Progressive Web GIS App – towards better User Experience

Sonal D. Kumar, Vinod M. Bothale, B. Gopala Krishna, Santanu Chowdhury

National Remote Sensing Centre, Hyderabad, Telangana, India

Abstract

Progressive Web App (PWA) is the current trend in Web Technology which helps to bridge the gap between a native Mobile App and a browser-based website. PWA provides same user experience as a native mobile app, without utilizing much storage and memory of the device. Some of the major features of a Progressive web App are - It can work offline, has access to the mobile device hardware, sends notifications to the user, can be launched as an app through a shortcut on home screen, can update the data/information at the background. PWA caches the static data and serves to the user during offline mode. It uses the concept of service workers which are basically the scripts running in the background for data updates. It also consist of a Web App Manifest which defines the application behaviour when installed on the device.

In order to leverage the benefits of Progressive Web App in GIS domain, we developed a "Lite" version of GIS application having features to visualize Multi-Resolution Satellite Imageries and other Vector datasets (like Base Map). This application has an option to work-offline and also notifies the user when using a slow internet connection. Since the raster and vector data are consumed as OGC compliant Web Map Services (WMS) in the application, the data is delivered to the user as 256 X 256 image tiles. These are cached using service worker and served based on the cache strategy set (Cache first, Network first, Cache expiration etc). We have used Workbox libraries for service worker implementation in this application.

We have used Openlayers 4 API for displaying the map. Since it provides better user experience compared to Openlayers 2, having new features like animated zoom, rotation and uses HTML5 canvas and WebGL . Framework7 is used to develop the Graphical User Interface. This open-source HTML framework is mobile friendly as well as responsive. And provides native look and feel for iOS and Android.

Search and get directions functionality is also integrated using third-party APIs. Statistics of Land Use Land Cover Thematic datasets in 1:50K and 1:250K scale is also disseminated using this application. Navigation to statistics page is within the application framework and it doesn't open a separate window. User preferences are stored using IndexDB at the client side.

Since more than 70% internet users in India access through mobile instead of desktop, It is highly essential to have mobile-based Web GIS application. Thus this progressive Web GIS application will help serve the purpose and enhance user experience.

In further releases of this application, we plan to integrate all citizen centric datasets like Weather Data, Near real-time disaster monitoring, Crowd-sourced geo-tagged information, so that the same could be utilized by mobile users effectively. We also plan to conduct usability tests on the application to enrich the application based on the test results and user feedback.
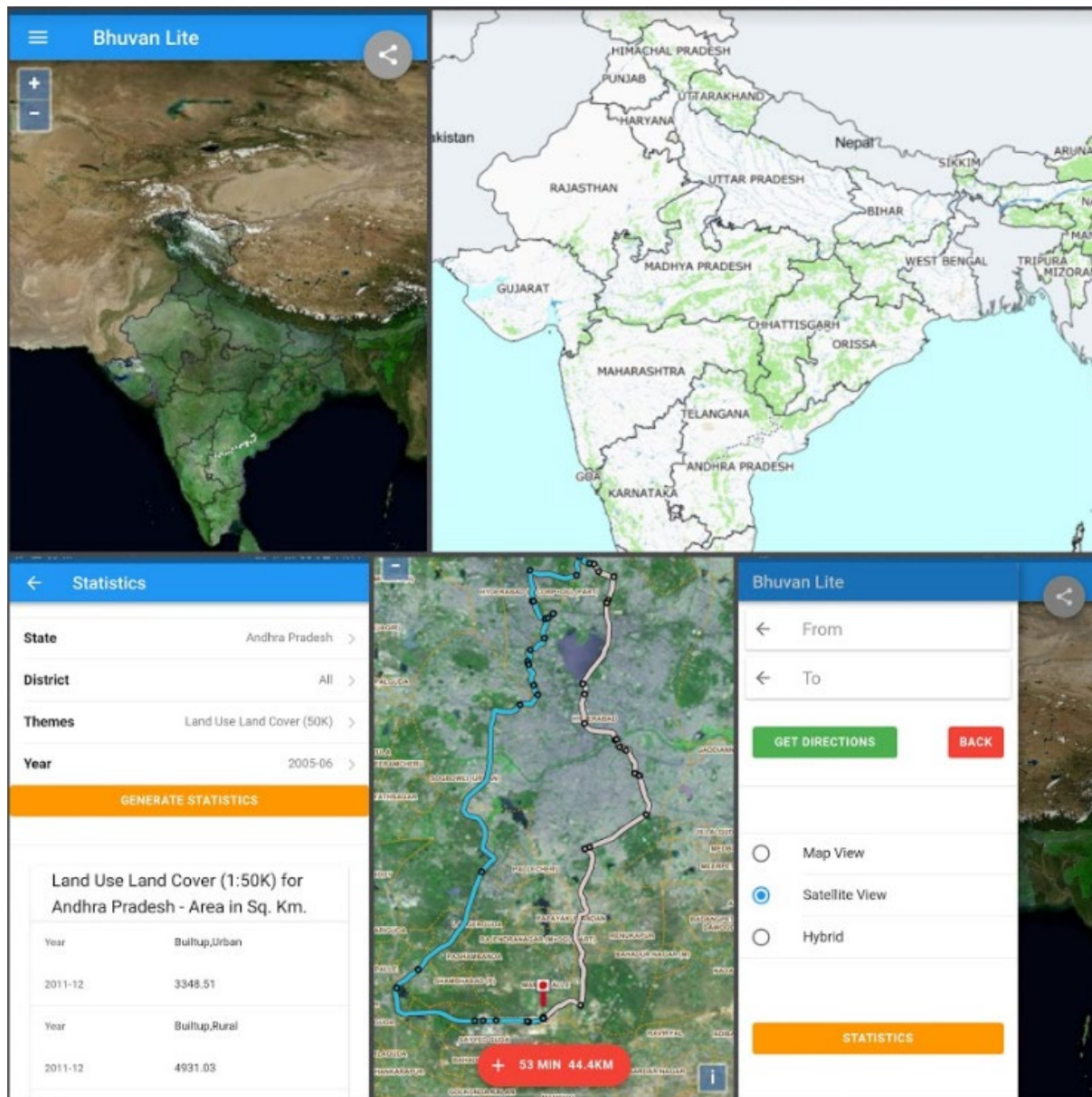
References

Progressive Web Apps -A new way to deliver amazing user experiences on the web. Retrieved from https://developers.google.com/web/progressive-web-apps/

Biørn-Hansen, A., Majchrzak, T. A., & Grønli, T. M. (2017, April). *Progressive web apps: The possible web-native unifier for mobile development.* In Proceedings of the 13th International Conference on Web Information Systems and Technologies (WEBIST) (pp. 344-351).

Desktop vs Mobile vs Tablet Market Share India. Retrieved from http://gs.statcounter.com/platform-market-share/desktop-mobile-tablet/india

Eriksson, L. (2018). Using IndexedDB with a spatial database.

1. Author/s Biography

Short Author/s Biography (150-200 words)

 Sonal D. Kumar

Authors are Scientist/Engineers working in National Remote Sensing Centre, Indian Space Research Organization, Hyderabad, India at various functional designations – Sonal D. Kumar(Sci/Engr SE BSWS),Vinod M Bothale (Group Director – G&WGS), B Gopala Krishna (Deputy Director- DPPA&WA), Santanu Chawdhury (Director NRSC).