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Izoo Mobile: Mobile Application For Mobile Assisted Malaysia Fauna Database Izoo

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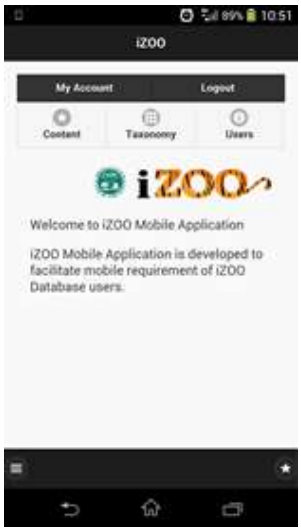
Graphical abstract



Abstract

The availability of smart phone provides a new opportunity in adopting the mobile technologies in biodiversity conservation. The compact communication hardware thats enables mobility, data connectivity and storage, image and video capture and georeferencing all on one platform is providing novel applications in the field of medicine, policing and disaster mitigation. In this study we implemented the use of an Android mobile application into a faunal biodiversity database. The aim of the study is to determine the process framework, identify the requirements, design and build an application that would facilitate the reporting process of occurrences into the web database in-situ and real time. Using iZOO (http://biodiversity.fbb.utm.my/izoo/), a FRIM faunal database that hosts hundreds of primary faunal data in Malaysia, we designed and deployed a prototype mobile app called iZOO mobile. The application allows complete digitisation of present conventional method of writing on paper during the data collection process and immediate upload into database using data connectivity upon availability. This prevents mistakes caused by human error, data loss and data disorganization. The application were tested during several fieldtrips in Belum-Temenggor and Lenggor. The creation of this mobile application would assist the field researchers in collecting data efficiently and accurately in the future.

Keywords: Biodiversity; fauna; mobile application; database; reporting process

Abstrak

Kewujudan telefon pintar memberikan peluang untuk teknologi mobil ini diserap kedalam usaha memelihara biodiversiti. Perkakas keras yang padat ini mempunyai membolehkan mudah alih, perhubungan dan simpanan data, imej, and video, dan georeferensi kesemuanya di atas satu platform ini memberikan applikasi yang unik di dalam bidang perubatan, polisi dan bantuan bencana. Dalam kajian ini, kami menggunakan applikasi mobil Android dan menghubungkannya kepada sebuah pangkalan data biodiversity fauna. Tujuan kajian ini adalah untuk menentukan rangka kerjanya, mengenal pasti keperluannya, mereka dan membina sebuah applikasi yang boleh membantu proses laporan kejadian ke pangkalan data secara in-situ dan segera. Dengan menggunakan iZOO (http://biodiversity.fbb.utm.my/izoo/), sebuah pangkalan data fauna kepunyaan FRIM yang mengandungi berates ratus data fauna di Malaysia, kami mereka dan melancarkan sebuah prototaip applikasi mobil yang dinamakan iZOO mobil. Applikasi ini menukar kaedah konvensional yang menggunakan pengisian borang kertas untuk proses pengumpulan data didigitalkan dan terus dimuat naik ke dalam pangkalan data melalui sambungan internet. Kaedah ini mengelakkan berlakunya kesilapan manusia, kehilangan data, dan menyalah susunan data. Applikasi ini telah pun di uji di beberapa kerja lapangan seperti di hutan simpan Belum- Temenggor dan Lenggor. Kewujudan applikasi mobil ini akan membantu para penyelidik di kerja lapangan dalam tugasan mereka mengumpul data secara berkesan dan tepat pada masa akan datang

Kata kunci: Biodiversiti; fauna; applikasi mobil; pangkalan data; proses laporan.

1.0 INTRODUCTION

Malaysia is one of the 17 mega diverse countries in the world. Despite this fact, there is still no comprehensive Malaysian faunal database available online. Our species diversity is depleting because of human development and it is feared that the rate of species extinction is occurring faster than the current effort of cataloguing them. Therefore, a web database named iZOO was created to host Malaysia faunal data suitable for the use of stakeholders in Malaysia. iZOO is a product of collaboration between Universiti Teknologi Malaysia (UTM) and Forest Research Institute of Malaysia (FRIM). The primary data was contributed by Zoology Department of FRIM while the content management system and database was designed and built by UTM. As of now, iZOO hosted 259 species data from four

taxonomic classes and fully functional at http://biodiversity.fbb.utm.my/izoo/.

Instead of limiting iZOO functionality only for data sharing, we decided to take a step forward by creating a digital tool in the form of a mobile application to assist our contributors in data collection process during fieldwork. The existing conservative method [1] involves the process of data collection in the field in the form of analog forms and photos with separate geo referencing using dedicated GPS equipment. These manually collected data are often collectively distributed across multiple individuals on papers or notebooks and recorded in tables of forms by hand. The subsequent data digitization process is a long arduous process of deciphering often illegible handwriting caused by challenges of fieldwork (stained, marks, tiredness) of multiple people and keying in data from these paper forms to excel files before uploading it to the web, cross matching the separate image data from the camera during fieldwork to the aid excel files and verifying the GPS coordinates. The major downside from this method are that it is extremely prone to human errors pre and post fieldwork collection such as error in data recording, data loss, and data confusion. Therefore, a unified and simplified method is desirable to improve the consistency and dependability of the data collection. A mobile application is proposed as an innovation to substitute the current data collection method. Mobile devices have now evolved to be extremely powerful devices with immense computing power. The smartphone has enables mobility, data connectivity and storage, image and video capture and dereferencing bundled into one hardware, removing the need to utilize multiple devices such as GPS equipment, camera and data logger. The extended battery time and robustness of current devices have extended its functionalities to meet the demands of fieldwork. The aim of the study is to identify the data flow process from the fieldwork to the database and to design and implement a working mobile application prototype to update iZOO in the database in-situ and real time. iZOO mobile is designed to be directly connected to iZOO database and its components with availability for its registered data contributors to ensure data provenance and trustability.

2.0 METHODOLOGY

Rapid prototype model was chosen as the most suited methodology for this study. This model was chosen in development process because it enables rapid constructions and improvement to the database and mobile application. Users will be able to explore the prototype of the mobile application themselves, points out the faulty areas and what the system lacks and amendments will be made on the next succession [2]. The advantages of implementing rapid prototype are, it saves tremendous amount of time and cost, and fulfill the requirements of users.

Open source software was used in the development process. Software such as Android Development Tools (ADT) bundle, Eclipse Integrated Development Environment (IDE) [3], Java Development Kit (JDK) and Drupal Gap [4] were chosen because their licensing options enables any party with low or minimal resources to download, modify, and share it for free. Therefore, they saves development time and cost.

The requirements of the application were first analyzed during a fieldwork in Endau-Rompin Forest Reserve and Lenggor Forest Reserve expedition with the Zoology Department of the Forest Research Institute Malaysia. The prototype of the mobile app was tested in the field during BelumTemenggor Forest Reserve Expedition with the same FRIM team. Discussion and its feedbacks were used to improve the functionality of the app. Repeated data entry pre, during and post fieldwork with online and offline mode were conducted to test the accuracy of the GPS coordinates, imagery upload and data entry. The results of the field tests were presented to the FRIM team after each iterative change.

3.0 RESULTS AND DISCUSSION

iZOO mobile is developed to assist researchers and data collectors for on-site reporting. Its purpose is mainly to simplify data flow from field to data storage. iZOO mobile delivers two main functions which are occurrence report and species update. Data collection process starts with species sighting and identification during fieldwork. Researchers have two options of reporting species to the web database, depending on species availability. For new discovered species, researchers can add the species to the database by selecting content type and add new content from content button. For species readily available in database, the occurrences of specimens of species is reported.Species availability is checked by selecting species taxonomic class and filling in species name in the autocomplete search engine. Location of the occurrences is submitted by utilizing the automated built-in Global Positioning System (GPS) in the device. This information will be displayed as a pin on location map of the particular species in the website in near real-time. In both situation, camera feature can be activated and specimen images can be submitted along with species data and geolocation. This simplifies the reporting process of digitizing data and cross matching image data to species data. Submission's timestamp and user information is automatically recorded for data track record. Data flow of iZOO mobile is as shown in Figure 1.

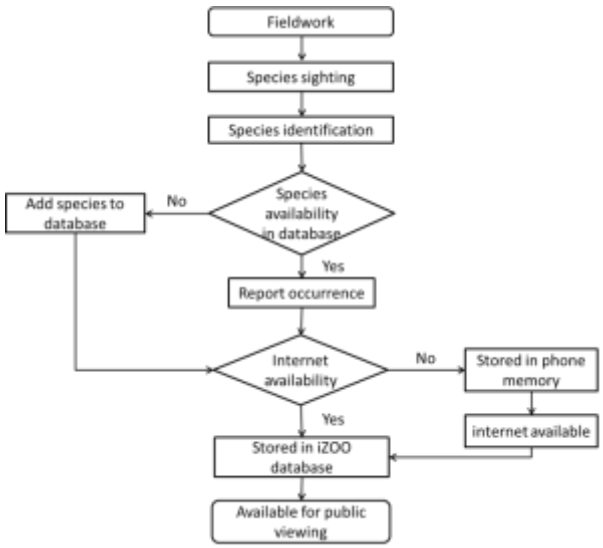


Figure 1 iZOO mobile data flow

In the case of no internet availability at the field, the word "offline" will pop out in the background to notify users. All function works as it is online with the difference that the

information sent will be kept locally in the device. Reports can be sent upon achieving adequate internet connection strength by reviewing data and click send. Screenshots of iZOO mobile online and offline mode is as shown in Figure 2.

Figure 2 iZOO mobile front page online (left and center) and iZOO mobile offline (right)

■4.0 CONCLUSION

The framework of the reporting process was determined and the requirements of a mobile application which facilitate the reporting process of occurrences in zoology field were achieved. ZOO mobile is expected to facilitate biodiversity researchers and data collectors in their work line. iZOO mobile is open for any party interested in contributing for iZOO once it finishes alpha testing phase.

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References

[1] S.A.M.S. M. A. Shahfiz, Shukor M.N, Nor Zalipah M., Muin M. A., Yusof M. O., Khairul N. A. M., Edzham S. M. S.H., Ganesan M, Nordin A., Juliana S., Stephanie C., Saharil A.A., Fadhil A.R., R. NikFathul. 2007. *Survey of Small Mammals at Two Forest Reserves in Cameron Highlands*. 6.

[2] S. Tripp, B. Bichelmeyer. 1990. *Rapid Prototyping: An Alternative Instructional Design Strategy, Educational Technology Research And Development.* 31: 38.

[3] Z. Chen, D. Marx. 2005. Experiences with Eclipse IDE in programming courses. *J. Comput. Sci. Coll*. 104: 21.

[4] T.H. Priya, J. Hima, K. Divya, M. Somasundaram, S. Karthikeyan. 2012. *Mobile Interface To Content Management System Based On HTML5 And Drupal: A Case Study*.