Topo.ly Excel Plugin

MBA 614 – Final Project December 6, 2012

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EXECUTIVE SUMMARY

TOPO.LY

In February of 2012, I launched a software-as-a-service startup company, Topo.ly (http://topo.ly). Topo.ly is a website that provides geospatial business intelligence tools for data visualization and analysis. That's basically a really fancy way to say it makes it really, really easy for business analysts to create maps from their data.

For example, if I have a spreadsheet of all of my sales volumes in all my retail outlet stores, I can copy and paste my data into Topo.ly, and it will build a map for me, plotting all my locations and embedding all my data in the "bubble" for each location. I can then plot my competitor's stores with a different icon, build a heat map of sales-per-square-foot by zip code, and then overlay demographic data of income levels, population density, etc. The goal is to help businesses visualize their data so they can make better strategic decisions.

I do all the development work, and my partner handles all of the marketing, SEO, and PR. Since our launch, we've grown at a tremendous pace, and now have almost 10,000 registered users, including analysts from many Fortune 500 companies, small businesses, state and city governments, and major universities.

THE PAIN

While our software has many different applications (from supply chain optimization to market segmentation analysis to customer relationship management), our users all have one thing in common: Excel. We've tried to focus on making it dead-simple for our users to build their maps, but no matter how easy the website is, it's still two-system process to have to copy my data from Excel and paste it in Topo.ly. When my data changes frequently (such as daily sales volumes, for instance), it can be very tedious to update all my maps.

THE SOLUTION

For a while now, we've wanted to build an Excel plugin that will help our users speed up this process. So that's what I did for my final project. The Excel plugin basically communicates with the Topo.ly API (which I also had to create for this project) via XMLHTTP requests. This allows you to interact with your Topo.ly account straight from Excel. So rather than copy my Excel data and paste it in my browser, I can simply click a button within Excel and it will create the location sets and maps for me.

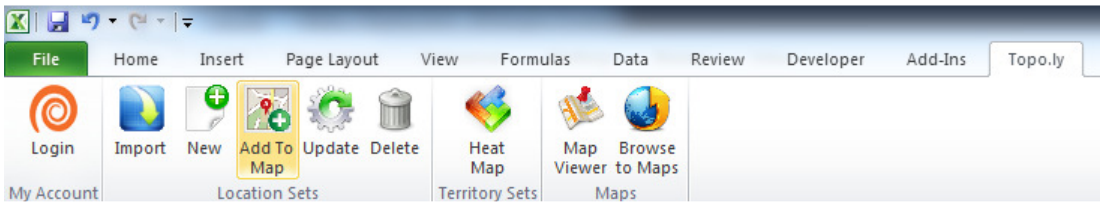
There is still a lot of refining that needs to happen before we're ready to release the plugin to our users, but this was an excellent starting point. Currently, many of the features available on the website are missing from the plugin (such as the ability to change the icons, the ability to apply filters, etc.), but these will be added with time. Right now, the most basic (and most widely-used) features are available:

- Login to your account
- Import locations sets from your Topo.ly account directly to Excel
- Create and delete location sets
- Add/edit/delete locations from a set
- Create a new map
- Add location sets to a map
- Build a location-density heat map
- View your map directly from within Excel

TOPO.LY EXCEL PLUGIN DOCUMENTATION

1. THE TOPO.LY EXCEL PLUGIN

Once you have the Topo.ly Excel Plugin installed, you will see an additional tab appear in your ribbon called "Topo.ly." Under this tab, there are ribbon buttons that help you do a variety of tasks with your Topo.ly account.



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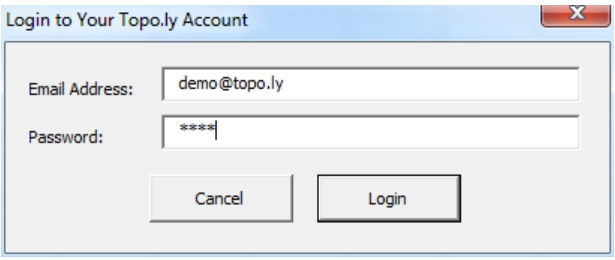
2. "MY ACCOUNT" SECTION

2.1 Login to Your Topo.ly Account

In order to use the Topo.ly Excel Plugin, you must login to your Topo.ly account. To do this, simply click the "Login" button in the Ribbon, and enter your username and password in the prompt that comes up:



If you have entered your username and/or password incorrectly, you will be notified. If you have previously logged in to your account but wish to log in as a different user, you can click the "Login" button again in the ribbon. In this case, the email address and password of whomever is currently logged in will already appear in the text boxes, but you can replace the information with different credentials should you so desire.

If you don't have a Topo.ly account, you can login using the following demo account (active only until December 20, 2012):

Demo Email Address: demo@topo.ly
Demo Password: demo

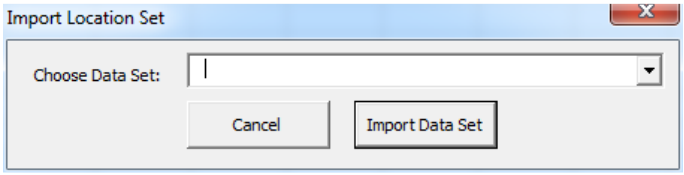
Lastly, if you forget to login, it's ok! If you click on any of the buttons in the ribbon before logging in, this same login window will popup, forcing you to login before you can access any of the plugin features.

3. "LOCATION SETS" SECTION

This section provides tools for you to interact with the location sets associated with your Topo.ly account.

3.1 Import a Location Set from Your Topo.ly Account

To import a location data set, select the "Import" icon from the "Location Sets" section of the Ribbon. This will bring up the "Import Location Set" popup. The Topo.ly Excel Plugin makes a call to Topo.ly's API and then populates the dropdown with all the location sets you have saved in your Topo.ly account. Simply select the one you wish to import.



Once you click the button to import a location data set, a new worksheet is created in your workbook with the same name as your location set. The top of this worksheet has the name and ID of your location set, and then all of the locations within this set are displayed. Notice that the cell with this ID (labeled DsId) cannot be edited (or even selected). Likewise, the row with your data headers (Address, City, etc.) cannot be edited. The "LocId" field is the unique ID number for each of your locations, and these values cannot be edited, either.

	A	B	C	D	E	F	G
1	Location Set Name:	Houses					
2	DsId:	127					
3							
4	**LocId**	**Location Name**	**Address**	**City**	**State**	**Postal Code**	**Country**
5	3683188	Beaver 1	200 N 100 E	Beaver	UT	84713	USA

If your location set name is really long (i.e., more than 30 characters), the worksheet name will be truncated to just the first 30 characters. If your workbook already has a worksheet with the same name as your location set, it will be deleted before the new sheet is added with your location set.

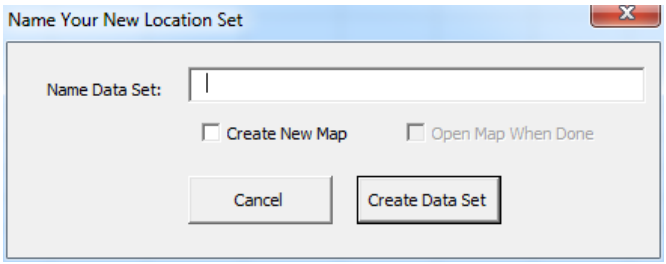
3.2 Create a New Location Set

If you have a worksheet with a bunch of location-based data, you can automatically create a new location set by clicking the "New" button in the ribbon. If the active sheet in your workbook is a location set that you already imported from your account, you will see a notification that the current sheet already exists as a location set.

Creating a new location set requires you have location-based data on your active worksheet, with a header row. The plugin automatically detects which columns contain the location name, address, city, state, zip code, and country using the header row. Only one location-based field (address, city, state, etc.) is required. The plugin also is fairly robust in its auto-detection of columns (so your header can read

Zip, Zip Code, Postal Code, etc. and still be recognized). If no header row is present, you will be alerted and won't be allowed to continue creating a new location set.

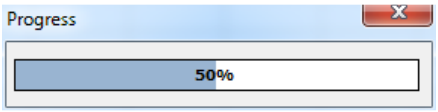
If you have valid data on your active sheet, you will see a box popup asking you to name this new location set. Notice that the cursor is already focused in the textbox, so you can just start typing right away.



There are also two checkboxes you can select if you want. If the first checkbox ("Create New Map") is checked, your location set will be created, and then a new map will also be created with the same name. Your new location set will automatically be added to this new map.

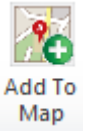
The second checkbox ("Open Map When Done") is only enabled when the "Create New Map" checkbox is checked. If this second checkbox is checked, your map will open in the Topo.ly Excel Plugin Map Viewer after your location set and map have both been created. The Map Viewer is discussed in more details later.

After you name your location set and click the "Create Data Set" button, the plugin makes API calls to both the Google Maps API (in order to geocode your locations), and to Topo.ly's servers (in order to save the locations to this location set). The plugin uses an artificially-created delay between processing each location in order to keep below the one-request-per-second limitation of Google Maps' geocoding service. While this is happening in the background, you will see a progress bar come up.



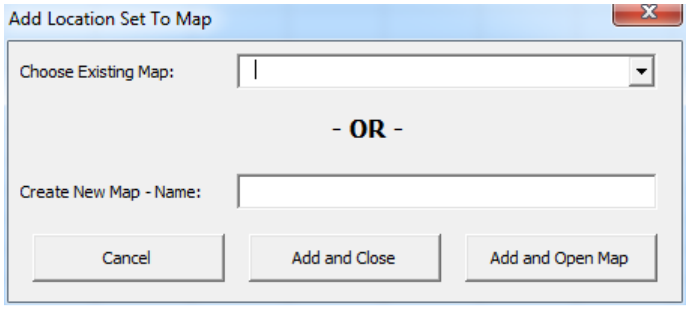
Once your location set has been created, it is automatically saved to your Topo.ly account. The active worksheet will be deleted and a formatted worksheet will be added for your new location set, just like when you import a location set. If you checked the "Open Map When Done" checkbox, the Map Viewer will open your new map.

3.3 Add a Location Set to a Map



After you have imported or created a location set, you can add it to an existing or a new map. Simply click the "Add To Map" button in the ribbon. In the window that pops up, you can either use the dropdown to select an existing map from your Topo.ly account (again, the list is pre-populated with all your maps), or you type in a new map name in the textbox if you want to create a new map. Notice that when you type something in the textbox, the dropdown blanks out, and whatever you have in the textbox is deleted if you select something from the dropdown. So you can only do one or the other, not both.

After you choose the name of the map, you can click the “Add and Close” button, which will add the location set to your map, and take you back to the worksheet with your location set. Alternatively, you can click the “Add and Open Map” button, which will add the location set to your map and then open the map in the Topo.ly Excel Plugin Map Viewer (discussed later).



If you try clicking the “Add To Map” button when you don’t have an actual location set from your Topo.ly account on the active worksheet, you’ll be notified that you must be looking at a location set before you can add it to a map.

3.4 Update a Location Set

When you have a Topo.ly location set on your active sheet, you can make changes to the location set. As mentioned above, you cannot change the DsId, the LocIds, or the location header row, but you can edit, add, and/or delete locations. To edit a location, simply change any of the data in any of its rows. To add a location, simply add it to the bottom of the list (leave the LocId column blank). In order to delete a location, you just have to delete all the data in the row (except the LocId, which you cannot remove). You can also change the name of the location set as well.

When you’re done making changes to your data, simply click the “Update” button in the ribbon. You will see the same progress bar popup while all your changed/new locations are geocoded, and all your updates are set to Topo.ly’s servers.

If you try clicking the “Update” button when you don’t have an actual location set from your Topo.ly account on the active worksheet, you’ll be notified that you must be looking at a location set before you can update it.

3.5 Delete a Location Set

If you would like to permanently delete a location set from your Topo.ly account forever, you just have to click the “Delete” button in the ribbon (again, this only works if you are looking at an actual Topo.ly location set). When you click on the “Delete” button, you will see a confirmation popup making sure you really want to delete your location set. Once you confirm, another API call is made to Topo.ly, and your location set will be deleted from your account, and the worksheet will be deleted from your workbook.

As with the other buttons, if you try clicking the “Delete” button when you don’t have an actual location set from your Topo.ly account on the active worksheet, you’ll be notified that you must be looking at a location set before you can delete it.

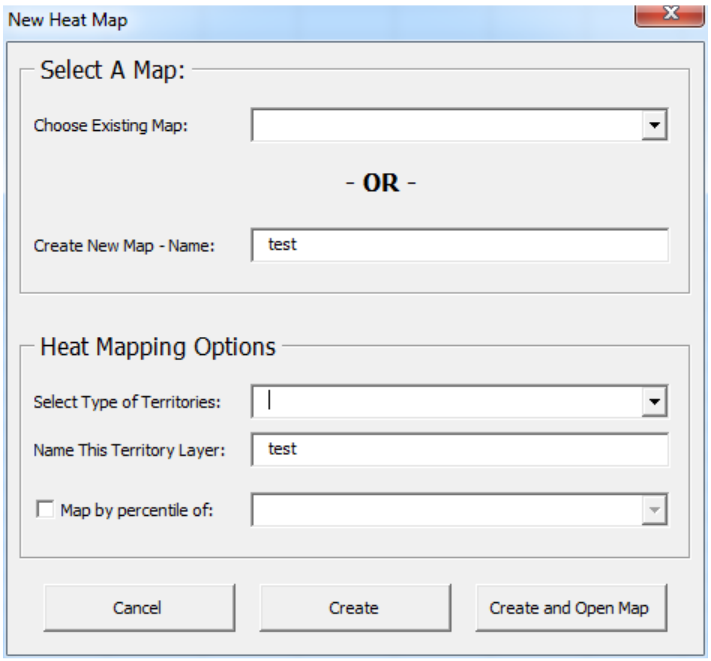
4. “TERRITORY SETS” SECTION

The current version of the Topo.ly Excel Plugin only contains one button in the “Territory Sets” section of the ribbon, which is described below.

4.1 Heat Map

The “Heat Map” button can be used to create a heat map from your location set. In order to access the heat mapping functionality, you must have an upgraded Topo.ly Plus account. If you have a Topo.ly Standard account, and you try to build a heat map, you will see a message saying you must upgrade, and then the Topo.ly Upgrade Account webpage will open up in your system’s default internet browser. As with the other ribbon buttons, if you try clicking the “Heat Map” button when you don’t have an actual location set from your Topo.ly account on the active worksheet, you’ll be notified that you must be looking at a location set before you can build a heat map from those locations.

If you are a Plus user and have a Topo.ly location set on the active sheet, you will see the following window popup when you click on the “Heat Map” ribbon icon:



This window consists of two sections: the “Select A Map” section on top, and the “Heat Mapping Options” section down below. The “Select A Map” section works just like it does for the “Add To Map” ribbon button already discussed: you can select from all your current maps using the dropdown, or you can specify the name of a new map in the textbox. Notice how it defaults to having the name of your location set populated in the “Create New Map – Name” textbox.

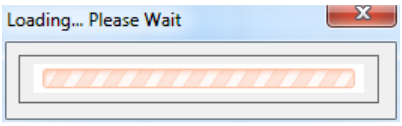
The next section is where you specify the settings for your heat mapping. In the first dropdown list, you select the type of territory you want to use for your heat map (e.g., states, counties, zip codes, etc.). The options are populated using Topo.ly's API, so you'll always have the most up-to-date list available.

The next line has a textbox where you specify the name of this territory set. Notice how it also defaults to the same name as your location set.

The third line in the "Heat Mapping Options" section is where you can specify if you want to base your heat map by percentile or not. If you check the box to use percentile mapping, you can then specify a percentile grouping (e.g., you want your map to have 4 colors, one for each quartile).

In this version of the Topo.ly Excel Plugin, heat mapping is based only on a location-density basis. Future releases of the plugin will also allow you to build heat maps using a SUM, AVERAGE, MAX, or MIN function of user-defined data fields in your location set, just like you can on the website.

Similar to the "Add To Map" feature, the heat mapping window has both "Create" and "Create and Open Map" buttons. When you click one of these, if your heat map is complex (i.e., it has a lot of locations, or your territories are very granular), you will see the following "loading" window popup while your heat map is being created:



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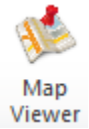
5. "MAPS" SECTION

This section of the Topo.ly Excel Plugin contains the Map Viewer, and a button that conveniently opens your default web browser to the "My Maps" page in your Topo.ly account.

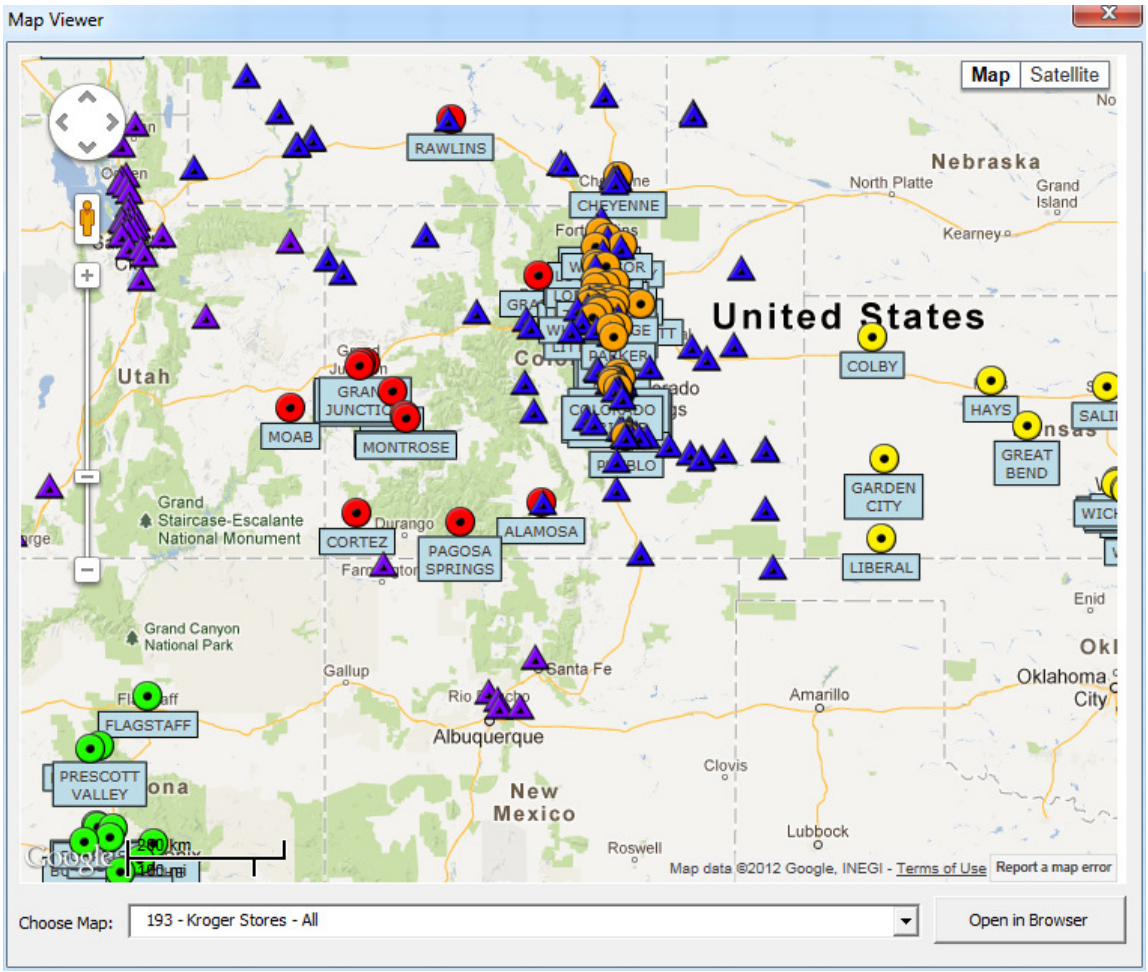
5.1 Map Viewer



Clicking the "Map Viewer" button in the ribbon will launch the Topo.ly Excel Plugin Map Viewer, which is shown on the next page. The Map Viewer has a dropdown across the bottom of the window, which lists all of your Topo.ly maps. Whichever map you select using that dropdown will automatically load in the Map Viewer window. If you would like to view the map in your default browser (along with the normal left sidebar), you can simply click the "Open in Browser" button, which will open your currently-loaded map in your default browser. (Note that when your browser opens the first time, you may be prompted to login to your Topo.ly account, and then you will be redirected to the map.)

5.2 Browse to Maps

Clicking on the "Browse to Maps" button in the ribbon opens up the "My Maps" webpage in your default web browser.


Map Viewer
Map
Satellite
RAWLINS
CHEYENNE
Nebraska
North Platte
Grand Island
Kearney
United States
Utah
COLBY
HAYS
GREAT BEND
GARDEN CITY
LIBERAL
MOAB
MONTROSE
PUEBLO
Grand Staircase-Escalante National Monument
CORTEZ
Durango
PAGOSA SPRINGS
ALAMOSA
Grand Canyon National Park
Gallup
Santa Fe
Albuquerque
FLAGSTAFF
PRESCOTT VALLEY
New Mexico
Amarillo
Clovis
Lubbock
Roswell
Enid
Oklahoma City
Map data ©2012 Google, INEGI - Terms of Use
Report a map error
Choose Map:
193 - Kroger Stores - All
Open in Browser

DISCUSSION OF LEARNING

This was a really valuable project for me. I have a lot of programming experience, but up till now, my VBA experience has basically been limited to Monte Carlo simulations. I really appreciate the opportunity to get a lot of exposure to different aspects of VBA. I liked learning how to customize the ribbon, and how to make XMLHTTP requests to different APIs.

One challenge I had was parsing the XML or JSON response coming back from Google Maps API calls. (Is there really no built-in XML or JSON parser?) I started building my own parser, but finally decided it wasn't worth the time and abandoned the idea. Instead I just implemented a simple text search to find the first <lat> and <lng> XML tags and extract the coordinates I needed from the full XML response.

Another challenge I had was getting the WebBrowser control to work. Originally, when I opened a map, I wanted to create a worksheet for the map, embed the WebBrowser control on the worksheet itself, and then navigate the WebBrowser control to the map. The problem I encountered is that the WebBrowser control, when created dynamically, doesn't register quite right. Apparently it's a known bug where the timing gets messed up while creating and using a WebBrowser control within the same method call. So I could have one button to create the worksheet and dynamically create the control, and then another button to navigate the control to the map's URL. I didn't really want to make my users have to take that two-step approach. So I finally decided on a different approach, which was to make a UserForm with a WebBrowser control. I could then just show this form. Since the control wasn't being dynamically generated, I could control its navigation from the same method that shows the form.

I also had to implement several DLL wrappers. Specifically, I used the "ShellExecute" function from shell32.dll. I really dislike Internet Explorer, so this allowed me to issue a shell command to open a URL using the default web browser.

Google Maps API limits geocoding requests to 1/sec, so I had to create an artificial delay between geocode requests. I did this using the "GetTickCount" (used to calculate elapsed time since the last request) and the "Sleep" (used to sleep the current thread) functions from the kernel32.dll.

ASSISTANCE

I received no assistance in this project, with the one exception of the Progress Bar window. I borrowed the progress bar UserForm and its associated methods from a homework assignment. Other than that, I created everything on my own, including all of the Topo.ly server-side APIs that this plugin calls.