

Cookbook 6 November 2013

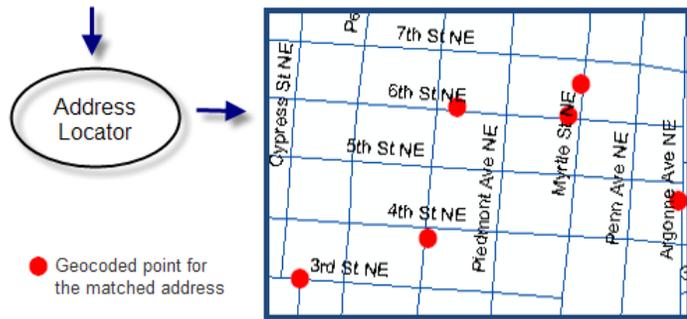
Geocoding (Part 2)

Overview

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2. Geocoding: Reference Data
3. Geocoding: Address Locator
4. Your Turn!
5. The New Reality



customers				
	NAME	ADDRESS	CITY	S
▶	Ace Market	1171 PIEDMONT AVE NE	ATLANTA	G,
	Andrew's Gasoline	1670 W PEACHTREE ST NE	ATLANTA	
	AP Supermarket	4505 BEVERLY RD NE		G,
	Atlanta Market	241 16TH ST NW	ATLANTA	G,



1) Geocoding: Address Data

No matter what you do: the address data are your responsibility!

Preparation of the address data set means formatting the information correctly so that ArcGIS can process it (called parsing) properly. The data set should be in a database-compatible format such as comma-delimited (.csv) or tab-delimited (.tab) text file or dBase (.dbf) or (if using ArcGIS 9.2) in an Excel worksheet.

The address should be contained in a single column that contains the street number and street name, as well as the street's prefix direction (e.g., W.), street type (e.g., Blvd.), or suffix direction (e.g., W.), if any. Intersection descriptions (for example, "MLK Blvd. & Vine St.") can also be included in this field.

Ideally you should have as complete an address as possible, but without apartment information.

The geocoding process will likely be able to handle missing street types like St. or Blvd., but it will go easier the more complete your address information is. Apartment information should go in a separate field if you need to maintain it for your information purposes – it will not be part of the geocoding process. It is also useful to have city, zip code, and state in your address table.

Also include all the attributes you need for a particular project (e.g., for a grocery store table, name, chain, type, size, annual sales, etc.). At a minimum, include the zip code if possible – this will be a big help.

The more carefully you format your address list with geocoding in mind, the better the geocoding process will work, so take some time doing this, and plan ahead if you know you will be geocoding.

It is important that your data formatting is consistent throughout the database!

For your column names: no spaces or odd characters in the field name, and a maximum of 10 characters.

Tufts GIS Tip Sheet Geocoding Overview and Preparation
<http://www.westfield.ma.edu/uploads/cbraun/geocodingtufts.pdf>

2) Geocoding: Reference Data

To geocode data, you must have a GIS reference layer available to act as your reference layer. Your choice of reference data is very important and will affect the accuracy and completeness of your results.

Street centerlines are often used as a reference layer. Well-formatted street centerline GIS data layers have separate fields for street name, street's prefix direction, street type, and suffix direction as appropriate (some streets don't have suffix or prefix directions).

They will also have four address range fields indicating:

- From address left and To address left (e.g., 1100 and 1122)
- From address right and To address right (e.g., 1101 and 1123).

This address range is what allows an address to be pin-mapped onto the street network by indicating house numbers on both sides of the street. If you need to match by both address and zip code, your reference layer should also have fields for zip code on the left side of the street and zip code on the right side of the street.

You basically have three choices for reference data: ArcGIS Online, TIGER/Line Street Centerlines from the U.S. Census Bureau, or commercial 3rd party products.

2.1) ArcGIS Online Reference Data

That's a great option if you have a full ArcGIS Desktop license, a fast Internet connection, an ArcGIS Online for Organization subscription, and are willing to pay the associated fees.

2.2) TIGER/Line Street Centerlines from the U.S. Census Bureau

That's a good option as those data are free and available to anyone = you do not need an ArcGIS Desktop license = you can use other open-source GIS software packages. The TIGER road data from the US Census are contained the address range fields and zip codes needed for geocoding. However, the data are not always especially accurate.

All TIGER/Line Shapefiles

<http://www.census.gov/geo/maps-data/data/tiger.html>

Note that TIGER roads files are downloaded county by county, so you may have to merge files to create a reference data layer for more than one county (to merge, in ArcMap, add all the data layers to be merged and then open ArcToolbox – Data Management Tools – General and choose Merge).

2010 Census TIGER Roads for Massachusetts (MassGIS)

<http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/census2010.html>

2000 Census TIGER Roads for Massachusetts

<http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/census2000.html>

Note: The MassDOT road layer at <http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/eotroads.html> is probably more accurate but does not contain address ranges thus cannot be used for geocoding.

2.3) Commercial 3rd Party Products

Esri includes data and maps when you purchase an ArcGIS 10 license. We have the license and the data and you can have it. I do not make it available on the server due to space and performance limitations – the full data set is 8 GB and comes as 3 DVD iso images – see me to make your own copy if interested.

What is Data and Maps for ArcGIS?

<http://resources.arcgis.com/en/help/main/10.1/index.html#//001z00000002000000>

About StreetMap North America

http://resources.arcgis.com/en/help/main/10.1/index.html#/About_StreetMap_North_America/001z000000039000000/

2.4) Great Tutorials and Information

Tufts GIS Tip Sheet Geocoding Overview and Preparation

<http://www.westfield.ma.edu/uploads/cbraun/geocodingtufts.pdf>

Step-by-Step Guide to Geocoding Using US Census TIGER

http://www.westfield.ma.edu/uploads/cbraun/guide_to_geocoding.pdf

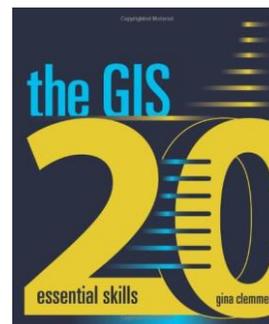
Step-by-Step Guide to Geocoding Using U.S. Census 2009 TIGER

<http://www.westfield.ma.edu/uploads/cbraun/Geocoding2009.pdf>

The GIS 20: Essential Skills Second Edition (Chapter 8)

<http://www.esri.com/esri-news/releases/13-3qtr/gis-20-essential-skills-workbook-helps-users-master-arcgis>

Chapter 8 walks you through downloading TIGER data, creating an address locator, and geocoding an address table.



3) Geocoding: Address Locator

The GIS reference layer, e.g., a street centerlines or zip code polygon layer, needs to be prepared by creating what ArcGIS refers to as an "address locator". This process essentially indexes a reference layer, much like indexing a book.

The address locator essentially connects your address data to the reference data.

It is very important that you are familiar with your reference data layer before you create an Address Locator. You need to understand which fields contain the necessary information for creating an Address Locator – e.g. which fields contain street name, street type, street prefix direction, address ranges, zip codes, etc.

You have several options for address locators: create your own, use the address locators from ArcGIS Online, or use the address locators that are part of ESRI's StreetMap North America data set.

3.1) Create Your Own Address Locator

You will have to create your own address locator when using the TIGER/Line Street Centerlines from the U.S. Census Bureau as your reference data.

See Section 2.4 for great tutorials.

Creating an address locator for TIGER 2010 data

<http://resources.arcgis.com/gallery/file/geocoding/details?entryID=A4F8045C-1422-2418-A0E9-479A9B776A18>

Creating an address locator

http://resources.arcgis.com/en/help/main/10.1/index.html#/Defining_the_address_locator_components/002500000010000000/

Creating an Address Locator (from PennState)

<http://guides.library.upenn.edu/content.php?pid=334808&sid=2743280>

ArcGIS 10.1 Geocoding Tutorial

<http://resources.arcgis.com/en/help/main/10.1/index.html#//002500000006000000>

3.2) Address Locators from ArcGIS Online

The default address locator in ArcGIS 10.1 is the ArcGIS Online World Geocoding Service, which points to <http://geocode.arcgis.com/arcgis/services>. That's a great option if you have a full ArcGIS Desktop license, a fast Internet connection, an ArcGIS Online for Organization subscription, and are willing to pay the associated fees.

3.3) Address Locators from of ESRI's StreetMap North America

The StreetMap North America dataset provides several address locators you can use right away for geocoding addresses in North America. When you use ArcCatalog or ArcMap for geocoding, you can browse for the StreetMap North America address locators, which are in the \streetmap_na\data folder on the ESRI Data & Maps and StreetMap North America DVD. For detailed information about the different locators, please see the StreetMap_NA_Locators.txt file located in the same folder.

See me to make your own copy if interested.

4) Your Turn!

Let's organize my carbon-neutral wedding!

First we need to determine the miles travelled, then we can purchase carbon offsets accordingly.

1. Geocode the wedding guest list.
Why are there so many mismatches?
2. Calculate the miles travelled, assuming the wedding was at my house.
3. Make some reasonable assumptions for vehicle fuel consumption, air travel, and the associated CO2 emissions.
4. Go to <http://www.carbonfund.org/individuals> and purchase the offsets!

A screenshot of a web-based 'Wedding Calculator' form. The title 'Wedding Calculator' is in blue, with the subtitle 'Estimate your own carbon footprint' below it. The form has a light green background with a decorative illustration of trees and flowers in the top right corner. It contains several input fields: '# of Guests', '# of Flights', '# of Cars', 'Total Hotel Room Nights', 'Avg. Flight Distance (one way)', 'Avg. Driving Distance', 'Upscale Hotel?' (checkbox), and 'Offset attendance at the Rehearsal Dinner?' (checkbox). A blue 'Calculate' button is centered below the fields. At the bottom, there are three boxes: 'Tons of CO2' with a white input field, 'Offset Cost' with a white input field, and a blue 'Offset Now!' button.

5) The New Reality

Up to ArcGIS 10.1 SP1 all was great and you were able to batch geocode using ArcGIS Online address locators and reference data – not anymore.

Over the past several months, Esri has published a new and expanded set of geocoding and routing services through the ArcGIS Online platform. These new services include substantially expanded coverage around the world, as well as new capabilities such as traffic-based routing, beyond what existed in earlier releases of geocoding and routing services.

Coincident with ArcGIS 10.1 SP1, the on-line geocoding locators visible to ArcGIS for Desktop were replaced by the new World geocoding service. The goal is to use the ArcGIS Online World Geocoding Service as a complete solution for batch geocoding and geosearch capabilities.

Why has Esri made this change? We have built the World service in partnership with data partners; you will appreciate it takes considerable resource to capture and maintain the world's address information and build it into reliable high quality web services.

Batch geocoding using the World service requires an ArcGIS Online subscription and will consume credits.

The options for batch geocoding are now:

- Using the fee-based World Geocoding Service.
- Using the locators included with StreetMap Premium data for TomTom or Navteq that are available for purchase.
- Using the StreetMap North America locators on the Data & Maps media that is included with the ArcGIS for Desktop 10.1 software.
- Building a custom locator.



Or: find an alternative to Esri! How about Google Fusion Tables!