

Open Source Based Software ‘GXT’

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1. Introduction

GXT is an abbreviation for GeoXTreme, and it is a commercial common spatial data analysis engine developed with GeoTools. GeoTools is a JAVA library based on open source (LGPL) that provides standardized method for operation and control of geographical information data. It provides functions such as interface determination of the spatial data structure, format of the various file types including vector and raster, support for spatial DBMS, elaborate data transection and access, and projection of various maps. GXT follows the OGC® Standards and it is GIS engine with high interoperability between the platforms. The provided analysis process is comprised of geometry, vector, raster, statistics, custom algorithm, and supports 230 GIS analyzing algorithm. GXT analysis function as plugin for uDig, eclipse RCP based open source desktop GIS program, can be added and GXT analysis process can be used employing WPS Extension at GeoServer. GXT analysis function is available for free when used for research and education.

2. GXT Architecture

GXT has been developed through the Java-based library. Typically through the GeoTools library, features such as JTS, GeoAPI, JAI, JTS have been

added to analyze the shape. GeoAPI is feature analysis for the properties, and JAI is functioned to speed up the processing of images, such as Raster. That was the developed based on GeoTools library that have been added for a variety of analyzes. See Figure 2 of GXT Architecture below. GXT supports a variety of spatial DBMS and data format including ArcSDE, MySQL, PostGIS, Oracle, WFS and Shapefile through data store. Then it offers an API that can support vector, raster, spatial statistics, and custom through a library such as GeoTools, GeoAPI, JTS or JAI. Its service is offered by two methods: one is GXT for Server and the other is GXT for Desktop. GXT for Server, an extension, is serviced in a server environment where it is possible to use GXT for Server into existing WPS (Web Processing Service) implementations to create processes, like OpenGeo Suite WPS, GeoServer WPS, and 52N WPS. GXT for Desktop is a tool box plug-in, operated in open source desktop GIS based on eclipse RCP such as gvSIG, OpenJUMP and uDig. As mentioned above, GXT plays a role of connecting tunnel that supports various data format, creates various spatial analyzing API through open source library, and offers a service as server and desktop method.



Figure 1: GXT processing

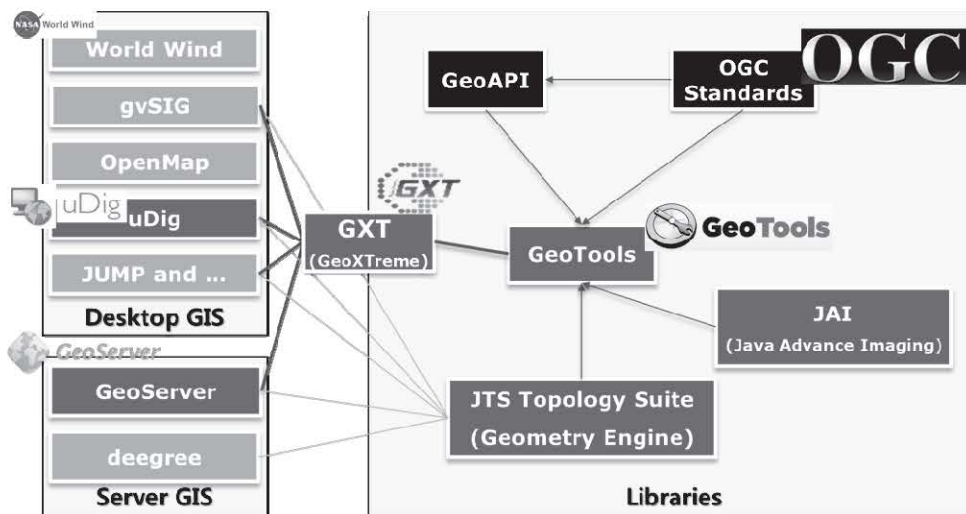


Figure 2: GXT architecture

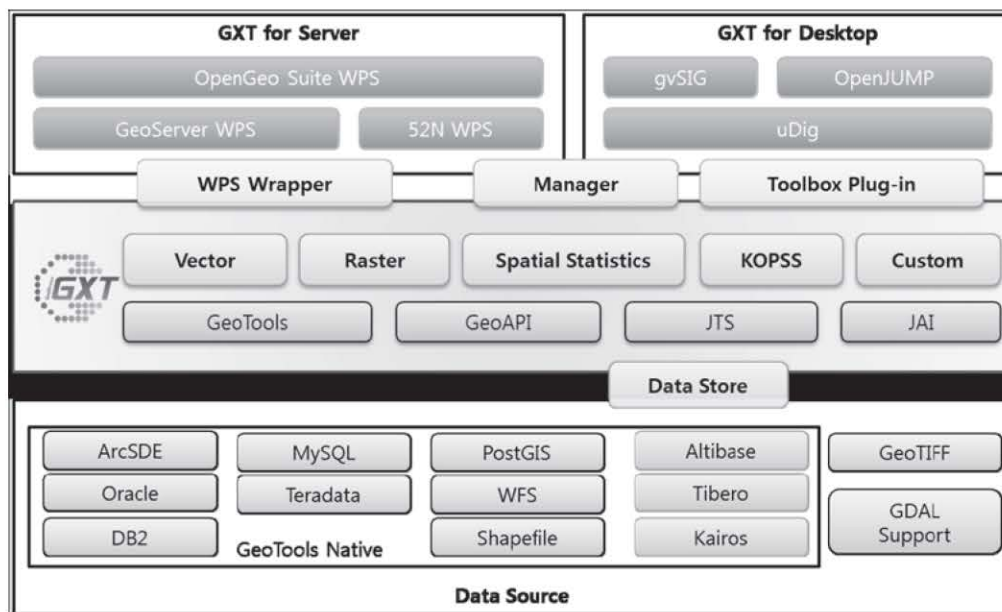


Figure 3: GXT architecture

3. GXT for Server & GXT for Desktop

GeoServer is open source GIS software which can share and edit geospatial data and have been developed as JAVA. Since it is a community based project, its test and development is done by individual and institutions in the world. Also, it is developed under the premise of interoperability so it supports OGC standard such as WMS, WFS, WCS and WPS. If one wishes to use GXT with about 230 analysis process, WPS extension can be used at GeoServer. It can be used like Figure 4 when WPS extension is created and GXT for GeoServer is

added. WPS Process parameter IO (PPO) of GeoServer supports encoding and decoding on parameter of INPUT and OUTPUT. It also provides user defined PPIO additional function and use result value directly such as WFS and WCS for parameter. uDig is an open source desktop GIS program based on RCP (Rich Client Platform) of Eclipse. It uses library of GeoTools and EPL and BSD is applied for the license. uDig Project is aimed at offering JAVA solution for spatial data inquiry, editing, and visualization.

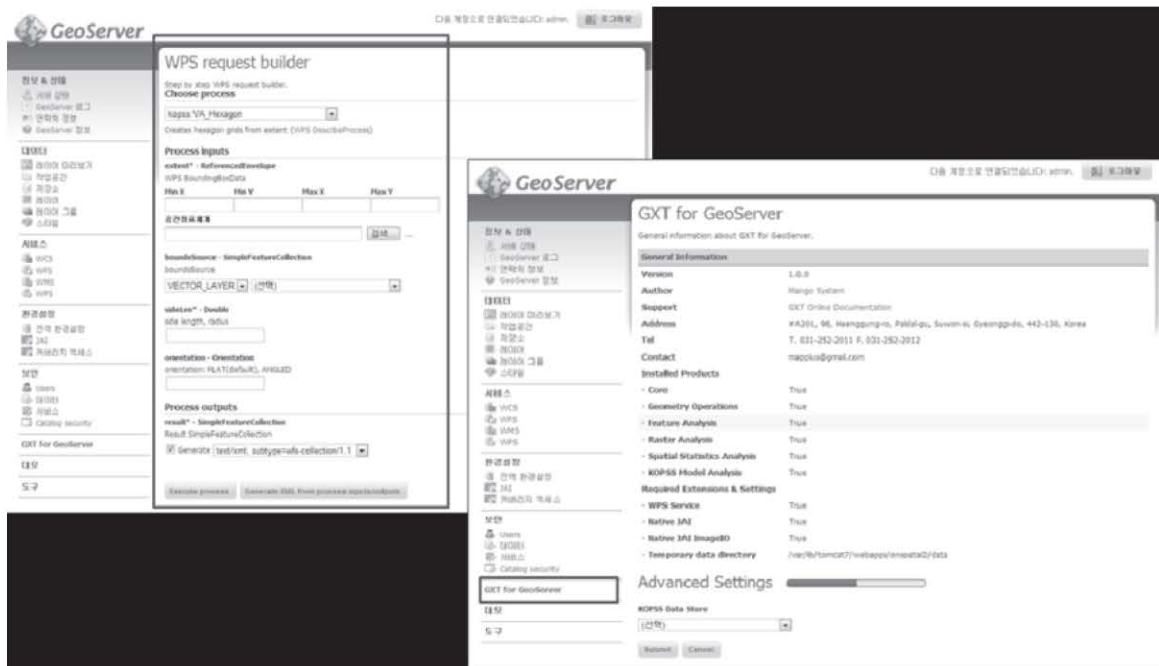


Figure 4: GXT for Server (GeoServer)

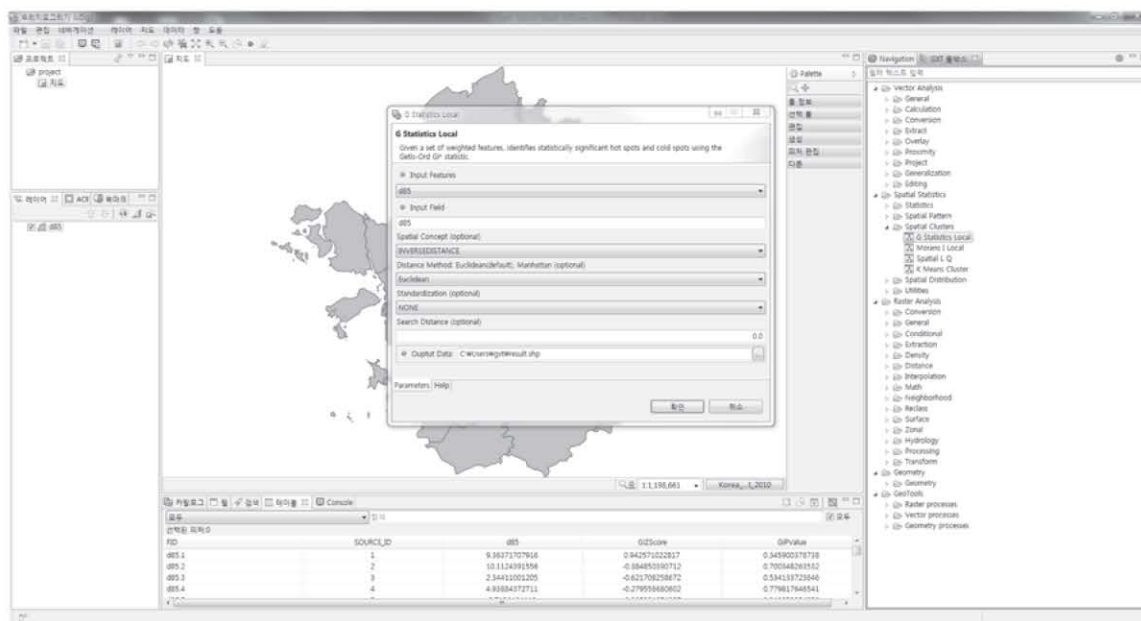


Figure 5: GXT for desktop (uDig)

4. Application of 'GXT' Cases

4.2 KOPSS

KOPSS stands for KOREA Planning Support System and is a supporting tool for a decision making that uses GIS and spatial statistics for spatial planning tasks such as regional planning, land utilization and urban regeneration maintenance planning.

GXT is used as a web-based KOPSS GIS engine via GXT for GeoServer WPS. Regional governments like Daejeon, Busan, Gwangju and North Gyeongsang Province in Korea also use KOPSS with GXT engine.

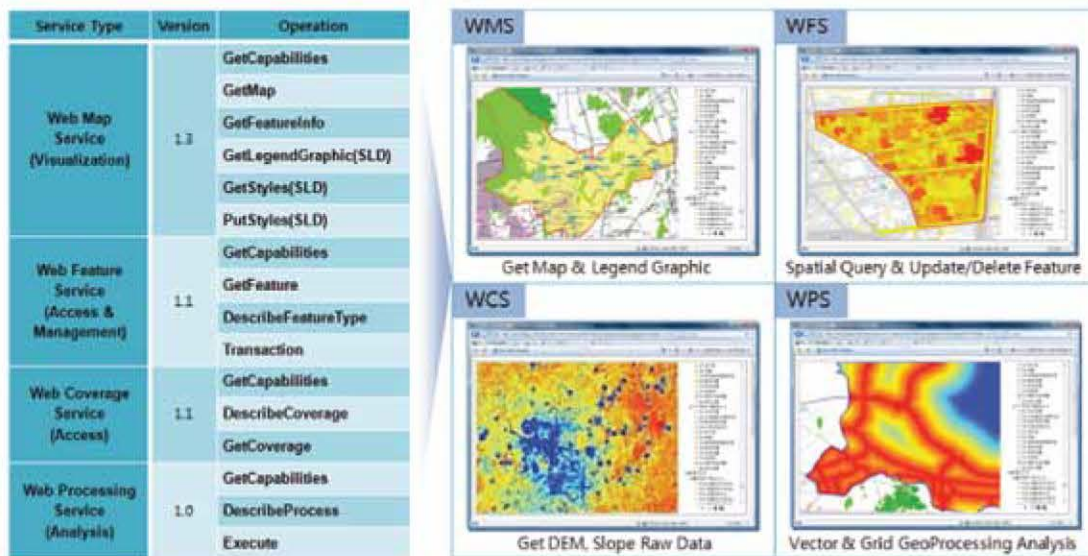


Figure 6: Common specification

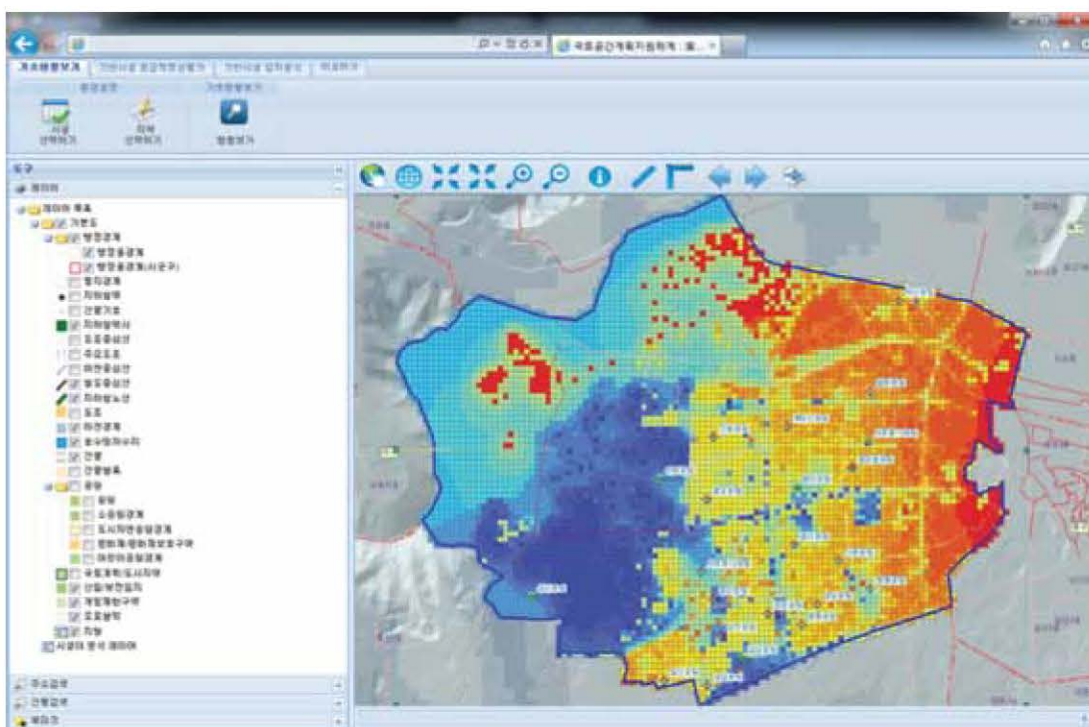


Figure 7: KOPSS - Application of the urban public facility planning support model

4.2 Pinogio

Pinogio is a web application that can create and share infographic map which uses GXT for Server. User's data is uploaded so that a large number of people can make and share the maps and layers. Pinogio can upload, analyze and visualize non-

spatial data like excel and CSV as well as spatial data. Also, it uses environment and encoding which are suitable for internationalization (i18n), and is designed for spatial database expansion so that various DBMS use is possible.

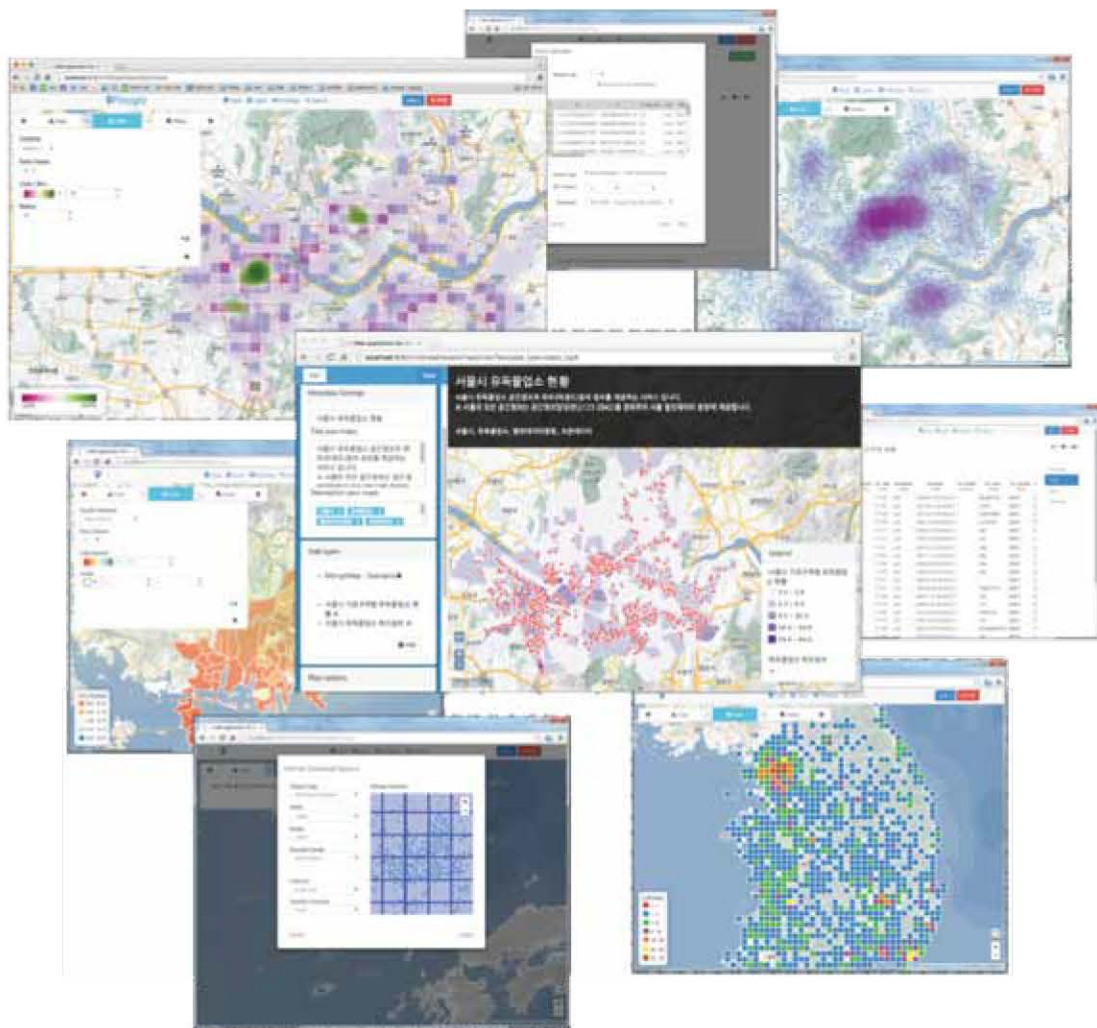


Figure 8: Pinogio - analyze and visualize

5. Discussion and Conclusion

GXT is a spatial data analysis library developed in Java and based on GeoTools, a platform for a variety of geoprocessing. GXT is combined with GeoServer make it possible to give the OGC Web Processing Service (WPS), and the transplant is possible in a GIS software based on GeoTools (52 °

North Web Processing Service, uDig GIS, etc.). It also supports all of the open API in KOPSS. As such the GXT has proven analysis library that provides high portability and interoperability and various geoprocessing.