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ORCHID MAN- AN ANDROID BASED DIGITAL FIELD BOOK FOR ORCHID EXPLORERS

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Abstract

Android applications are expanding their utility in agriculture to simplify the process and procedures and to disseminate the knowledge amongst farmers and researchers. Orchid-Mobile Assisted Notebook (MAN) application has been developed and hosted on Google Play Store to simplify passport data entry for orchid explorers. The application was developed for android users and supports android version 4.1 (API 16) to 10.0 (API 30) smartphones using offline inbuilt SQLite DB, Core Java program coded in Android Studio Platform. The app provides a digital notebook platform to store a large number of data with photographs in a systematic manner. Users can easily transfer their data in MS Excel format anytime or anywhere. App is offline and stand alone to protect data at user's end. More information and feedback features help users to know additional details and direct their query to the developer- ICAR-NRC for Orchids. This app assists as digital field book for orchid collectors, growers, researchers to maintain records of orchid germplasm collected, cultivated, and maintained at their level.

Introduction

WRITING, WORKING, and managing records on manual mode, which requires reliable and accurate execution of the task is always an unpleasant task for the smartphone generation users. According to a survey, manual entry of information is inconsistent, provides room for errors and frequent overwriting on information and duplication of data as compared to feeding information digitally into any digital platforms. Orchid exploration and germplasm collection from their natural habitats is a tough task for the researchers or any orchid enthusiast because of habitat conditions and forest density, in addition to manual entry of records on a notebook in the field. Smartphones have become an integral part of human biological system and lifestyle. Android smartphones are popular means of communication on the World Wide Web, enabling the creation of customized digital applications for target customers. The Orchid-MAN application developed in Android studio that provides a unified environment where one can build apps for Android phones, tablets, Android Wear, Android TV, and Android Auto. Apart from this, structured code modules allow us to divide project into units of functionality that can independently build, test, and debug. Android studio is the official Integrated Development Environment (IDE) for Android app development. Orchid-MAN built on Android platform works as a Digital Field Note book where the passport data of the collected orchids can be entered in the field. It assists the users to systematically manage germplasm records and retrieve them anytime, anywhere in the app or in MS Excel format on smartphones. Currently Orchid-MAN cumulative distribution is 99.8% of all android devices which includes Android version 4.1 (Jelly bean) to version 10.0 (Android 10) (Fig. 1).

This Android application assists the orchid explorers in inserting, storing, updating, and deleting of records that have to enter with image of plant, flower, host tree, and live location of user. In today's scenario, all walks of life use Android smartphone for standard requirements, so this application is easy to use without carrying extra record books or stationary during the time of exploratory studies. The architecture of application of the Orchid-MAN application in stepwise manner is described in Fig. 2.

Development of Mobile Application for Data Collection

The availability of applications for data collection in field is a potential value addition in digital world. The developed android application addresses many issues inherent to field notebooks and manual entering of records. The developed field notebook, including all source code, is freely available so that developers may further customize the application to meet specific data collection requirements. The application hosted on Google Play Store (https://play.google.com/store/apps/details?id=com.nrco.datasheet&hl=en_IN&gl=US) for free and many other relative applications are available on institute link (Tomar *et al.,* 2019).

Orchid-MAN designed and developed to display data at an individual level with shared screen and insert records help users to check/recheck/insert entries any time. It

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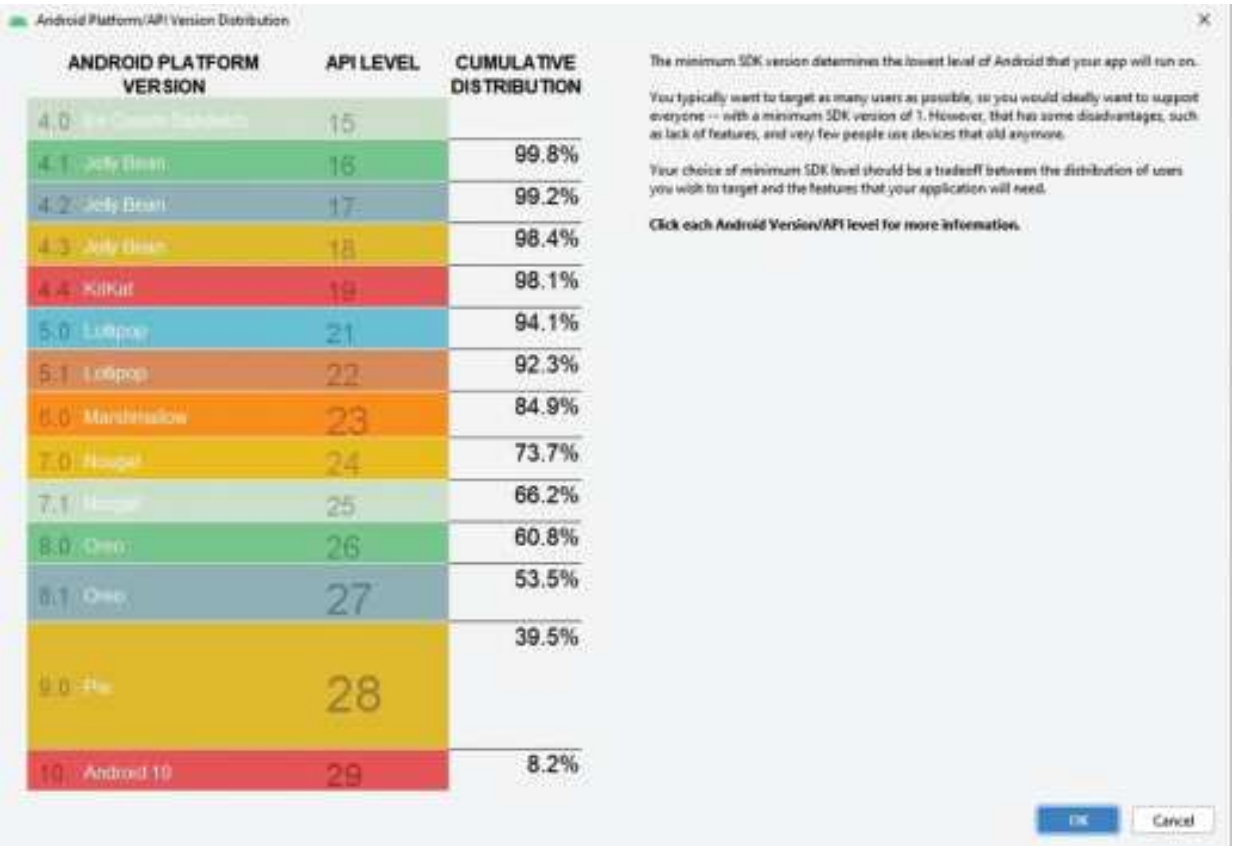

Fig. 1. Cumulative distribution of Orchid-MAN in android devices.

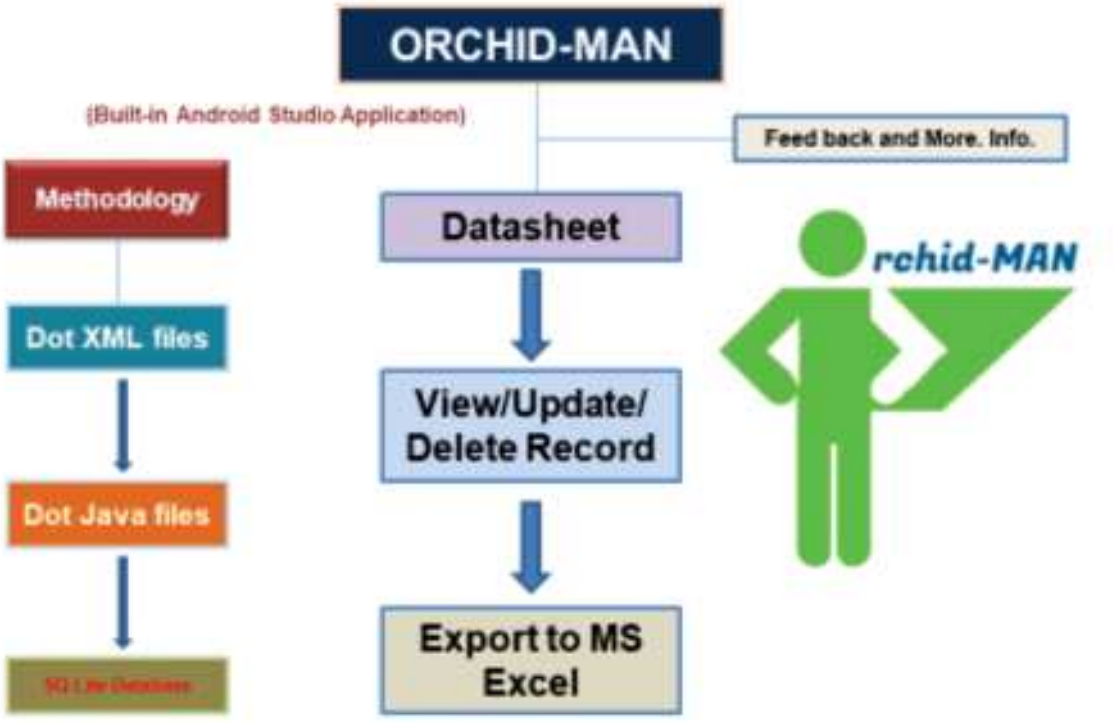

Fig. 2. Architecture of Orchid-MAN.

Fig. 3. a-f. Functionality of the Orchid-MAN: a, Home page with demo screen; b, Working page with menu option; c, Data sheet page with insert on the top scroll and view/update at down; d, Orchid records page; e, Feedback screen; f, More Info page.

also facilitates easy and rapid data insertion in SQLite Database with low space which is easily viewable/ downloadable in *View Record* option. Data can be exported in tabular format which uses the traditional spreadsheet format with a list of entries in rows and corresponding traits in each column. Image file path also stored with individual entry in the database to identify the location. This ability to keep data organized in digital form allows orchid collectors to focus on other task rather worrying on the compilation and safeguarding the data collected. Miscellaneous function on the right side popup menu option redirects the user on any activity page which gives flexibility. For ease of orchid data collection, Orchidopedia Mobile application also developed for orchid growers with a view to identifying native orchid species easily. This application includes 172 native orchid species with all scientific details (Tomar et al., 2022) so as to enhance the knowledge about concerned species. *How to use* option in menu popup bar gives about a small demo/description of application to user. Share option helps users to share the application with co-workers. *More Info* provides the details on source and contact information whereas *Feedback* button allows users to interact with developer of application through inbuilt email address online. As per the technical specification of the application, it is built-in Android Studio Application which is an Open Source Software. Java Core Library provided most functions of the application and the Gradle- advanced build toolkit, to automate and manage the build process, while allowing you to define flexible custom build configurations. For the creation of this application, two file formats were used. Firstly dot XML files that give design support of application and secondly, dot JAVA files that provide backend programming support. Default permissions, namely *android.permission. INTERNET* and *android.permission. SEND_SMS* had enabled in the Android Manifest.xml file of the application, which users need to allow these permissions for using feedback options. As per user reliability, the hide-unhide feature is enabled because of the enormous data displayed on single screen users who can easily select information according to their needs. The application size is less than 7 MB which will work on any device without acquiring much space. After insertion of records, size of application is likely to increase.

How to Use the Mobile Application

Easy to access theme followed in the application gives secure reliability to users. *Orchid-MAN* app allows users to feed information in the inbuilt database as per requirement in simple and straight forward ways. The steps described with screenshots provide an example of functionality.

i) Start the application after downloading from Google Play Store. The splash screen displayed with only first time demo screen to give brief intro about app (Fig. 3a).

ii) Followed by completion of demo session, a screen appears with datasheet, orchid record, more info and feedback option with menu option in top right corner (Fig. 3b).

iii) While clicking on datasheet option, user can see two scroll view area. In top area, user can insert records with hide-unhide options, whereas in second scroll view option, user has an option to check the inserted records as well as to select for update and deletion (Fig. 3c).

iv) On clicking orchid record, one can see the number of entries in stack format with the option of export in MS Excel option or to download the data in internal storage drive (Fig. 3d).

v) Users can easily hide/unhide data as per their need. This functionality gives vital help while accessing particular species detail.

vi) Feedback includes email service that helps orchid growers communicate with us in easy manner (Fig. 3e).

More info option gives detail about the organisation and their developer info which will assist the user in performing the desired work smoothly (Fig. 3f).

The records to be filled under the data sheet are broadly titled under, basic details, ethnobotanical uses, and photographs. Under basic details, date, collection number, accession number, species name, common name, cultivar/vernacular name, region explored, village/ block, district, state, latitude, longitude, altitude, forest type, vegetation, source, status, frequency, material, sample type, sample method, habit, occurrence, habitat, associated vegetation, flowering season, disease symptom, and pest infestation are to be filled with auto select feature. With ethnobotanical uses options, one can fill the part used, purpose, informants from whom the details on ethnobotany details were received and additional note can be filled. Under photograph tag, photograph of the habitat, community/ host tree, orchid species in close up, inflorescence/ flower, and herbarium can be uploaded.

Conclusion

Field data collection is fundamental and essential for genetic resource management of any crop. Rather than generating data, systematic compilation and

maintenance of data is herculean task in the field of germplasm management. Orchid-Mobile Assisted Notebook (MAN) has been developed as open-source handheld tool and can be used to collect data on orchid germplasm both for research and experiments. The motive behind the development of this application is to accelerate the speed of germplasm collection with live location and camera functionality, and the scope and quality of field records to be digitally perfected. The ability to keep data organized in digital form allows orchid collectors, growers and breeders to focus on other tasks, enhance the exploration in innovative manner. The application is totally based in English language and will be offered in other local languages depending on the number of downloads requested.

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