GEOLocate

GEOREFERENCING SOFTWARE

Museum of
Natural History
Tulane University
Belle Chasse, LA 70037

USER'S MANUAL

Nelson E. Rios and Henry L. Bart, Jr.

Table of Contents

1 Overview

What is GEOLocate?

GEOLocate is a comprehensive electronic georeferencing solution designed for natural history collection data. Easy to use, GEOLocate significantly reduces the time and cost required to georeference specimen locality records.

GEOLocate provides:

- Georeferencing of data from the United States, Canada, and Mexico
- Import of existing locality data
- Batch processing for unattended georeferencing
- Detailed visual map display and correction capabilities
- Polygon error determination

System Requirements

- Pentium II or higher
- 128 Megabytes of RAM
- 1.2 Gigabytes of hard drive space
- Microsoft .Net Framework (located on CD)
- Microsoft Windows 98/ME/NT/2000/XP
- Microsoft Internet Explorer 5.01 or later

2 Installation

Load the GEOLocate CD into the CD-ROM drive of your computer. The installation program should start automatically. If the *GEOLocate 2.0 Installer* window does not appear, navigate to the CD-ROM drive from the *My Computer* icon on the desktop, and double-click the *setup.exe* file to initiate installation.

Installing Microsoft .Net Framework

Once the setup program loads, you are given options to install the Microsoft.Net Framework, install GEOLocate, or exit the installation program. If your computer does not contain the Microsoft .Net Framework, you should install it prior to installing GEOLocate. To install the .Net Framework, select *Install Microsoft .Net Framework 1.1* from the installation menu. Follow the onscreen instructions to complete installation of the Microsoft .Net Framework and return to the main installation menu.
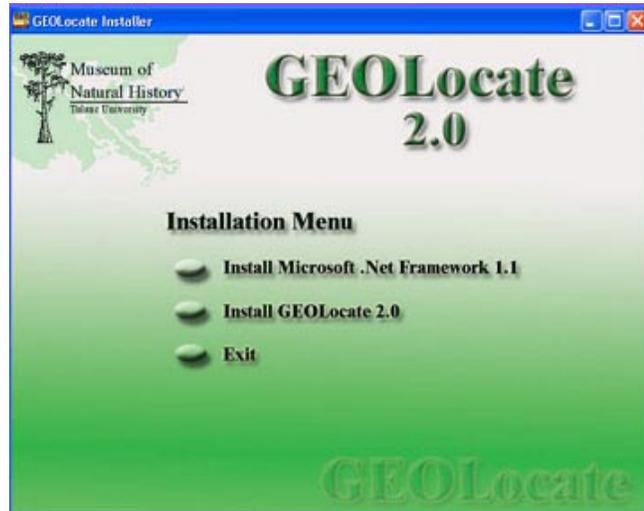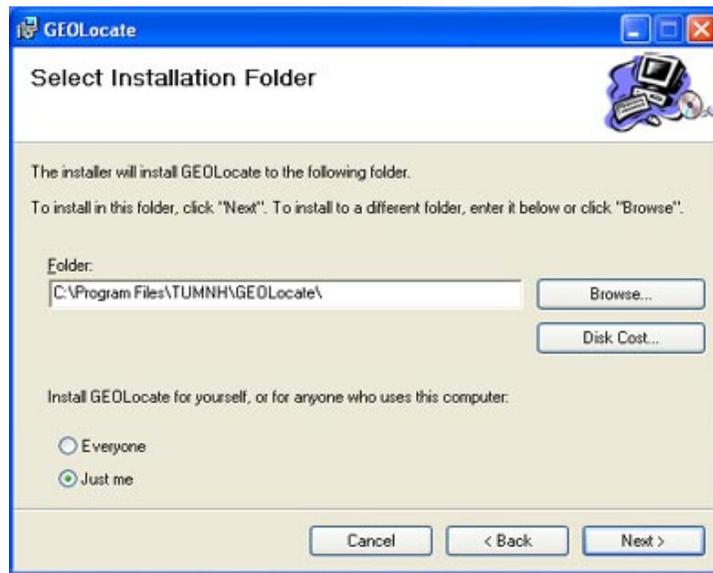
Installing GEOLocate

To install GEOLocate, select *Install GEOLocate 2.0* from the installation menu. The *GEOLocate Setup Wizard* window appears. Click *Next* to continue or *Cancel* to exit installation.
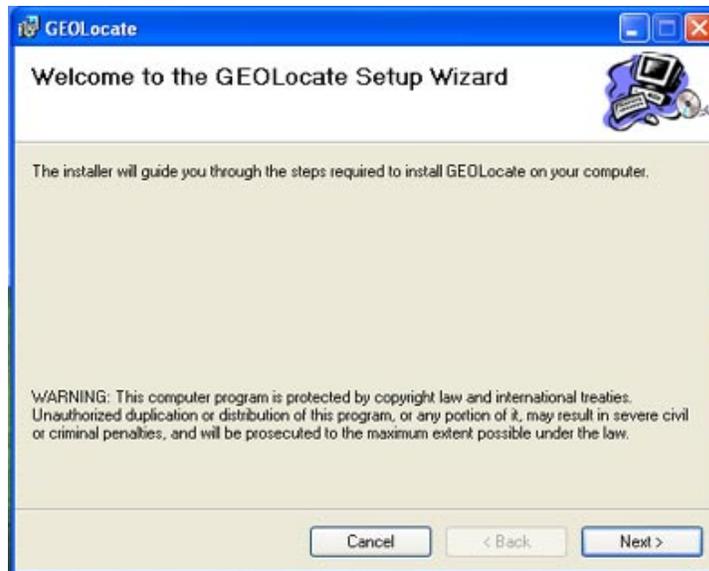
The setup wizard then prompts you for an installation folder. Select a folder by clicking *Browse*, otherwise click *Next* to accept the default installation path.

After a few minutes, the setup wizard will prompt you to insert GEOLocate Disk 2. Insert Disk 2, and click *OK*.
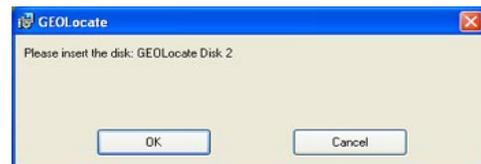
Upon completion of installation, a window indicating that GEOLocate has been successfully installed will be displayed. Click *Close* to exit the installation and return to the main installation menu.
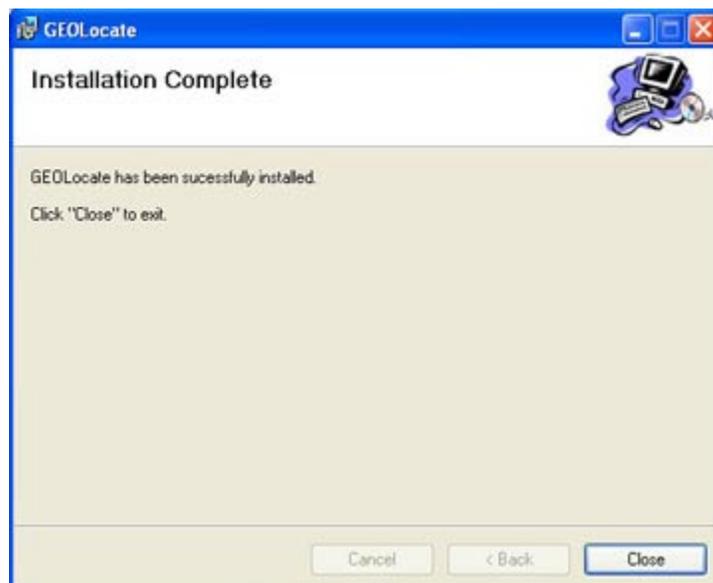
3 Using GEOLocate

Georeferencing Locality Data

When you open GEOLocate for the first time, you will see the main program window containing a map display in the upper portion of the screen and a georeferencing data entry form in the lower portion (*user input* mode). To georeference data, simply enter a locality string, state and county (county is not required for the U.S., but recommended for greater accuracy) in the appropriate text boxes, and click the *G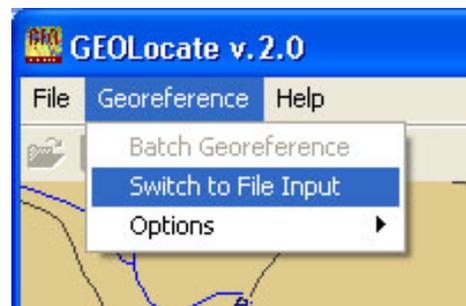eoreference* button to calculate coordinates. The calculated coordinates, along with a precision score are displayed in the lower left of the data entry form, and a green marker indicating the calculated coordinates is displayed in the mapping portion of the program window. Precision scores range from high to low, and are an indication of the quality of locality information. Precision scores are only meant to serve as a guide to which records will require more effort during the correction stage. If more than one result is determined for a given locality, a red arrow is placed at each result and the green marker will be placed on the result with the highest probability of being correct. See section titled *Visual Correction of Locality Data* for details on verifying, correcting and adding error polygons to the result.
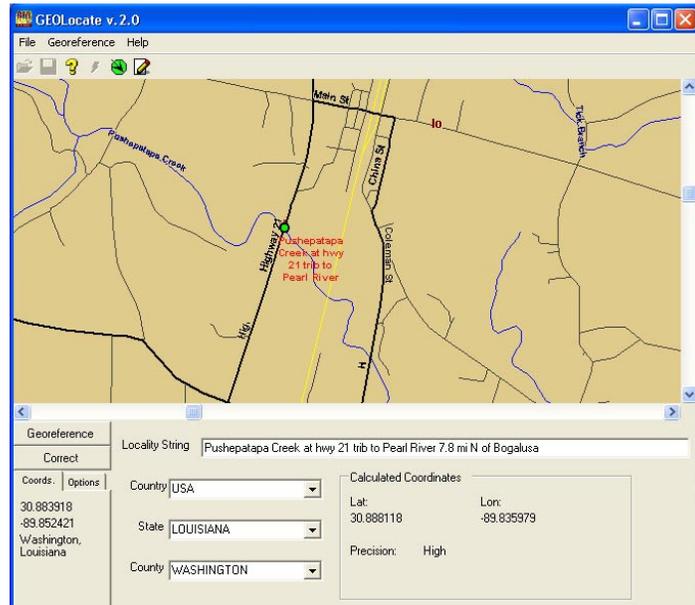
Multiple Record Georeferencing

To facilitate georeferencing of large numbers of localities, GEOLocate supports input of datasets from external data files (*file input* mode). To switch to *file input* mode, go to the *Georeference* menu and select *Switch to File Input*. The data entry portion of the program window will display an empty dataset. To load data into this dataset, click the *Open File* icon or go to the *File* menu and select *Open File*. This will allow you to load data from a properly formatted XML file. Additional file formats may be imported into geolocate by selecting *Import File* from the *File* menu. For details on creating and using data files, see section titled *Working with Data Files*.

After a data file has been loaded, the data entry portion of the program window will display a spreadsheet style listing of all the data loaded with field names displayed above each column. To georeference a record from the loaded dataset, select the record to be georeferenced and click the *Georeference* button to calculate coordinates. The calculated coordinates, along with an estimate of precision, correction status, and a multiple results array are displayed in the appropriate fields of the selected record in the dataset. As with user input mode, a red arrow marker is placed on the map display for each result calculated and a green marker is placed on top of the "best" result. See section titled *Visual Correction of Locality Data* for details on verifying, correcting and adding error polygons to the result.

Batch Georeferencing

GEOLocate supports batch georeferencing to automatically georeference an entire dataset loaded from file without human intervention. To batch georeference a dataset, begin by loading a file into the dataset as described above. Once the dataset is loaded, click the *Run Batch* icon ⚡ or select *Batch Georeference* from the georeference menu located at the top of the program window. A batch status box will drop down from the top of the map display indicating that batch georeferencing is in progress. Controls to *pause*, *exit*, and *resume* the batch are also displayed in the drop down box. During batch processing of data, all other georeferencing functions are disabled. Once complete, the batch status box will indicate that georeferencing is finished, how many records were successfully georeferenced and the time it took to complete the job. Click the exit batch button on the status box to close the box and return to GEOLocate. The dataset now contains georeferenced data.
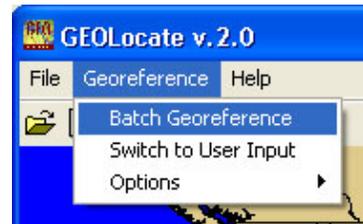
Multiple Point Support

It is common for single locality strings to contain multiple phrases or keywords which each produce a different result. Each result returned by GEOLocate for a given locality record is represented as a red arrow on the map display. Placing the cursor over one of the red arrows will display its pattern identifier in the lower left hand corner of the program window. The pattern identifier is a text description of the pattern or keyword used to determine a coordinate, and is intended to aid the user in georeferencing.

In addition to displaying multiple results, GEOLocate will attempt to determine the "best" coordinate pair of the multiple result set and display it as a green marker on the map display. For *user input* mode, it is this "best" coordinate pair that is displayed as the calculated coordinates. *File input* mode records the latitude and longitude of the "best" result in the computed latitude and longitude fields, but will also record a comma delimited string of the multiple results in the multiple points field of the loaded dataset. This string has the following format:

latitude1,longitude1,pattern identifier1,latitude2, longitude2,pattern identifier2...

Advanced Georeferencing Options
Waterbody Matching
        If enabled, GEOLocate will search the locality string for the names of rivers and streams. If one is found, GEOLocate will snap the calculated points to the nearest point on the waterbody. This feature only works for U.S. localities and requires county data. To enable, select *Waterbody Matching* from the options menu under the georeference menu at the top of the program window.

Hwy/River Crossing Lookup
        If enabled, GEOLocate will search the locality string for bridge crossing information and attempt to pinpoint the locality at the intersection of the river and highway. This feature only works for U.S. localities and requires county data. To enable, select *Look for Hwy/River Crossing* from the options menu under the *Georeference* menu at the top of the program window.

Visual Correction of Locality Data
        GEOLocate allows for visual representation and modification of computed geographic coordinates using the integrated map display. When a locality record is georeferenced, a green marker representing that locality is drawn onto the map. The green marker can be moved by click and dragging it to another location or by clicking the *place green marker* icon on the toolbar and then clicking on the map display to place the marker. Clicking the *Correct* button near the button left of the program window updates the calculated latitude and longitude with the coordinates of the green marker.

Error Estimation
        GEOLocate has the capability to represent error due to the uncertainty of the locality information provided. Error within GEOLocate is visualized as a user-defined polygon which encompasses the entire area of uncertainty. To create an error polygon, click on *the Create Error Region* icon in the toolbar to enter *error* mode. This adds 2 additional icons to the toolbar. While in *error* mode, each single mouse click on the map will add a point within the error polygon for that record. To erase the polygon, click the *Erase* icon in the toolbar. Clicking the *View/Record* icon while in *user input* mode, displays a popup window containing a list of the vertices in the error polygon. Clicking the *View/Record* icon while in *file input* mode, records the error polygon vertices as a comma delimited array in the error field of the selected record. To exit *error* mode, click *the Create Error Region* icon in the toolbar a second time.

General Map Controls

Zooming

To zoom in, click and drag the mouse across the map display to indicate the area you wish to zoom into, and then release the mouse to update the display. Alternatively, right click on the map display and select zoom in from the popup menu.
To zoom out, right click on the map and select zoom out from the popup menu.

Panning

To pan, hold down the CTRL button while pressing the left mouse button and move the mouse to pan the map display.

Measuring Distances

To measure distance on the map display, hold down the shift key while pressing the left mouse button and move the cursor to measure the distance (in miles) along the cursor's straight line path.

Plotting an Entire Dataset Loaded From File

GEOLocate provides the ability to plot an entire dataset that has been loaded from file. To plot your loaded data, select plot all from the *File* menu. All data records containing latitude and longitude will display on the map. This is a static plot and meant for visualization purposes only.

Additional Display Options

One of three zoom options (located on the lower left of the program window under the options tab) may be selected to automatically adjust the map display when a locality description is georeferenced. *Zoom Area* will zoom in automatically to the calculated coordinates when a Locality String is georeferenced. *Full Extent* will zoom out to the full extent of the map when a locality string is georeferenced. *No Zoom* will not zoom in or out but maintains the zoom level and position of the current map display when a locality string is georeferenced.
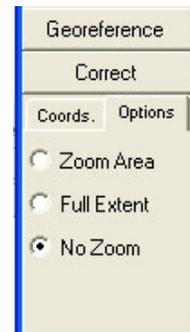
4 Working With Data Files

Using *file input* mode provides an easy way to import existing digitized data from a database or spreadsheet. GEOLocate uses a specially formatted XML file as its default data format. In addition, delimited text files and CSV files can be imported and exported. One requirement regardless of file format used is that each data file contains at least 10 fields and the first 10 fields must be: locality string, country, state, county, latitude, longitude, correction status, precision, error polygon array and multiple results array in that order (actual field names do not matter). Additional user-defined fields may be added after the first 10 fields.

XML

Creating an XML file for use with GEOLocate can be tricky if you have never worked with XML before. The simplest way is to export your data from your database or spreadsheet as XML if supported by your software. The first data record of the XML file must contain ALL the fields in your dataset even if some are empty and must contain the first 10 fields mentioned above in the proper order. Subsequent records only need fields which actually contain data, although it is still ok if the fields are present and empty. GEOLocate provides a sample XML data file in the */samples* subdirectory.

```
<?xml version="1.0" standalone="yes" ?>
- <NewDataSet>
  - <Table1>
      <Locality>Creek at GA-FL state line, GA Hwy.97 crossing</Locality>
      <Country>USA</Country>
      <State>Georgia</State>
      <County>Decatur</County>
      <Lat />
      <Lon />
      <Corrected />
      <Precision>Low</Precision>
      <Error />
      <MultiPlot />
    </Table1>
  </NewDataSet>
```

Select *Open* from the *File* menu to open an XML file. Select *Save* from the *File* menu to save your data as an XML file.

CSV

A CSV (comma separated values) file can easily be created by most spreadsheet and database software. The easiest way to create a CSV file for use in geolocate is to organize your locality data using a spreadsheet program like Microsoft Excel. Within your spreadsheet organize your data columns so that the first 10 fields are as mentioned above. You will probably have to add blank columns for some fields (i.e. correction status, error polygon etc.). Ensure that the first record of each column contains the field name for that column. Save your spreadsheet as a .CSV file. GEOLocate provides a sample CSV data file in the */samples* subdirectory. Select *CSV* from the *Import* submenu on the *File* menu to import a CSV file. Select *CSV* from the *Export* submenu on the *File* menu to Export a CSV file.

Simple Delimited Text File

A simple delimited text file is a text file in which each record is a single line of data. Within each line, fields are delimited via any user defined unique character not found within the dataset. The first record must contain the column headings. The first 10 fields must correspond to the first 10 fields mentioned above. GEOLocate provides a sample delimited .TXT data file (using '~' as the delimiter) in the */samples* subdirectory. Select *Simple Delimited Text* from the *Import* submenu on the *File* menu to import a text file. Select *Simple Delimited Text* from the *Export* submenu on the *File* menu to export a text file.

5 Support Information

Technical support is available Monday through Friday from 9:00 a.m. to 4:00 p.m. Central Standard Time.

You can contact us at:

Phone: (504) 394-1711
Fax: (504) 394-5045
Email: support@museum.tulane.edu

Or write us at:
GEOLocate Technical Support
Tulane University Museum of Natural History
Bldg. A-3, Wild Boar Rd.
Bell Chase, LA 70037

Or visit us on the web:
http:// www.museum.tulane.edu/geolocate