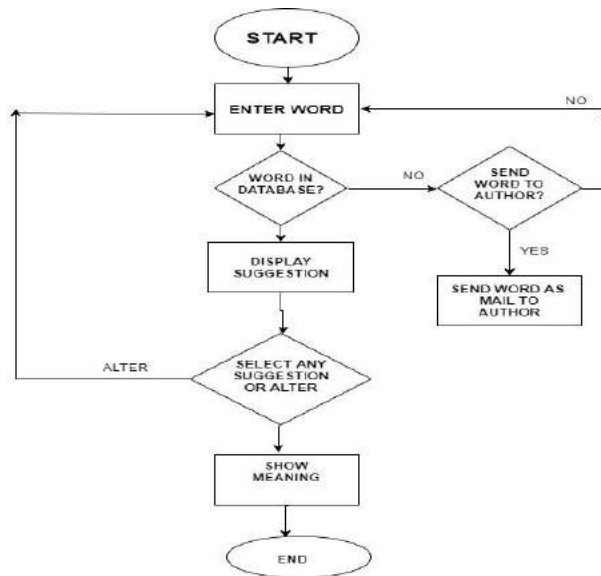
Figure 4: Flowchart

The flow chart as shown in Figure 4, is a diagrammatic expression that shows the functions which the application can perform in a systematic manner. It is a graphical representation of a process that details the sequencing of steps required to create the desired output.

3. **Results and Discussion**

The application developed using the JAVA programming language for functionality and XML to design the application interface, using android studio as the development environment.
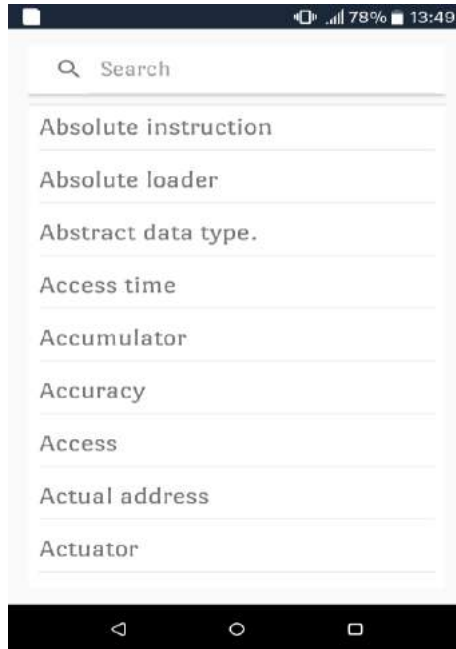
3.1 Operation

Figure 5: homepage of CPE Glossary

The homepage as shown in Figure 5, consists of the search bar and a list of words. A user can either scroll through the list of words before clicking on a word of choice, or enter a word into the search pane.

Figure 6: The suggestion function of CPE Glossary

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Figure 6 describes the suggestion function of the application. While the user is entering each character of the desired word into the search pane, the application offers the user a list of suggestions from the available words based on the entered characters.
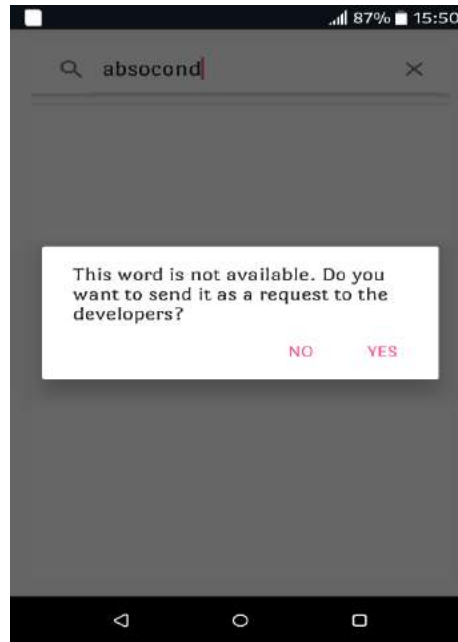

Figure 7: CPE Glossary when the entered word is unavailable

Figure 7 shows what happens when a user enters a word which is not contained in the application database. A prompt is displayed for the user to send the word to the developer via email or return to the homepage. If the user decides to submit feedback to the developer, the email is automatically created, requiring the user to simply press the "SEND" button, as shown in Figure 8.

Figure 8: Feedback function

The author of the application uses this information to improve the database upon the next scheduled update of the application. The feedback is important as the field in question is an ever-growing field which contains thousands of terminologies requiring definitions.

4.Conclusion

CPE Glossary was designed to work on older android versions (from version 4.3) to allow older devices which run later versions of android and are now characterized as low budget devices, to be able to utilize the application. By so doing an even greater number of users can use this application. The user interface of the application was also kept simple, to allow for easy navigation and utilization of the application. The application was also designed to be light-weight in terms of storage space, (occupying 5MB of storage space) to eliminate chances of uninstallation due to lack of storage space on user device. The database contains over a thousand words and their definitions, and to allow for improvements based on the users need, users are able to send unavailable words to the author which will be added in the next update of the application. Overall, a positive result characterized by the display of the entered terminology without the need for an internet connection was achieved. The application fulfilled all the stated requirements and can be used as an ICT integration tool for educational purposes for users interested in the computer engineering field.

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