Toponyms Mobile APK for volunteered geographic information; Case study of Kenya

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Abstract

The toponyms or place names mobile application aims to captures the historical characteristics of place names using volunteered geographic sources on a free toponyms (place names) application via a mobile feature layer autogenetic form. The Android Package Kit (APK) mobile application performance, was developed to act as a link between the open source data and official records of geographical names gazetteer. The app was tested and overlaid with open street map data to ascertain current positions as reflected on the application versus the positions of ground feature. Further testing of the app will be done with data from geo-parsing osmosis and overpass turbo sources to determine their characteristic relationships, accuracy, validity and reliability. The final product will be validated and served as a web feature service continuously updated by official and Volunteered Geographic Information (VGI) sourced datasets in a freely accessible platform by configuration.

Key words: Databases, Geo-parsing, Data, VGI, Toponyms

1   INTRODUCTION

This paper presents a toponymy mobile application for use in toponymal or place name data capture and research. The toponymal research is one of the research topics under the United Nations economic and social affairs group, United Nations Group of Experts on Geographical names committee (UNGEGN). The application is a centrally and regionally customizable, for data collection and merging with the data from VGI and official records. Some of the admissible drawbacks of the VGI include inaccuracy, poor quality in terms of what is desired and the general acceptability of the data which may be countered by the use of a mobile application to asses and mitigate to a reasonable level since open source data is freely available and has been experimented (Laura, 2012). Toponyms in society are inseparable and contains attributes such as feature type, positions they occupy centrally among others. Resolutions on guidelines governing toponyms generation have been discussed and partly concluded (UN, 1967) for naming, submissions made from selected countries, the romanization of non-English words to conform to the I.P.A systematic address standards among others.

Currently there are standards for new technologies in geospatial data extraction and management developed by United Nations (UNGEGN, 2006) and the requirements in the technical reference manual (UNGEGN, 2007) (though trivial to implement on scope fully in most countries), tailored for geographical names when sorting data from VGI sources. The issue of transcription and translation across different dialects of the multilingual ethnic tribes is a challenge. Sometimes there is use of translators and local elders to check the names on the Swahili orthography used on the names from volunteers who sometimes are in some cases anonymous; where name variant (allonym) are used, creating complications. Also there is partial reduction of ambiguous names even if done un-intentionally which causes misinterpretation which is the correct name.

1.1 OBJECTIVES AND AREA OF STUDY

The objective of the paper is to develop and deploy a toponyms (place-names) mobile application to collect and receive data to be used to update place names based on VGI crowd sources. This forms part of the main ongoing research of characterizing lineage of geographical names attributes using geo-parsed volunteered information and combine with public or official Government records after verification for digital gazetteer service deployment. The area of study is Kenya's boundary.

2 LITERATURE REVIEW

There exists various mobile based mapping application such as MapIt and GeoODK. MapIt is not customizable to use for toponyms data collection unless until it is re-scripted and paid for as it is not open source. GeoODK(http://geoodk.com) is an open source mapping application whose storage is on google-drive and needs some customization to create feature service which is not supported. Also, it does not have a ready to use, feature form, unless pre-created. The proposed toponyms mobile application is a hybrid application with a single feature service. There is need to give names with description and locating the areas of interest precisely through the use of apps coordinates, VGI names from OSM to manage updates streaming daily and geo-parsing to check and derive names for regular updating and validation in the official server database (Pinde F, 2011) for changes on names (renaming) due to politics or developments gives the process an edge on the current practice. Open Data for Resilience Initiative paper (OpenDRI), (GFDRR, 2018) discusses the considerations in the use of VGI. However it does not consider Geographical names (GN) as a dataset collected by VGI. Some governments are moving from official standardized data collection methods to VGI (Hogerwerf, 2017), for example the FINTAN place names project) (UnitedKingdom, Ordinance Survey, 2012) which relied on existing gazetteer and place names.The apps data collected is merged and is used to validate the geo-tagged and geo-parsed open street map data obtained using open source tools such as Osmosis (OSM, 2018). Also, bigger files can be extracted using osmo2pgsql and Weka 3 (Eibe Frank, 2016).

2.1 MATERIALS AND SOFTWARE

The development of the toponyms or place names mobile application was developed using Android studio IDE, Java scripting interface and Esri runtime SDK which were tested in smart phone. The SDK enables the building and deployment of the toponyms

under lite license level. The updates are to be streamed via FOSS tool; osmosis or manually configured by use of turbo-overpass query wizard. The data collected may include the layers masked by a polygon boundary for the area of interest, Kenya.

Figure 1: Prototype data capture workflow   **Figure 2a: On Launch welcome Page**

Figure 1 shows toponyms data capture, update workflow from multiple users who have the app installed. The dotted lines show where customization is to be applied. On launch of the app, one navigates to collect data page where the user is prompted to fill a collect data form. Figure 2a is a welcome page showing current customized location of the user.

2.2   DATA COLLECTION AND DATABASE LINKAGES

In the user's level view, the data is captured and stored on the mobile device, in the cloud storage and also in the country's server-connected storage. This works only after customization and synchronization of the data with the hosting devices.

3   METHODOLOGY OF ANDROID IDE DATA CAPTURE APK DEVELOPMENT, DEPLOYMENT AND CUSTOMIZATION

Concurrently the data captured is stored in database with a file name; data in a mobile device automatically. The local data on the device is then linked to a customized local server owned by a country's mapping agency responsible for mapping. Updating of the server is done by synchronizing each specific country's local database to devises for receiving data at country level and also at the crowd server hosting the application in the global level and it is the default database when it is not customized.

On launch of the Toponyms mobile APK, it gives one the option to navigate through the app features. The collect data form is used to collect names from various users of the app throughout Kenya and anywhere in the world and update regionally configured country databases as well as the national default server with both official records and VGI community data of open street map(OSM). Data mined from OSM website is then merged from the mobile app and integrated after validation to update official records.

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4   PROTOTYPE APK FOR TOPONYMS COLLECTION

A sample Toponymy mobile application was developed by coding using java scripting in Android IDE and sample data collected using the APK feature layer attributes of the mobile application collect data form. The data will be used to check the data from the VGI sources obtained through Osmosis from the pen street map website through terminal connection. After validation of the data, the data will be published in a digital gazetteer service for visualization.

4.1 Toponym mobile APK

Toponym application was developed under a GNU or General Public License software developed from Googles Android studio IDE desktop application. It is a free and open source tool for toponyms or place names data collection and management through validation of volunteered geographic information from crowd sources.
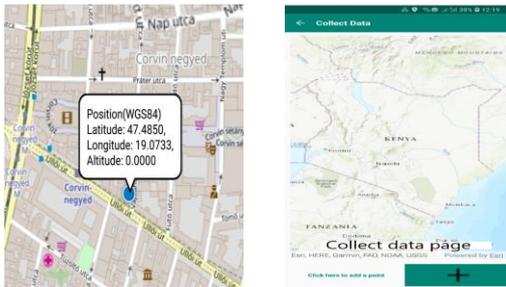
Figure 2b: Current location   Figure 2c: Collect Data Page

Figure 2a is a welcome page showing current location or customized map of the user 2b indicates the location coordinates of the user of the app while figure 2c shows the collect data page where the user is tasked to fill the form appropriately including taking a picture of the feature. Its functionalities can be extended and customized to suit user needs for various mapping organization interested on geographical names collection and data updates management.

4.1 Data capture

On each mobile user app interface, the filled collect data form contains features' detail entered appropriately.
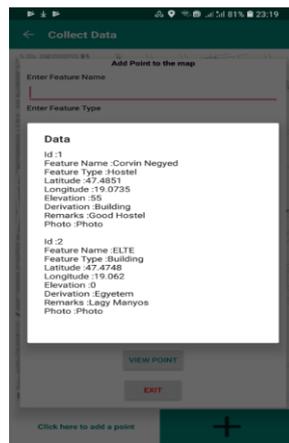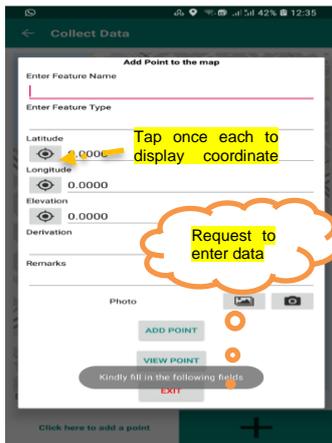
Figure 2d: Blank Data form   Figure 2e: Sample data collected

Figure 2d is a blank data form, which require the user to fill such as the feature name, feature type, derivation or history of the name and take a picture of the feature or name and add the point and finally 2e is a sample data view on a user's screen. The id value is generated by the app automatically on adding the point to the local device storage. The location attributes are entered on the form by clicking on the app's GPS location icon so that the zero values change to current location coordinates in for of latitude, longitude and elevation format.

5   CONCLUSIONS AND FURTHER WORKS

Conclusion

The prototype Toponyms mobile APK was successfully developed and deployed. It can be used to collect toponyms information anywhere as it localizes to a region of the user and can be used to update official records and validate crowd sourced data. In addition, one can extend the app's feature table attributes so that more details can be capture using the collect data form of the app so as to have populated feature attributes

Further Works

Further customization needs to be to be done in future to achieve the anticipated idea of concurrent synchronizing of the updates from the app, databases of the devices, office server and crowd servers which is beyond the scope of this paper. In addition the development of the mobile APK is part of an ongoing research on application of VGI crowd sourced data in combination with formal records.

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