

Project Summary

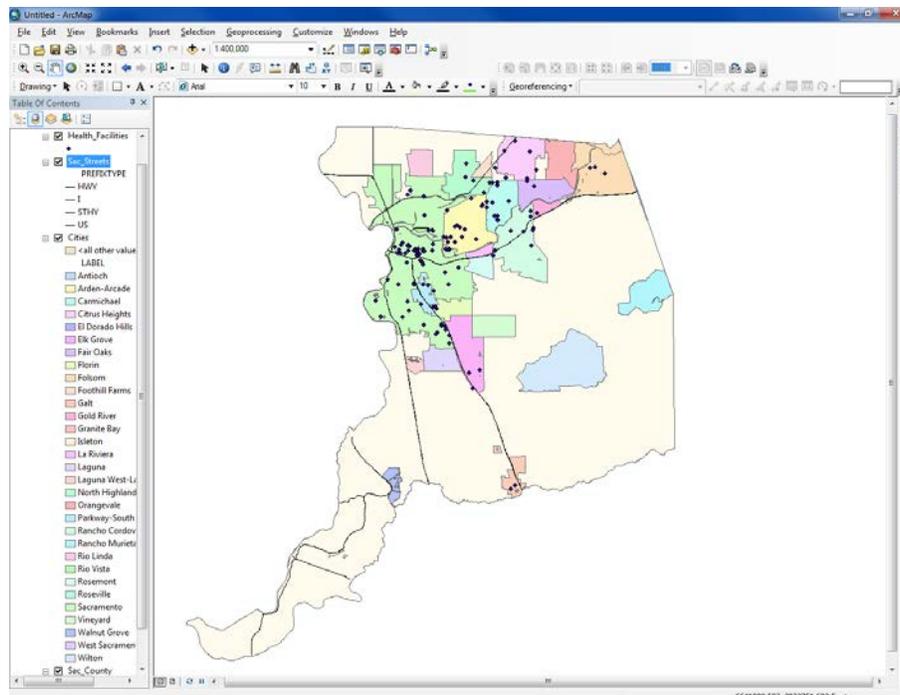
California has been rapidly increasing in population and the cities in Sacramento County are booming. With the increase in population, it is important to know where the local health care facilities are in proximity to each city. In most metropolitan cities, health care facilities are vast while in more rural cities, health care facilities might be non-existent and people must travel outside their city to find the closest health care facility. A python script that can make a selection of the cities with health care facilities and mass produce maps may prove helpful to release to residents in each city. To stylize this data and map with the every changing city boundaries and health care facility locations would be burdensome, however a python script that can automatically create the maps would be very useful.

Parameters

The purpose of this project is to create a python script that will produce maps specific to the city and display the healthcare facilities. A user will be able to mass produce maps for an entire county by each city or other specific selection set. Data and information on the location of the health care facilities and counties, cities, streets, and background data information will be needed. The example data sets were obtained from Tom Lupo for student assignments. This will provide a valuable tool to display the available health care facilities within each city and can save time to reproduce the maps based on changing city boundaries or the addition of new health care facilities.

Methods

Data was collected for the counties in California, the cities in Sacramento County, and the health care facilities in Sacramento County from Tom Lupo's data set. Once the data was compiled, it was added to ArcMap to create the dataset and focus on the information in Sacramento County. Base layers containing the streets were added as reference.



Sacramento County cities, streets, and health care facilities.

Once I gathered my data and stylized the map, I created a Python query to select the health care facilities within a specified city and create a map. To do this, I ran a trial in ArcMap to make sure the Select By Location query was accurate. The results showed that it was correct and 13 cities had a health care facility. From this, I knew that I would only be creating 13 maps from the 25 cities.

Select By Location

Select features from one or more target layers based on their location in relation to the features in the source layer.

Selection method: select features from

Target layer(s):

- Detail Map
 - Health_Facilities
 - Sac_Streets
 - Cities
 - Sac_County
 - county_poly

Only show selectable layers in this list

Source layer: Health_Facilities (0 features selected)

Use selected features

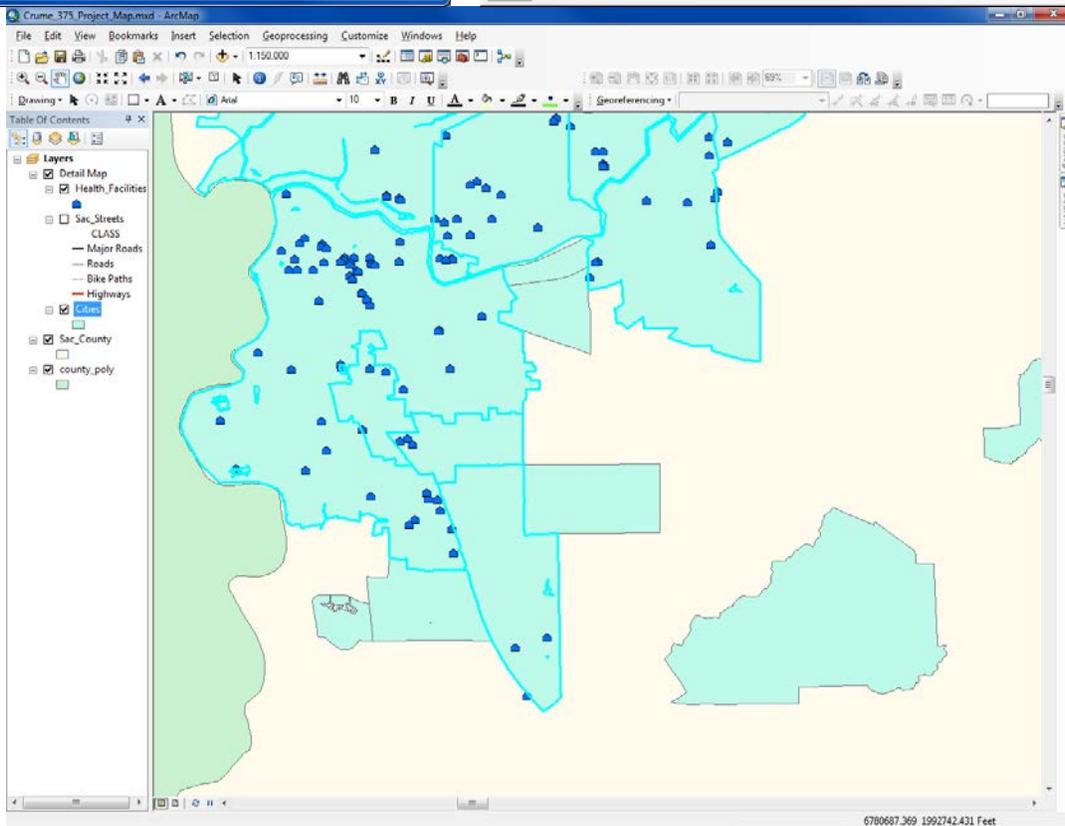
Spatial selection method for target layer feature(s): contain the source layer feature

Apply a search distance: 10000.000000 Feet

Table

FID	Shape *	WATER	POPULATION	COUNTYNAME	LABEL	TYPE
0	Polygon	0	96025	Sacramento County	Arden-Arcade	CDP
1	Polygon	0	49742	Sacramento County	Carmichael	CDP
2	Polygon	0	85071	Sacramento County	Citrus Heights	City
4	Polygon	0	59984	Sacramento County	Elk Grove	City
5	Polygon	0	28008	Sacramento County	Fair Oaks	CDP
6	Polygon	0	27653	Sacramento County	Florin	CDP
7	Polygon	0	51884	Sacramento County	Folsom	City
8	Polygon	0	17426	Sacramento County	Foothill Farms	CDP
9	Polygon	0	19472	Sacramento County	Galt	City
10	Polygon	0	8023	Sacramento County	Gold River	CDP
12	Polygon	0	828	Sacramento County	Isleton	City
13	Polygon	0	10273	Sacramento County	La Riviera	CDP
14	Polygon	0	34309	Sacramento County	Laguna	CDP
15	Polygon	0	8414	Sacramento County	Laguna West-Lakeside	CDP
16	Polygon	0	44187	Sacramento County	North Highlands	CDP
17	Polygon	0	26705	Sacramento County	Orangevale	CDP
18	Polygon	0	36468	Sacramento County	Parkway-South Sacramento	CDP
19	Polygon	0	55060	Sacramento County	Rancho Cordova	City
20	Polygon	0	4193	Sacramento County	Rancho Murieta	CDP
21	Polygon	0	10466	Sacramento County	Rio Linda	CDP
22	Polygon	0	22904	Sacramento County	Rosemont	CDP
24	Polygon	0	407018	Sacramento County	Sacramento	City
25	Polygon	0	10109	Sacramento County	Vineyard	CDP
26	Polygon	0	669	Sacramento County	Walnut Grove	CDP
28	Polygon	0	4551	Sacramento County	Wilton	CDP

(13 out of 25 Selected)



Once the query layout was confirmed and resulted in the answers, I created the python script to create the same result. This would select all of the cities within Sacramento County and select the cities that

had health care facilities within them. From this, a new layer was created and added to the map for the map reproduction step.

```
Crume_Final3.py - E:\375\Crume_Final3.py
File Edit Format Run Options Windows Help
# GEOG 375 Final Project
# Created by: Christina Crume
# Created on: 03.19.2016
# Updated on: 05.14.2016

import arcpy, sys, traceback, os, datetime
from arcpy.mapping import *

arcpy.env.workspace = 'E:\\375\\375Project\\'
cities = 'Cities.shp'
city_layer = 'city_layer'
health_facilities = 'Health_Facilities.shp'
HF_layer = 'HF_layer'
HF_City = 'HF_City.shp'

author = 'Christina Crume'

CUR_DATE = datetime.date.today().strftime('%m.%d.%Y')

try:
    if arcpy.Exists(city_layer):
        arcpy.Delete_management(city_layer)

    arcpy.MakeFeatureLayer_management(cities, city_layer)

    query1 = """ "COUNTYNAME" = 'Sacramento County' """
    arcpy.SelectLayerByAttribute_management(city_layer, "NEW_SELECTION", query1)
    print "Selected cities within Sacramento County"

    if arcpy.Exists(HF_layer):
        arcpy.Delete_management(HF_layer)

    arcpy.MakeFeatureLayer_management(health_facilities, HF_layer)

    arcpy.SelectLayerByLocation_management(city_layer, "CONTAINS", HF_layer, "0", "SUBSET_SELECTION")

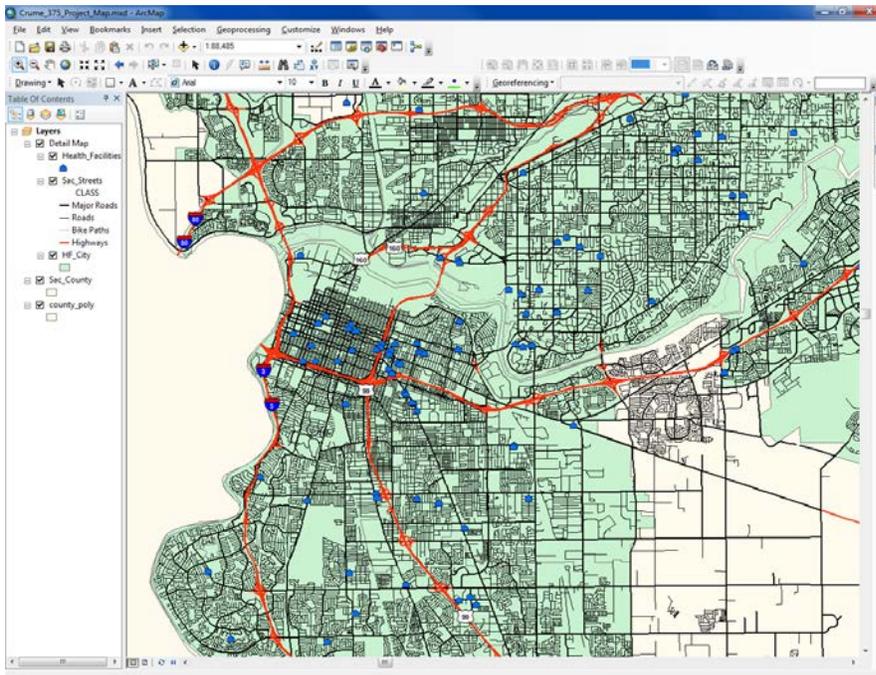
    print "Queried cities with health facilities"

    if arcpy.Exists(HF_City):
        arcpy.Delete_management(HF_City)

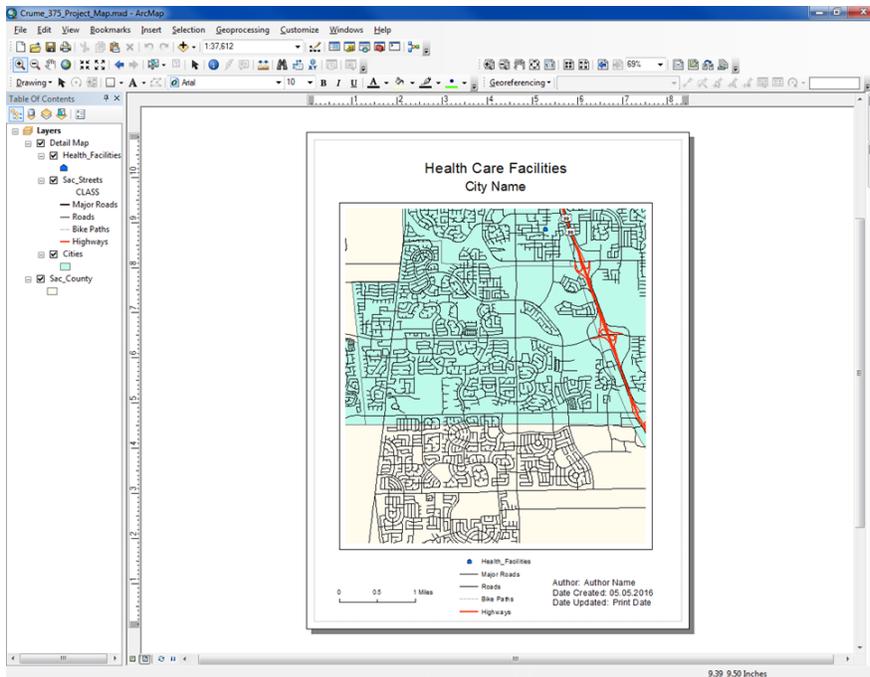
    arcpy.CopyFeatures_management('city_layer', 'HF_City')
    print "Created cities with health facilities layer. Now lets make some maps"

Ln:1 Col:0
```

Since the python script was confirmed and functional, the map was further stylized to add scalable layers, labels for the streets, and background counties for the cities that bordered other counties.



Additionally, in order to mass produce maps, a map template was created and stylized. Each map that is produced will have the same features and layout.



Once the data and the map template was ready, the python script was created to mass produce the maps for the selected cities.

```

Crume_Final3.py - E:\375\Crume_Final3.py
File Edit Format Run Options Windows Help

datapath = 'E:\375\375Project\'
mappath = datapath + 'MyData\Maps\'
mxd = MapDocument(datapath + 'Crume_375_Project_Map.mxd')

dataframe = ListDataFrames(mxd, "Layers") [0]

TOCLayers = ListLayers(mxd)

for TOCLayer in TOCLayers:
    print 'Layer Name ' + str(TOCLayer.name)
    print 'Longname ' + str(TOCLayer.longName)

    if TOCLayer.longName == 'Detail Map\HF_City':
        print 'inside TOC'
        HF_CityLayer = TOCLayer

field_name = ["LABEL"]
with arcpy.da.SearchCursor(HF_CityLayer, field_name) as Crows:
    for Crow in Crows:
        CLabel = Crow[0]

        query = """"LABEL" = '""" + CLabel + """"""
        arcpy.SelectLayerByAttribute_management(HF_CityLayer, "NEW_SELECTION", query)
        HF_CityLayer.definitionQuery = query
        dataframe.extent = HF_CityLayer.getExtent()

        dataframe.scale = dataframe.scale * 1.1

```

```

Crume_Final3.py - E:\375\Crume_Final3.py
File Edit Format Run Options Windows Help

dataframe.scale = dataframe.scale * 1.1

tElements = ListLayoutElements(mxd, "TEXT_ELEMENT")

for tElement in tElements:
    if tElement.name == 'Map Title':
        tElement.text = 'Health Care Facilities'
    if tElement.name == 'City Name':
        tElement.text = CLabel
    if tElement.name == 'Author':
        tElement.text = str(author)
    if tElement.name == 'Print Date':
        tElement.text = str(CUR_DATE)

    if arcpy.Exists(mappath + CLabel + '_map.pdf'):
        arcpy.Delete_management(mappath + CLabel + '_map.pdf')

    print 'Writing PDF file...'
    ExportToPDF(mxd, mappath + CLabel + '_map.pdf')
    print 'Created : ' + CLabel + '_map.pdf'

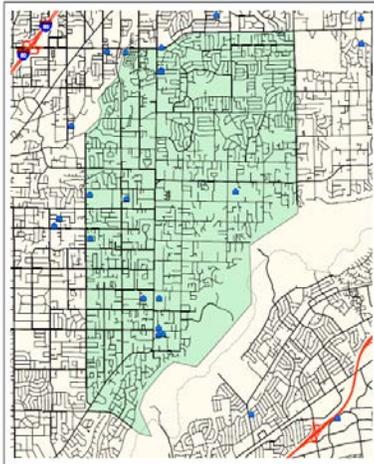
del mxd

print 'Completed Unique Map Sheets'
Ln: 101 Col: 59

```

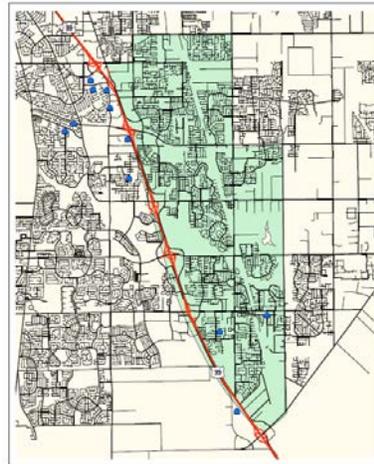
Once the script was complete and tested, it produced 13 maps as expected and each was identical in the layout and features, but specific to each city.

Health Care Facilities
Carmichael



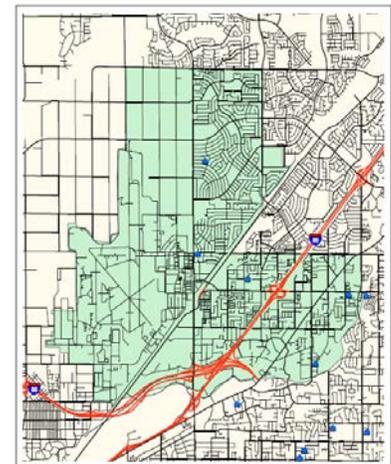
Health_Facilities
Major Roads
Roads
Bike Paths
Highways
Author: Christina Crume
Date Created: 05.05.2016
Date Updated: 05.09.2016

Health Care Facilities
Elk Grove



Health_Facilities
Major Roads
Roads
Bike Paths
Highways
Author: Christina Crume
Date Created: 05.05.2016
Date Updated: 05.09.2016

Health Care Facilities
North Highlands



Health_Facilities
Major Roads
Roads
Bike Paths
Highways
Author: Christina Crume
Date Created: 05.05.2016
Date Updated: 05.09.2016

Discussion

Overall this project was relatively smooth and provided useful results. Creating the script was challenging because I started with the map production and my data sources changed with the selection queries and additional layers added. When I initially ran the script, it produced 25 maps, even though in ArcMap the selection resulted in only 13 cities. From this I knew there was an issue with the script even though there was no technical error. I re-scripted the selection set and found that the city layer referenced in the map reproduction was the original city layer and not the new selection set. Because the data was set up as variables, it was relatively easy to rename the layer locations instead of re-writing the script.

Creating the datasets and determining the selections was straightforward, however creating the map was slightly challenging because of the complexity of the streets layer. I ended up grouping the streets into different symbol selections and symbolizing them based on the scale of the map. This created a simpler map that was easier to read and display the features of the data that was important.

Ideally the user would be able to select each city and have a map created, however that was beyond the scope of my knowledge and this class.

Conclusion

A simple python script that queried cities within a county that contained health care facilities and then reproduced maps was created and the maps were stylized and symbolized to display the health care facilities in each city. The script was fun to create and use, proved how valuable the python scripting can be in GIS. Overall the project went well and provided a useful learning experience as well as an introduction to python scripting.

References

Data was obtained from Tom Lupo from the Geography 334 class at American River College, Fall 2014.