

Mobile Data Collection Using an Android Device

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Abstract

Advancements in the field of Information and Communication technology has altered the way we collect, process, distribute and use information for the benefit of the society. In spite of this revolution larger part of the society has not benefited from this technological progress. Data collection projects like collecting information about a disease breakout in a region, socio-economic or census surveys, collecting geo-tagged data during a disaster or creating of inventories of natural resources utilize a lot of resources like personnel, camera's, GPS (Global Positioning System) device etc which are costly. The collected information is in the form of hand written text, images and GPS points. Lot of time is taken to collect, process and convert this data into useful information.

This paper reviews ODK (Open Data Kit) an open-source suite of tools with the help of which data for such projects can be collected and sent to a centralized server using an android device in real time and with least resources.

Keywords

ODK, Android, Data Collection

I. Introduction

Since last few years the growth of the telecom industry had increased sharply. The mobile services are becoming cheaper and so are the mobile handsets/tablets. A simple android mobile handset contains all the features like a camera, GPS, internet access, Wi-Fi, typing options, sufficient memory and processing power. These mobile sets are cheap and easy to procure. No specialized training has to be provided to the user to operate them.

The current practice for projects like collecting information about a disease breakout in a region, socio-economic or census surveys, collecting data during a disaster, creating of inventories of natural resources or government development is that it is paper-based and takes a lot of additional resources like camera, GPS and stationary. Also trained manpower is required to collect and process the data.

There are various software tools which can help in collection, processing and management of data using a mobile device. Some examples are FrontlineSMS, RapidSMS, GeoChat, EpiSurveyor, SMS Tool Kit, MobileResearcher, Populi.net, Nokia Data Gathering. This paper reviews the Open Data Kit (ODK) for mobile data collection.

For computing to truly address the information gaps information services must be composed by non-programmers, deployed by resource-constrained organizations, used by minimally-trained users, and remain robust despite intermittent power and connectivity. To address these challenges Open Data Kit (ODK) [1], a modular, extensible, and open-source suite of tools designed to empower users to build information services for developing regions has been developed. Open Data Kit is a research platform for the Department of Computer Science & Engineering at the University of Washington. With the help of ODK (Open Data Kit) an open-source suite of tools, data can be collected and sent to a centralized server using internet connected android devices in real time.

[2-3] and [4] provides information about the ODK toolkit, its features and its advantages for developing nations with case

studies.

[5], Provides the results of a real-world deployment of an IVR (Interactive voice response) application for collecting feedback from teachers in rural Uganda using ODK.

[6], Describes the development, implementation, and evaluation of a mobile device-based system to support health services. ODK has been used in this project.

ODK is being used in UC Berkeley's Health in Hands project in Mumbai and Karnataka. ICTPH enrolled 3,000 households (12,500 individuals) for a comprehensive primary healthcare delivery model in Tamil, Nadu. UNICEF and the children of Kolkata are mapping their community with ODK.

The various modules of ODK are:

- ODK Build: It is a form designer with drag and drop interface.
- ODK Collect: It is an app that is installed on the Android mobile. The form created in ODK Build is loaded in it. It has options to accept text, image, video, barcodes, location, options etc through the form. It connects to the centralized server to store that collected data.
- ODK Aggregate: It provides a ready-to-deploy server and data repository to provide blank forms to ODK collect, accept finalized forms and store the data in the database, visualize the data in maps and charts and export data into various formats. ODK Aggregate can be deployed on Google's App Engine or on the local users server.
- ODK Briefcase: It is a tool to transfer data from Collect and Aggregate.

II. Tools & Methodology

The various tools required are:

A. Server Side

ODK Aggregate (web server, aggregate application, PostgreSQL or MySQL database) installed on a server with a fixed IP address.

B. Client Side

ODK Collect application installed on the Android based mobile/tablet having Camera, GPS and GPRS connection.

The methodology of data collection work is as follows:

1. Decide the data to be collected and create a form by logging in at <http://build.opendatakit.org> (Fig. 1). Final form in the form of a XML file can be downloaded in the (/odk/forms folder) mobile device or uploaded on the Aggregate server.
2. Download the ODK collect (Fig. 2) in your Android mobile device. In the settings option set the server address to the aggregate application on the server. Also, download the form from the server if already not downloaded. Now use the fill blank form option to fill all the details in the form and if finalized can send the finalized form to the server or save it on the mobile itself. There are options to edit and delete the saved forms.

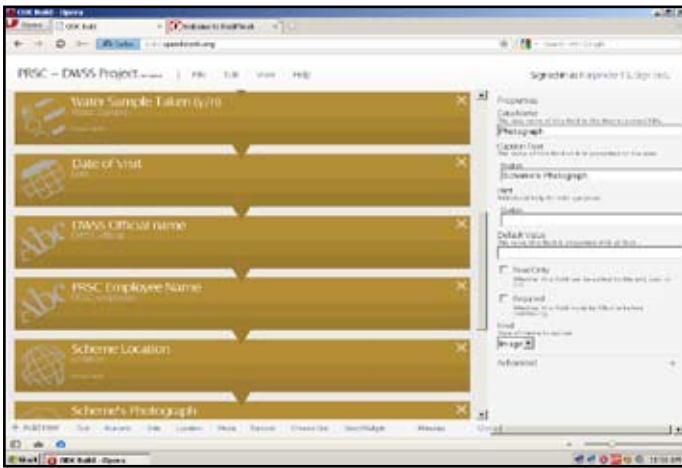


Fig. 1: ODK Build User Interface

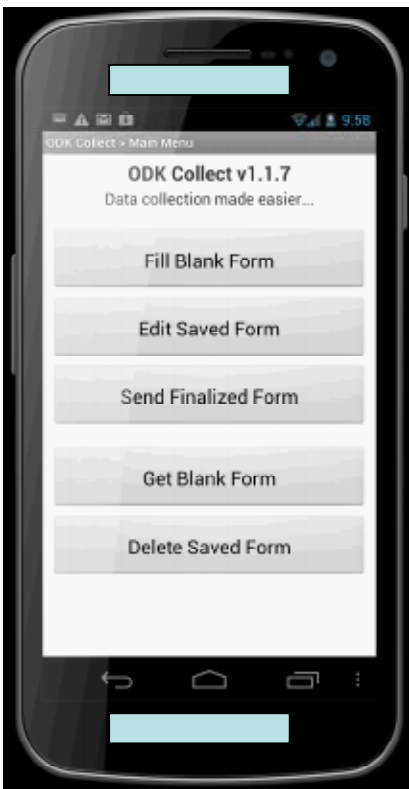


Fig. 2: ODK Collect User Interface

Install the ODK aggregate locally on a Tomcat server backed with a MySQL or PostgreSQL database server. The step by step help will guide to install and configure the database to receive the data sent from a mobile. There is a main window on which the data sent by the mobile can be seen (Fig. 3). There is option available to convert that data in CSV or KML format so that it can be viewed in Google earth if location is available. There are options to set various user permissions and view that data in the form of graphs also.

The mobile user will send the filled finalized form through the mobile device(with GPRS connectivity) which will be received in real time by the ODK aggregate server application running on the a server with a fixed IP address. The communication process is as shown in the Figure 4. The data will be stored in the MySQL or PostgreSQL database. If in case there is no GPRS connectivity the forms can be filled and stored on the mobile can be sent when there is connectivity or ODK Briefcase application can be used to transfer data from Collect to Aggregate.

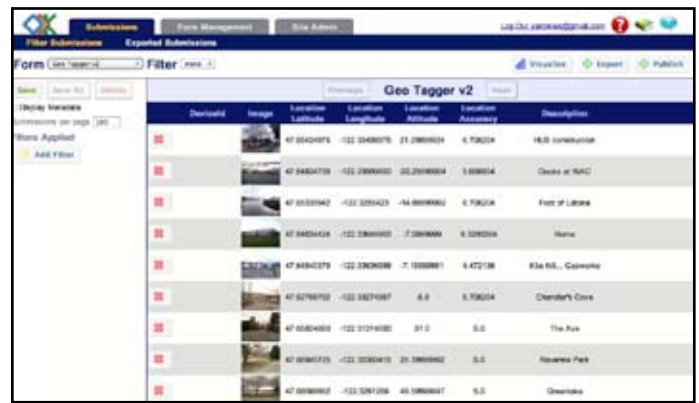


Fig. 3: ODK Aggregate User Interface

III. Results & Discussions

Open Data Kit automates the work of data collection and it is reliable in resource-constrained settings. As it is implemented using open source tools, it lowers the project costs also. It is simple to use and no trained manpower is required.

Also, real time geo-coded evidence based data in the form of images, GPS point and text can help in faster decisions, transparency and monitoring of various development projects in cheap and fast manner.

The planners and administrators need to be made aware about the advantages of this technology.

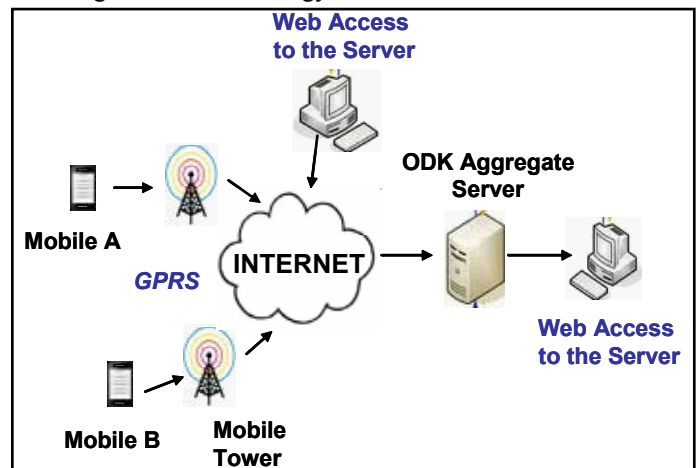


Fig. 4: Communication Process

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