

Geoweb Application for Web based geoprocessing

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ABSTRACT: - GIS (Geographical Information System) plays a very important role in web based geoprocessing which is useful for many geospatial data for decision making. Web services can be consumed in web browser based application using GIS software like QGIS. QGIS (Quantum GIS) is open-source software for GIS application that supports viewing, editing, and analysing of geospatial data. Web based geoprocessing technology has been developed to perform the supporting capability of GRASS-GIS. The geoweb application provides the functionality for vector based geo-processing. In this paper, the zone map of Odisha state is being used to mapping.

Keywords: GIS, web service, QGIS, Open Source, cross-platform, geospatial, geoprocessing, Grass-GIS, vector data, raster data, geoweb application.

I. INTRODUCTION

Geographic information system (GIS) is a computer based information system that handles all kinds of geospatial data for decision making. It enables the input, management, manipulation, analysis, modelling and display the land related data [1]. GIS applications are tools that allow users to create user-created searches, analyse geospatial information and edit data in maps. Web services can be consumed in web browser based application

using GIS software like quantum GIS (QGIS). The web GIS is an extension and application of client/server computing, where the geospatial data is accessible in a shareable environment. Client/server computing describes a model for computer networking to provide information and services to concurrent user(s) simultaneously [2]. Quantum Geographic Information System (QGIS) is an open-source GIS application that allows user to create, analyse and edit the geospatial information, in addition to composing and exporting graphical maps. Geoprocessing means processing of earth information. Grass-GIS is used to create the map layer [3]. Through Online geoprocessing, we are gathering data and extracting the information by applying Grass-GIS functions from anywhere over the network, which is a part of WEBGIS. QGIS supports vector and scalar data like PostGIS, Grass-GIS, Shapefile, PNG, JPG etc., which has been used for creation of data [4]. Here, we have analysed the mapping of Odisha. To the best of our knowledge, first time such analysis is introduced in the related research work.

II. DATA INVOLVED IN GIS

GIS data represents the real world objects such as road, land and elevation with digital data [5]. There are two methods used to store data in a GIS such as-

- Vector Data

- Raster Data

A. Vector Data

A representation of the real world objects like road, land and elevation using points, lines and polygons. Vector models are useful for storing data that has different boundaries, such as state borders, country borders, land area and streets etc. It is represented by a shape file (.shp).

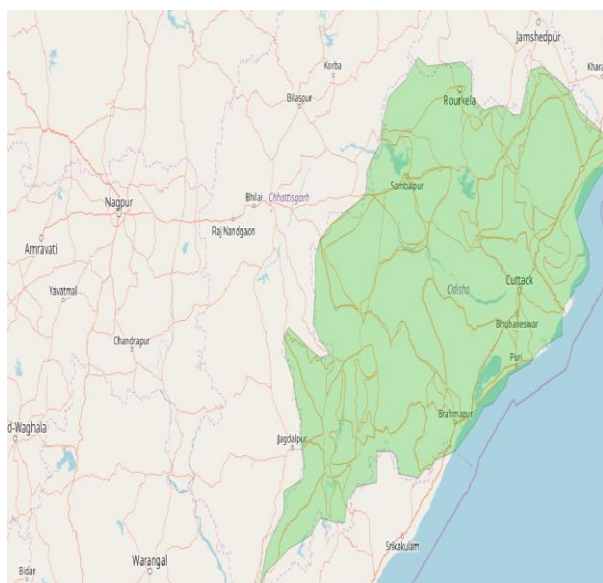


Fig. 1 Vector Data

B. Raster Data

Raster is the digital aerial photographs, imagery from satellites, digital pictures, or even scanned maps. It can be an image like (.tif) or (.jpg).

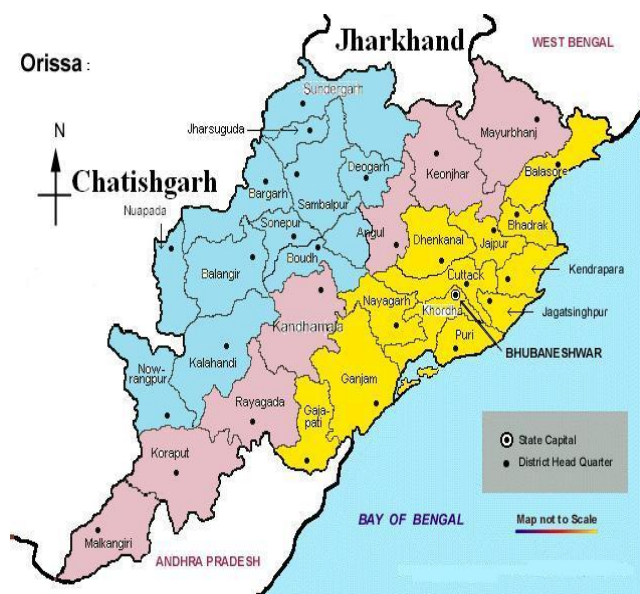


Fig. 2 Raster Data

III. COMPONENTS AND TECHNOLOGIES

GIS technology builds the basic operations with the geospatial database, such as query and statistical analysis with the unique visualization and geographical analysis offered by MapGIS [6]. Spatial networks are modelled in graph. In this paper, for GIS function implementation, QGIS has been used. QGIS is an open Source GIS application that runs on Linux, UNIX, Mac OSX, Windows and Android. QGIS supports vector, raster, and database format for geospatial data. QGIS is creating the maps and geoserver, which is a mapping control that has easy and powerful mapping capabilities for applications. The mapping information can be displayed in a format that's easy to understand [7].

A. QGIS python plugins

QGIS is designed by plugin architecture. This allows many new functions to be easily added to the basic application. A large number of the functions in QGIS are implemented as plugins.

There are two groups of Plugins:

1. Core Plugins are maintained by the QGIS and are automatically part of every QGIS distribution. The functions are loaded or unloaded to the QGIS interface using the Plugin Manager.

Loading a QGIS Core Plugin- To load a QGIS Core Plugin is done by Manage Plugins from the main Plugins Menu. The Plugin Manager lists all the plugins and their status, including all the core and external plugins that have been installed and automatically activated using the Python Plugin Installer. The loaded Plugins, which have a check mark to the left of their name. To enable a particular plugin, click on the checkbox which is available at the left of the plugin name then click OK. When we exit from the QGIS project, the list of loaded plugins is carried and further run QGIS these plugins are automatically loaded.

2. External Plugins are stored in external repositories and maintained by the end-users. These Plugins can be added to QGIS in the Python Plugin Installer.

Loading an external plugin

These plugins are accessible via the Python Plugin Installer found via the Fetch Python Plugin button in the Plugin Menu.

B. The OpenLayers Plugin

The OpenLayers plugin allows adding a number of image services from Google, Bing, Yahoo and OpenStreetMap to the map canvas.

The OpenLayers Plugin uses view extent to fetch the data from the service to choose. For this reason it is useful to load a layer that centres on or near area of interest first.

To use this plugin, require a good connection to the internet. If the connection is not good, the layers will either fail to load, or load too slowly to 'keep up' with view extent.

C. The OpenStreetMap

The OpenStreetMap(OSM) is an initiative whose goal is to create a free, editable map of the world, established to bypass the legal and technical restrictions that most geographic data. Registered users can add vector data to the map either by uploading GPS data or digitising from the aerial photography held by the server. The OpenStreetMap plugin has been designed to download, edit, create and upload data (.osmfiles) to support the OSM project.

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3.1 Buffer Analysis

A GIS Buffer is an analysis tool which is used to create polygons based on a specified distance for geospatial data. The output of QGIS is a region that surrounds and encompasses the geographical feature. The output of a buffer is used to determine any features that are within a distance of a point, line or polygon as shown in the following figure.

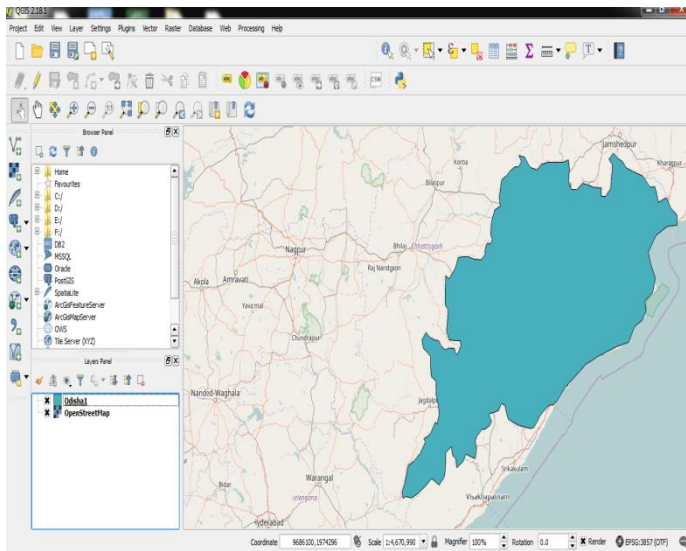


Fig. 3 Polygon Buffer and result

3.2 Union Analysis

Union analysis is another analysis tool which is used to perform overlay analysis on the basis of the vector data. Union builds a new class by combining the features and attributes of each class as shown in the following figure.

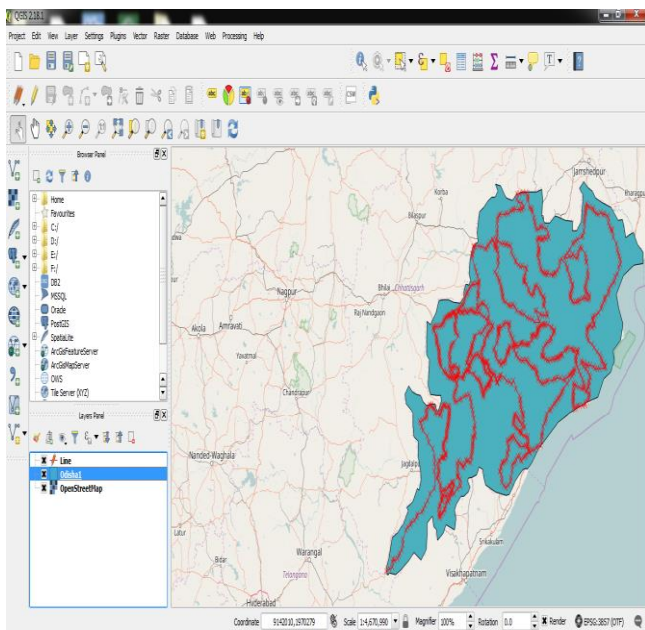


Fig. 4 Union of Line and Polygon

The process of application provides single features by combining multiple features and its corresponding attribute. This customized application can perform the functionality to union in proximity and remote feature class.

3.3 Intersection Analysis

Intersect is an analysis tool used to perform overlay analysis on vector feature and builds a new intersecting feature which is common in both features. If the geometries do not share any space, then an empty geometry collection is returned [8].

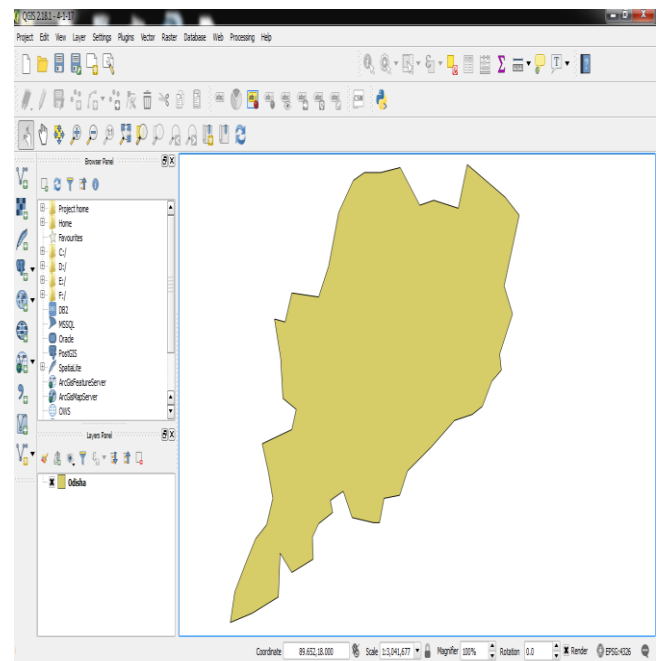


Fig. 5 Intersection of Line and Polygon

IV. CONCLUSION

The web GIS based application using open source GIS has been developed & demonstrated for different data set. The web serviced base architecture provides a framework using distributed GIS technology for disaster management. Web services can be consumed in web browser based application using GIS software like QGIS, Open

Jump, and ESRI ArcGIS etc. Web serviced based architecture is sharing and dissemination of GIS data. The geoprocessing capability demonstrated using SQL will be very useful in many areas of national resource management. The geoprocessing is emerging area where GIS researcher are trying to create a solution for solving any GIS based decision problem. The spatial decision support system (SDSS) can be developed to solve GIS based decision problem.

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