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Software design and application for oil palm kisan mobile message services in India

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Indian farmers receive agricultural information at present through several sources such as newspapers, television, telephone consultations, internet, mobile *etc*. Revolutionary development in information technology made mobile phones available for most of the Indian population. Due to its versatility, mobile phones have become powerful tools. In agriculture, mobile message services are used for marketing, extension/education *etc*. (Dhaliwal *et al.,* 2010). Kisan call centers in the country respond to issues raised by farmers on queries related to agriculture and allied sectors (agricoop.nic.in). Agricultural short message management system aids in sending and receiving of short messages on agricultural services (Jiang *et al.,* 2008). SMS based application responds to the query received as SMS in a particular format which retrieves the answer from the database and sends the reply as SMS to the farmer (Mitra *et al*., 2006, Veeraraghavan *et al.,* 2009). In all these, the farmer/user sends the queries to the kiosk/ agriculture database/SMS application, which then retrieves the required information from the database and sends it back to the user.

Directorate of Oil Palm Research has taken lead under Indian Council of Agricultural Research (ICAR) with the financial support of TMO&P in implementing a project on "Oil palm kisan mobile message services" (OPKiMMS) for dissemination of oil palm technology to its stake holders for improving production and productivity of oil palm in the country. As quality of information, its timeliness and trustworthiness are the important features to be ensured to enable farmers to use it effectively to improve productivity, the content on oil palm is disseminated to the registered oil palm farmers through text and voice SMS (Mary Rani *et al*., 2012). The project was conceptualized to be implemented in two stages. The first stage comprised of content development and collection and compilation of mobile and land line data and publishing of the messages. The second stage was to attend to the queries raised by the farmers. This paper describes the design and development of software for providing OPKiMMS to the farmers.

The software for OPKiMMS was developed using the Waterfall model of the Software Development Life Cycle (SDLC). The software application was developed as a web based application with ASP.NET as front end and SQL Server 2008 as back end using embedded SQL queries to retrieve and update data. Reports were developed to retrieve information from the database using Crystal Reports 10.0.

Waterfall Model of SDLC

Software development comprises of various phases such as requirement analysis, design, development, testing and implementation. The SDLC model describes the activities performed at each stage of software development. In the Waterfall model the development process proceeds to the next phase after completing the previous phase. The model is easy to understand and manage.

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The process of publishing the short messages to the registered oil palm growers in the specific language identified for the State was initially tested real time by using data in MS Excel and MS Access which helped in studying the requirements in real time and aiding in design of the software.

ASP.Net

ASP.NET is a development framework for building web pages and web sites with HTML, CSS, Java Script and server side scripting. ASP. Net code was written using the VB.Net language. Java script was used for data retrieval of string type data based on keyword. CSS was used in design of the screens.

SQL Server Database

SQL Server database is widely used in Relational Database Management System (RDBMS) supporting small applications on standalone systems to large amount of data accessed on the internet. Identification of the main entities, their relationships and constraints commences the design of the database. The entities represent different information of OPKiMMS, which include the message content in English and vernacular languages, plantation details along with mobile and land line data, publishing details, message delivery information *etc*.

Crystal Reports

Crystal reports help in designing reports from wide range of data sources. Crystal Reports for Visual Studio.Net enable to create interactive reports and presentation-quality content.

The framework for the software application is given in Figure 1. The content was developed and mobile and land line data of the oil palm stakeholders could be stored and retrieved by using the software application. Using the interface provided by the service provider, the retrieved message and the list of mobile and land line numbers which are in the form of file is used to transmit the message to the farmer *via*. the SMS Gateway, SMC Center and the mobile operator. The status of the published message for each mobile/land line is obtained and updated to the database and retrieved through the software.

The software application has three main functions *viz*., data management, message publishing management and information retrieval (Fig. 2). Data management further dealt with content management and contact details. The contact and plantation data management stores the mobile and land line data of the oil palm stake holders *viz*., farmers, entrepreneurs, state department officials, research personnel *etc*. In case of oil palm growers, details of plantations such as year of planting, area *etc*. are also made available so that the specific messages could be sent based on the age of plantation (*i.e.,* juvenile, adult plantation *etc.*). Content management stores the SMS content developed on different aspects of oil palm such as planting, irrigation, fertilizers, intercultural operations, intercropping, pest and disease management, harvesting *etc*. in English and translated to other vernacular languages.

The message publishing management is about the data retrieval for publishing the message

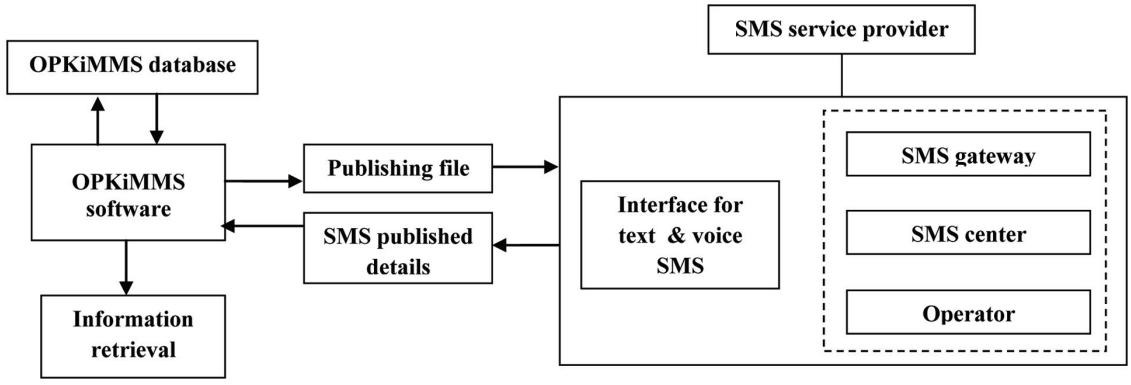

Fig. 1. Layered structure of OPKiMMS Software

(content, mobile & land line data), storage of publishing details and the status of published message for each mobile and land line number. The software enables to retrieve state and district wise unique mobile and land line numbers and export them into a *.csv* file. The message content is retrieved by searching the content in English, based on the keywords typed. Based on the content retrieved in English and the language selected, the message in respective vernacular language is retrieved and exported to MS Word file. Message sending details stores the content of message published, the language in which it is published, text/voice message, date of publishing and list of mobile numbers to which it is published *etc*.

The published message details contained the data on the delivery status of the message, the date and time of delivery and if it is a voice message, the duration of message heard *etc*. The information retrieval, retrieves the information in the form of reports about message content, client details based on state and district and client type, publishing details and receipt of published messages. User friendly screens were provided to store and retrieve the data.

The software was used since 2012 and more than 29,515 pre processed mobile and land line data were collected from six states (Andhra Pradesh, Goa, Gujarat, Karnataka, Maharashtra and Mizoram) in the country and were updated in the database. The total customer count was 17,283 of which 96 per cent data pertained to oil palm growers and 85 per cent belonged to Andhra Pradesh which is the major oil palm growing state. Content for short messages on oil palm that was developed in English, was translated to four languages, and stored in the database. Details of the voice files for the corresponding text messages were stored in the database. A total of 54 text SMS were published to 3.12 lakh mobile numbers with a delivery percentage of 81 per cent. A total of 40 voice messages were published to 3.71 lakh mobile per landline numbers of which the delivery percentage is 42.75.

The software application was useful in handling the voluminous data in the implementation of the project. This intervention of mobile message service would not only help farmers but also help all the related organizations to work for oil palm development more effectively and efficiently. The

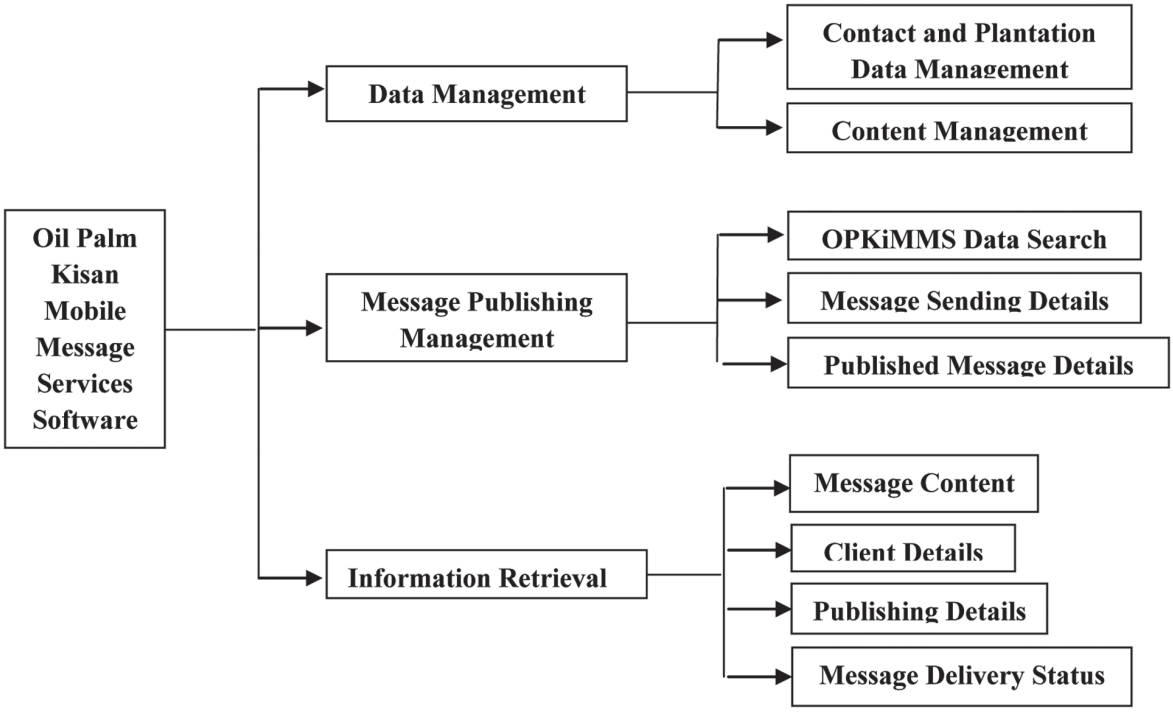

Fig. 2. Functions of OPKiMMS Software

software application could further reduce the time of pre processing by automizing to a certain extent.

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