



Geofairy: An Open Geospatial Information Sharing Mobile Platform



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Introduction

Geofairy is a mobile app developed by the Center for Spatial Information Science and Systems in George Mason University.

- Geofairy succeeds to collect and display nine kinds of the mostly used geospatial information: vegetation, weather, precipitation, atmosphere, soil moisture, altitude, agriculture, land cover and land use.
- The information comes from different data providers, e.g. NASA, NOAA and Google. Geofairy performs as a hub gathering and reformatting information and sharing with users in an intuitive style.
- It supports users to view information in three modes: table, chart and map.
- Geofairy involves eight public datasets and more than 100 data layers nearly covering the whole globe, including most developing countries.
- For developing countries where geospatial information is hard to retrieve, Geofairy allows them to monitor the measures of the environment, provide timely and accurate status reports, analyze the trends in the history and guide people in developing countries to make plans and take actions to prevent or remove the possible bad consequences.

All the used datasets in Geofairy

| Name | Type | Coverage | Desc |
|--|---------------|----------|--|
| Google Gecoder | Location | Globe | - |
| USGS DEM Explorer | Altitude | Globe | - |
| OpenWeatherMap | Weather | Globe | - |
| NOAA Weather Report | Weather | U.S. | - |
| VegScape | Vegetation | U.S. | Daily NDVI, Weekly NDVI, Biweekly NDVI, Weekly RNDVI, Biweekly RNDVI, Weekly MVCI, Biweekly MVCI, Weekly RMNDVI, Biweekly RMNDVI |
| GADMF5 | Vegetation | Globe | Biweekly VCI |
| USDA Hardiness Map | Agriculture | U.S. | - |
| The Global Land Cover by National Mapping Organizations (GLCNMO) | Land Cover | Globe | - |
| USDA Cropland Data Layer | Land Use | U.S. | 1997-2013 (some states miss some years between 1997 and 2007) |
| NASA Soil Moisture | Soil Moisture | Globe | - |
| NASA AIRS Atmosphere | Atmosphere | Globe | More than 100 layers are used |
| NASA AIRS Precipitation | Precipitation | Globe | - |

Table 1

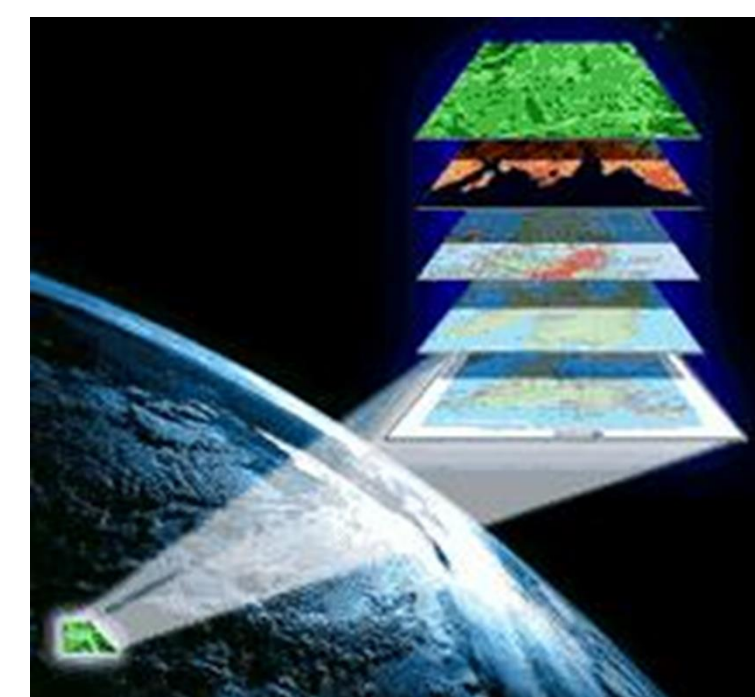
Objective

Background:

- Due to the explosive development of sensors, nowadays geospatial data is rapidly growing and distributed by a lot of data providers. There are few connections among the datasets from different providers which make the datasets as isolated entities. It is very inconvenient for users to be comprehensive aware of the real in-situ status and makes it hard to extract valuable information from the datasets.

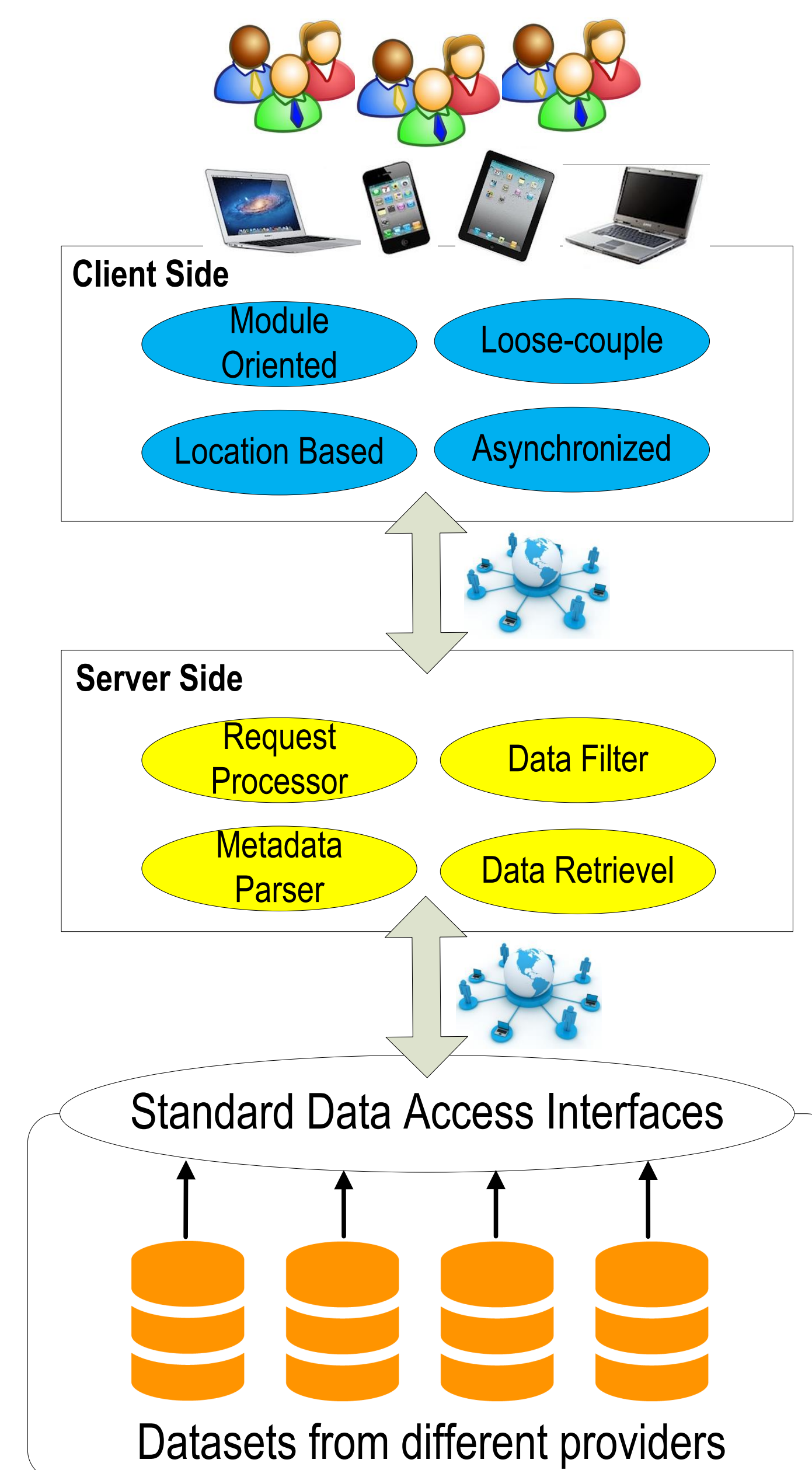
Goal:

- Geofairy aims to build a platform in which all the datasets can be seamlessly combined through standard interfaces. It will break the walls between different datasets, fuse all the information together and significantly improve the efficiency of acquiring and understanding geospatial data for users.



Methodology

We propose a general mobile framework which makes it very easy to plugin various geospatial datasets and provides users with a flexible and customizable interface on mobile phones to acquire geospatial data and understand the contained information.



Implementation

We implemented the framework into a mobile geospatial information sharing system - Geofairy. The used programming languages and tools include the GEO Discovery and Access Broker (DAB), Cordova, HTML5 and CSS3, JQuery mobile API, Netbeans IDE, Eclipse Kepler IDE, JSFiddle, Java, Openlayers (all the maps in the mobile app are overlaid as WMS or TMS layers in OpenLayers).



Evaluation

We compare Geofairy with the famous "one-billion app" - Climate Basic. Table 2 lists the results from which it can be concluded that Geofairy has more higher information resolution (location based), larger coverage (the Globe) and more kinds of available information (vegetation indices, atmosphere status, altitude and hardness zone) than Climate Basic.

| (Table 2) | Climate Basic | Geofairy |
|-------------------|---------------------|----------------------------------|
| Weather | ✓ | ✓ |
| Forecast | | |
| Temperature | ✓ | ✓ |
| Precipitation | ✓ | ✓ |
| Soil Moisture | ✓ | ✓ |
| Wind | ✓ | ✓ |
| Humidity | ✓ | ✓ |
| Dew point | ✓ | ✓ |
| Level | Field -based | Location-based |
| Coverage | U.S. continent only | The whole world (8) or U.S. (4). |
| Vegetation status | × | ✓ |
| Atmosphere | × | ✓ |
| Altitude | × | ✓ |
| Hardiness Zone | × | ✓ |

Product

Geofairy has been published on Google Play store as a free app. (<https://play.google.com/store/apps/details?id=edu.gmu.csis.s.mobile.geofairy>)



Conclusion

This study proposed a specific information framework for the heterogeneity problem when combining isolated datasets from different providers. A mobile platform system, Geofairy, is developed and published to realize the framework. It successfully proves the practicality of the framework. We also evaluate Geofairy by comparing with a famous existing geospatial information mobile app. The results shows that Geofairy has some significant advantages which may greatly enhance the capabilities of geospatial information distribution and sharing platforms.

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