

MACBenAbim: A Multi-platform Mobile Application for searching keyterms in Computational Biology and Bioinformatics

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Abstract:

Computational biology and bioinformatics are gradually gaining grounds in Africa and other developing nations of the world. However, in these countries, some of the challenges of computational biology and bioinformatics education are inadequate infrastructures, and lack of readily-available complementary and motivational tools to support learning as well as research. This has lowered the morale of many promising undergraduates, postgraduates and researchers from aspiring to undertake future study in these fields. In this paper, we developed and described *MACBenAbim* (Multi-platform Mobile Application for Computational Biology and Bioinformatics), a flexible user-friendly tool to search for, define and describe the meanings of keyterms in computational biology and bioinformatics, thus expanding the frontiers of knowledge of the users. This tool also has the capability of achieving visualization of results on a mobile multi-platform context.

Availability: *MACBenAbim* is available from the authors for non-commercial purposes.

Keywords: Multi-platform application, Keyterms, Computational biology, Bioinformatics, Mobile application

Background:

Restricted access to vital resources, scientific information and infrastructures, in the field of computational biology and bioinformatics, is one of the challenges facing aspiring scholars in some developing countries [1-3]. In the African continent, students and researchers who live in some rural communities are often confronted with inaccessibility to electricity and quality internet usage for research and personal study. In some developing countries, undergraduates are often faced with lack of complementary tools to help them learn more about the fields of bioinformatics and computational biology in their various institutions. Some useful mobile-related, online and stand-alone bioinformatics and computational biology research tools have been developed in the past [4-7]. In this paper, using

computational techniques, we developed a stand-alone mobile multi-platform application, to assist undergraduates and upcoming scientists from developing countries, have real-time mobile access to key-terms and gain more knowledge in computational biology and bioinformatics. This novel tool (*MACBenAbim*) is to complement existing educational materials in these fields and also motivate students and researchers from developing nations undertake future study and research in bioinformatics and computational biology. Thus, *MACBenAbim* can be introduced to students and researchers of developing countries as one of the strategies for promoting effective bioinformatics and computational biology education and research in such countries.

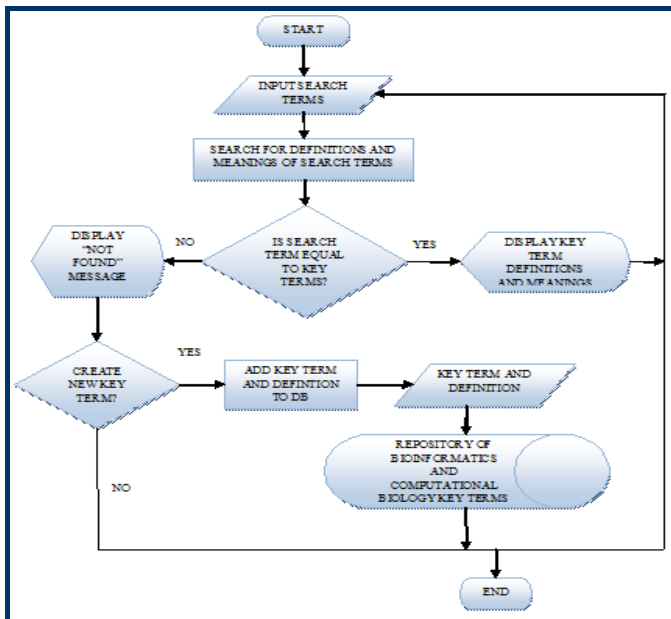


Figure 1: Flowchart of MACBenAbim

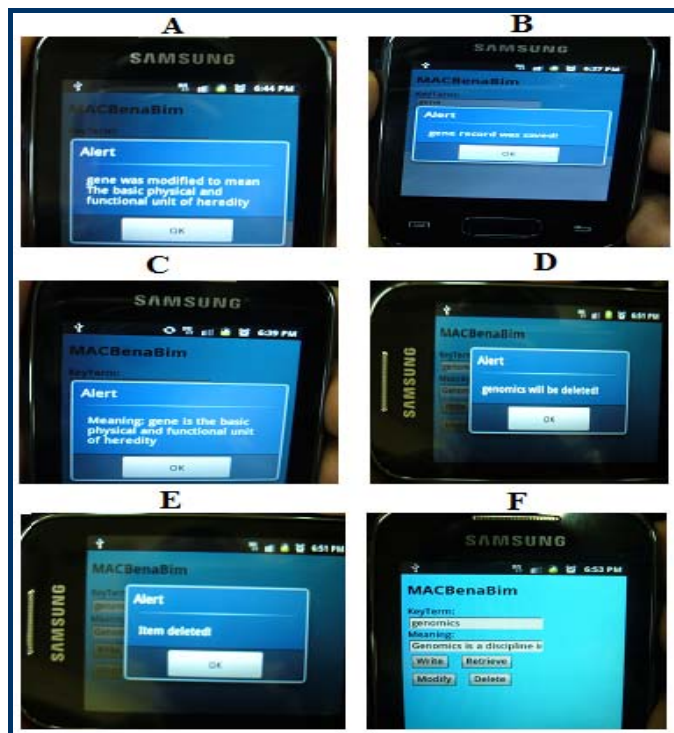


Figure 2: (A) shows the modification of the meaning of a gene in MACBenAbim revealing the definition of a gene as stored in its database; (B) shows an alert notifying that gene record has been modified and updated within MACBenAbim; (C) reveals the new definition of a gene after successful modification within MACBenAbim; (D) shows the operations of the delete function within the MACBenAbim mobile application. Here, the record genetics will be deleted; (E) shows the deletion of the record genetics within MACBenAbim after confirmation; (F) shows the GUI (Graphical User Interface) and homepage of MACBenAbim as displayed on the screen of a SAMSUNG

Android mobile device. The GUI consists of the Write, Retrieve, Modify, and Delete function buttons within MACBenAbim.

Methodology:

MACBenAbim was implemented using Java Script for the functionalities. HTML 5 was used to develop the page contents. CSS (Cascading Style Sheets) were used for styling; PhoneGap was used to implement the multi-platform visualization characteristics of the software. LocalStorage was used for data storage and retrieval. Relevant literatures were consulted to obtain the definition and meanings of key-terms in computational biology and bioinformatics and duly referenced. The flowchart for MACBenAbim is illustrated in (Figure 1).

Software Input:

MACBenAbim a user-friendly interactive mobile tool, used for understanding the definitions and meanings of key-terms in bioinformatics and computational biology. MACBenAbim accepts input as the bioinformatics or computational biology term to be checked in the mobile application. It also has the flexibility of allowing users to add new key-terms, edit existing key-terms, delete wrongly entered key-terms and also update existing keyterms.

Software Output:

MACBenAbim produces instant results through a notification dialog in a mobile device. Its output (which include the definitions and meanings of key-terms in bioinformatics and computational biology), can be viewed on multiple mobile platforms such as BlackBerry, iPad, IPod-touch as well as Android devices. For this paper, we show the output as displayed on an Android phone as illustrated in (Figures 2).

Caveats & Future Development:

MACBenAbim has presently been developed as a stand-alone mobile application. We are currently developing a web based CGI (common gateway interface) for MACBenAbim.

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