TdhGIS API

Overview
Sept 2025

Introduction

Spatial analysis packages are unwieldy and difficult to use, until now. How about a package that:

- Can perform spatial analysis using just 2 executable files and a handful of c++ include files, taking up about 10 MB. No other external libraries required. This is a lean and mean calculating machine.
- Can calculate:
  - polygon area, perimeter and centroid
  - thiessen polygons from points
  - contour lines and polygons from points
  - polygon intersection, merge, subtraction, split and trim
  - whether a point or polygon lies within a polygon and the point on a polygon closest to a specified point
- Can use geometry data from existing code, no data duplication necessary.
- Uses linked list data structures so there are no built in limits on the number of any components. The package will scale nicely from modest to high end hardware.
- Interfaces with a library to perform database I/O, requiring just standard sqlite.
- Interfaces with the GDAL package for data transfer with a wide variety of formats, while optionally performing coordinate transformation.
- Includes libraries for linux (gcc), msvc and mingw.

These features are highlighted in compact demonstration source code that will get you going in the time it takes to download other packages.

Libraries and Header Files

The header files contain documentation for the included classes and functions.

The library files are contained in directories associated with one of 3 compilers:

- gcc for linux
- msvc for mswin
- mingw for mswin

2 libraries are needed to perform spatial analysis:

- TdhCommon provides general data structure management, defined in the file TRecordsNav0.h, and geometry specific data structures, defined in the file CadPrimitives0.h. Some basic spatial analysis functionality not specific to polygons is also provided here.
- TdhSpatial performs the heaving lifting for spatial analysis with the interface defined in TdhSpatial_Intf.h

These libraries and header files are the same used for the TdhGIS app, so they can support everything from a simple to a robust spatial analysis project.

The TdhGIS_API library is used to perform database I/O requiring only standard sqlite. The interface is provided in the TdhGIS_API.h header file. The database structure is the same used for the TdhGIS app, so the app can be used to create input data and inspect results.

The TdhOGR_API library makes use of the gdal package to exchange data with a wide variety of formats with the TdhGIS_API package. The interface is provided in the TdhOGR_API.h header file. This library facilitates coordinate transformation during a data exchange process. The capabilities are essentially the same os provided in the TdhOGR app. The libraries TdhCairo and TdhPath are also needed because the TdhOGR_API library also data exchange with TdhCad and TdhGISnet, in addition to Open Street Map.

Along with the power of gdal comes the challenges of using such a large and multifaceted package. The gdal package is not distributed with TdhGIS_API. The gdal package used to compile and link TdhOGR_API was obtained through standard channels (e.g. pkg-config , vcpkg and pacman, for gcc, msvc and mingw, respectively). Successful use of TdhOGR_API is more likely with gdal packages issued about the same time as the TdhGIS API package.

Demonstration App

The demonstration app, contained in the demo_source directory of the distribution package, is intended show how to use the TdhGIS API quickly and easily. It is intended to be run as a console app.

The directory has a source/header file combination for each of the 3 library groups described above and a main.cpp file that calls each of the 3 other source files. The calls to the other 3 source files can be implemented independently and the main.cpp starts off with only the call to TdhSpatial_API, the most fundamental demonstration, not commented out. After each call to a source file is successfully executed and understood, it can be commented out and the next one uncommented.

To make use of the last 2 source source files, which demonstrate the TdhGIS_API and TdhOGR_API libraries, the variable dataDir in main.cpp must be set to the location of the Data directory that was included with distribution package.

As mentioned previously, the gdal package is not included in the distribution package for the TdhGIS API, so, to make use of the TdhOGR_API_demo source file, the gdal package will need to be obtained for the compiler in use.

License

- Government use

For commercial use, you are welcome to experiment and see whether the software can meet your needs, without charge. For the software to be incorporated into a commercial product or used for revenue related purposes, such as supporting operations or meeting contractual requirements you must receive permission from the copyright owner.

The software may not be redistributed in any form for revenue without the permission of the copyright owner.

Anyone wanting to contribute to the development of the software is encouraged to do so at this account:

Paypal account: timhirrel@tdhgis.com