情報地質 第27巻 第2号 114-115頁 2016年
Geoinformatics, vol.27, no.2, pp.114-115, 2016

カスタマイズ可能なモバイルアプリケーションと Web マッピングツールを用いた 野外調査用データ管理プラットフォームの開発

ニロシャンバンダラ*・ベンカテッシュ ラガワン*・大介吉田*・パビトラ ヤヤシンバ*

Development of Field Data Monitoring and Evaluation Platform using Customizable Mobile Application and Web-Mapping Tool

Niroshan BANDARA*, Venkatesh RAGHAVAN*, Daisuke YOSHIDA*
and Pavithra JAYASINGHE*

*大阪市立大学大学院創造都市研究科, Graduate School for Creative Cities, Osaka City University,
3-3-138 Sugimoto, Sumiyoshi-ku, Osaka 558-5858, Japan. E-mail: niroshansnj@gmail.com

キーワード: モバイルデータ収集, オープンデータキット ODK, Web マッピング, GeoServer
Key words: Mobile Data Collection, Open Data Kit (ODK), Web Mapping, GeoServer,

1. Introduction

Over the past few decades, field data collection is an expensive and time consuming task. Most of the techniques were based on pen-and-paper. Geospatial and non-geospatial data collection is one of the most important tasks for many fields of study. The significant changes have been occurred due to the development of information technology. As a result of that Mobile data collection has been introduced instead of conventional methods of data collection. Mobile devices offer immediate digitization of collected data at the point of survey. Interest in mobile computing and data collection are rapidly increasing. Due to this rapid growth, mobile-based applications for field data collection have penetrated areas as diverse as public administration, health, education, agriculture, and business development, etc. Usually field data has been collected by local community volunteers, students, field officers and researchers. They tend to suffer from frequent errors such as double data entry etc. Therefor the data should be monitored and evaluated. The harmonization between wireless networking and Web-GIS/Web services allow mobile users to stream large amounts of geo-information which helps to eliminate cost and data processing times for field data collection. Programming skills and advanced computer knowledge are required to develop/customize such mobile applications. This study tries to integrate Open Data kit (ODK) with web map services(WMS) through conducting develop an integrated platform for field data collection by using customizable mobile application, monitoring and evaluation via web based tool. The main objective of this project is to demonstrate real-time geospatial data collection and the providing a reliable field data collection platform.

2. Method

In order to address this issue truly, the system should be able to deploy and customize by the non-programmers. It should be able use by minimally-trained users. Open Data Kit (ODK) is able to address these challenges (Hartung, Anokwa, Brunette, & Adam). It has been developed with a modular, extensible, and open-source suite of tools designed to empower users to build information services. ODK currently consists of three tools: Collect, Aggregate, and Build. ODK collect is the client side application (mobile app) and ODK Aggregate is the server side application. ODK build is to make forms for ODK collect.

ODK collect can be downloaded for Android devices. The forms can be downloaded to ODK collect from the server (ODK Aggregate). Apart from ODK Build, XLSforms can be used to make forms for ODK Collect. XLSforms can be simply developed by using Excel sheet and you should follow the given guideline (http://xlsform.org). In the server side, ODK Aggregate is setup with the integration of PostgreSQL. After developing the XLSform, it should be converted to xml format. Then XML file can be uploaded to the ODK Aggregate directly. After that the uploaded form can be downloaded to ODK collect as a form and it will be created the filed survey form.

Further, GeoServer has been integrated to the system since data are stored in the PostgreSQL. Web map tool has been developed by integrating GeoServer.

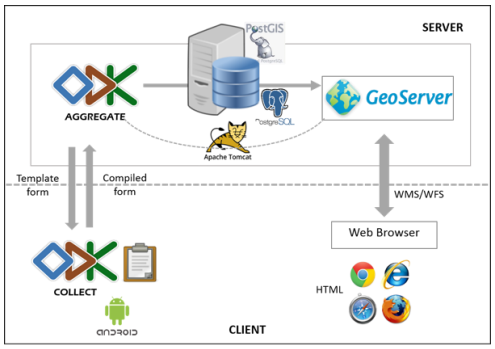


Figure 1: System architecture

3. System and Data Collection

This system has been developed as a pilot project. It has been used for the Osaka City university, Sugimoto-cho campus information collection. The form has been developed as XLSform by using Excel. Basically, the form contains fields to collect information such as open spaces, gathering places, activities, building names and its utilization. It has been uploaded to the ODK Aggregate, after convert the XLSform in to XML format. Form has been downloaded to the ODK collect in the Android tablet devices. The survey has been conducted by the student in the Geo-Lab at Media Center. Students have to observe the activities in the particular place, take pictures, identify the building names and its uses etc. The location information is automatically recorded from the GPS. The given tablet has not connected to the wireless network while conducting the survey. Student has to collect the data in the field, finally the data are uploaded to the ODK aggregate server after they reached to the lab. In this system PostgreSQL has integrated with ODK aggregate as a database. GeoServer has been connected to the database. Therefore, uploaded data can be visualized on the web based map with a base map of OSM.

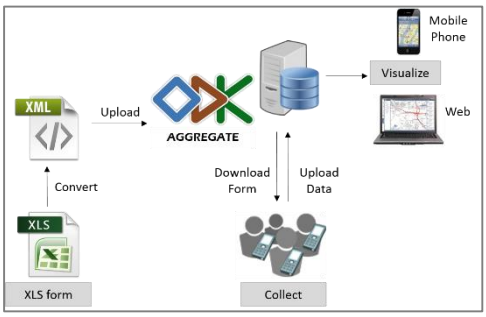
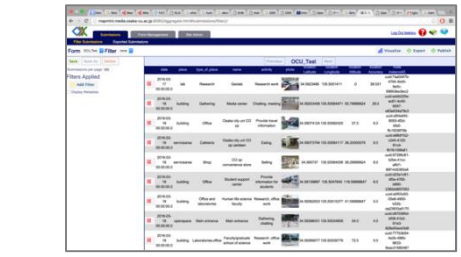


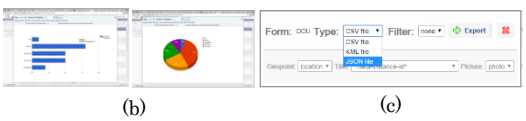
Figure: 2 Developed system

4. Results

ODK aggregate has few capabilities to visualize the collected data. That capabilities enable to generate pie charts, bar charts and point them on the google map. Pie chart can be generated according to collected data. This data has the type and use of places such as laboratories, open spaces, parking areas and service areas according to that, pie chart can be generated as shown in the figure. As well as data can be visualized on the web map tool which is developed by using GeoServer. Apart from the visualization, the data can be compared with different information layers such as road, building, water bodies, etc.



(a)



(b) (c)

Figure 3: (a).Aggregate window, (b).Pie Chart and Bar Chart generated by Aggregate, (c).Export data

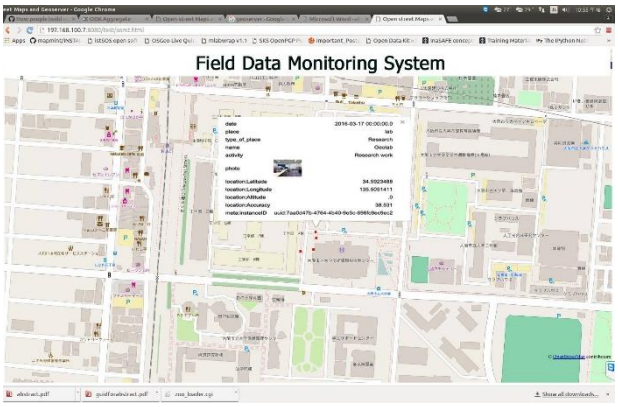


Figure 4: Web mapping tool

5. Conclusion

The use mobile communication devices, such as smartphones, for field data collection is increasing due to the emergence of embedded Global Positioning Systems (GPS) and wireless Internet access. Accurate, timely and efficient field data collection is required for many fields such as disaster management and a quick response during emergencies, etc. but available applications have not reached to the user demand and it needs programming skills for further modifications. Since unavailability of customization according to the situation and needs. This study is demonstrated, the utilization of different available technologies, customization methods according to the user demands for smartphones in field data collection is handy and timely manner. Moreover, the system enables to compare the data verses different geospatial layers. The system itself is reusable and updatable for various field data collection purposes.

6. Future development

This system allows for fast and automated data aggregation and visualization. Further the system is going to be integrated with varies web services for analyze the data within the platform. In order to do that, data aggregation will be done inside the ZOO-Project.

Reference

Hartung, C., Anokwa, Y., Brunette, W., & Adam, A. (2010). Open Data Kit: Tools to Build Information Services for Developing Regions. Retrieved 10 May, 2016, from Open DataKit:https://opendatakit.org/wpcontent/uploads/2010/10/ODKPaper-ICTD-2010.pdf

Jeffrey-Coker, F., Basinger, M., & Mod, V. (2013). Open Data Kit: Implications for the Use of Smartphone Software Technologyfor Questionnaire Studies in Intern ational Development. Retrieved 10 May, 2016, from The EarthInstitute,ColombiaUniversity:http://sel.columbia.edu/assets/uploads/blog/2013/06/Open-Data-Kit-Review-Article.pdf

Lwin, K., Hashimoto, M., & Murayama, Y. (2014). Real-Time Geospatial Data Collection and Visualization with Smartphone. Journal of Geographic Information System, Vol 6,No2 pp 99-108.