

UNIVERSITY OF NORTH TEXAS
Department of Geography

GEOG 4220/5220: Applied Retail Geography

Applied Assignment, Part 2: Advanced GIS Location and Market Assessment

In this second part of your applied assignment, we will use advanced GIS analysis capabilities from the software package *Maptitude* to provide regional location site and market insights of use to the top decision-makers in a large, chain restaurant business. The instructions below pick up where Part 1 of the assignment left off (Task 5), so the analysis in Part 2 begins with Task 6.

The scenario: you are continuing in your job as market analyst for *Pei Wei Asian Diner*. Your assignment now is to analyze *Pei Wei* restaurant network in the entire Dallas-Fort Worth region and compare this network with the restaurant network of *Chipotle Mexican Grill* in particular. Recent survey and focus group research that *Pei Wei* has done has indicated that Chipotle is a particularly important competitor for *Pei Wei* in North Texas.

As noted earlier, *Chipotle* is not a direct competitor for *Pei Wei* (their menu is considerably different from *Pei Wei*), but *Pei Wei* competitor analysis indicates that both chains appeal to very similar market segments. Your objective in your regional analysis is to draw insights from a GIS assessment of *Pei Wei* current regional operations and *Chipotle's* competitor locations that could help *Pei Wei* formulate locational strategies to guide its next best moves in North Texas.

As in Applied Assignment Part 1, please provide “**rough note**” results or answers (using complete sentences) or other material (maps, graphics) for **anything highlighted as a “rough notes step”**. Also, please label each of these responses using the task and step number associated with the bolded question you are answering – e.g. “Task 1, Step 1a”. Many steps do not require a written response, but you still might need to save a map or report produced in some steps. Also, please note that most steps do not require that you record anything at all, although you will still need to complete every step in order to complete the exercise.

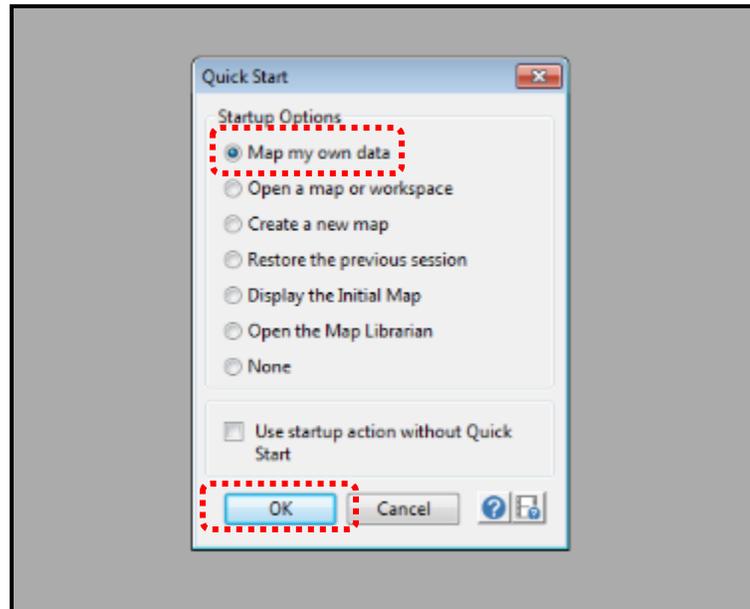
Also, before you begin this part 2 analysis, please read this important note about the software we will use:

- *Maptitude* is a desktop software package that runs directly on your CSAM lab computer. This means that *Maptitude* uses storage space on your computer for all files being used and created in the course of your analysis. You would be wise to store all maps and other files you create on your own portable storage device, such as a flash drive or other portable electronic media: this will enable you come back to complete or modify your work later without re-doing all of your work.

Assignment Credit: Dr. Murray Rice created part 2 of this applied assignment using the *Maptitude* GIS package and its associated data resources.

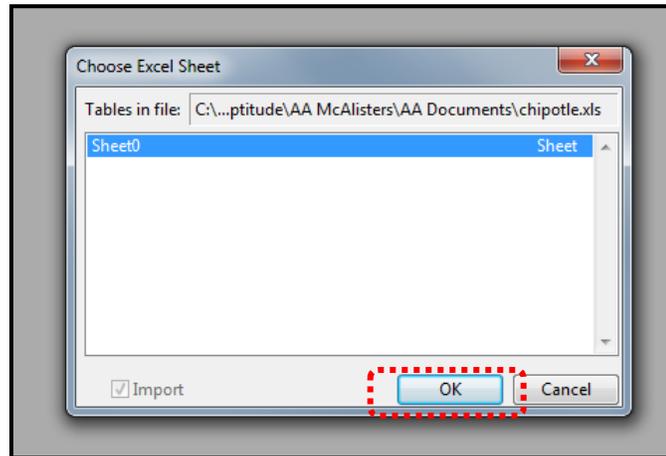
Task 6: Maptitude GIS – Basic Analysis of Chipotle and Pei Wei Locations in North Texas

1. This part of the assignment will be done using the Maptitude software accessible in our CSAM computer lab. Start Maptitude and get ready to map some locations (in the Quick Start dialogue box, click the “Map my own data” button, and then click on “OK”).

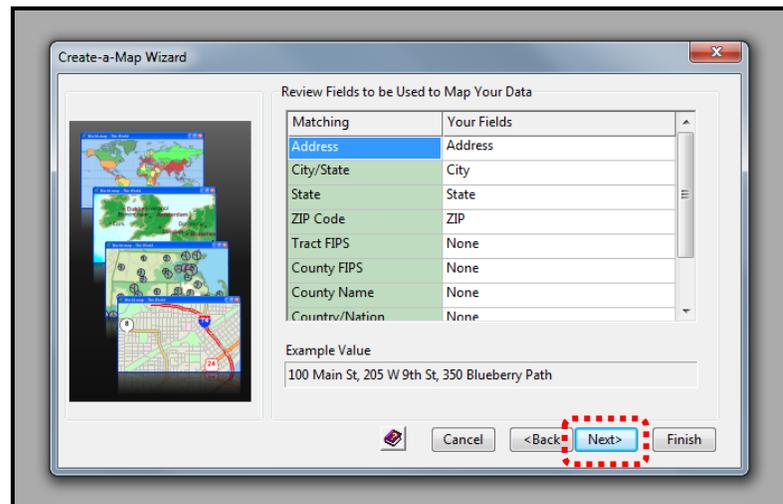


2. Choosing to map your own data takes you to a file open dialogue box where you can find the restaurant data files we will use. To begin, let's map the D-FW locations for the Chipotle chain that is one of Pei Wei's key competitors. Find and open the "chipotle.xls" data file located in the "class\4220" network drive on your CSAM GIS lab room computer.

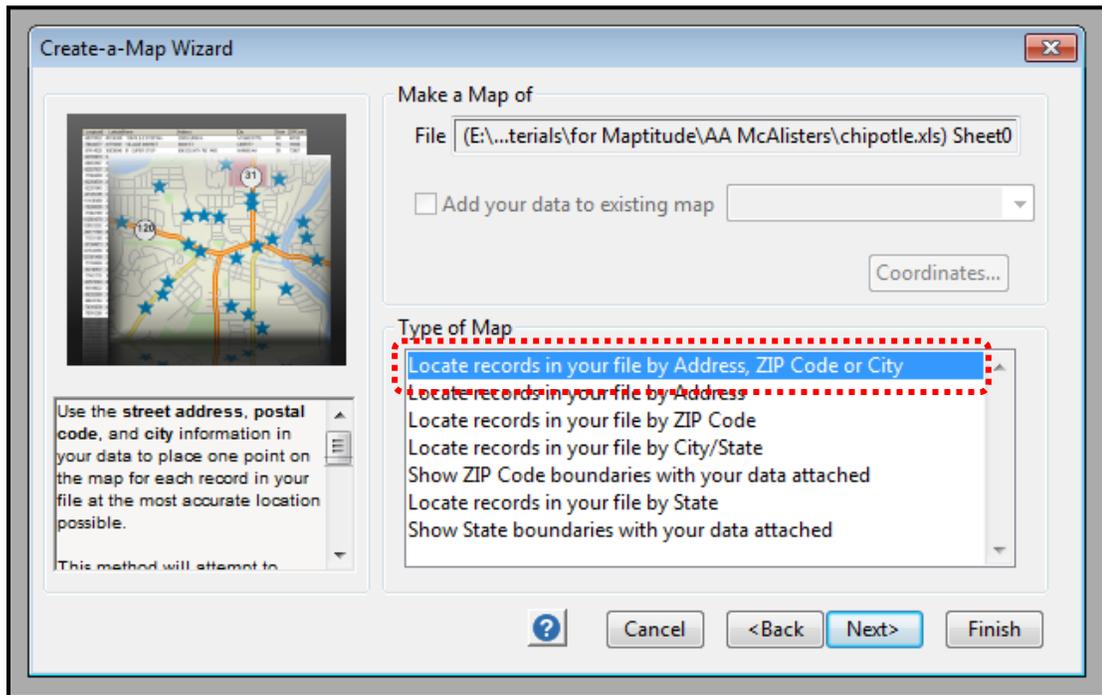
3. The Chipotle location file is an Excel spreadsheet file containing the addresses of Chipotle restaurant locations in Dallas-Fort Worth. Select the only sheet in the Chipotle Excel file as the one to import and click “OK”:



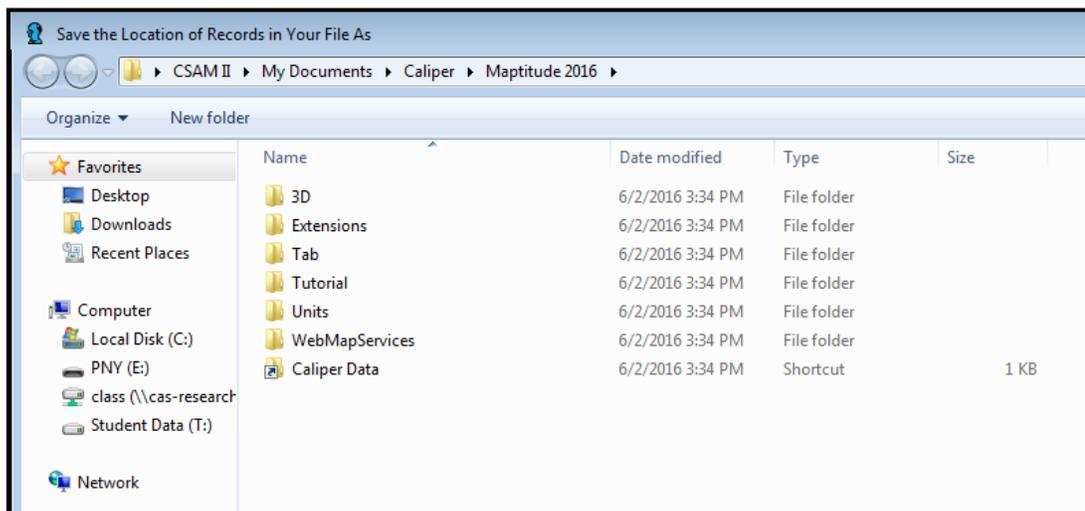
The next dialogue box gives you an opportunity to confirm that Maptitude is properly recognizing the Address, City, State, and Zip Code fields in the Chipotle file. All should be fine here, so you can click “Next”:



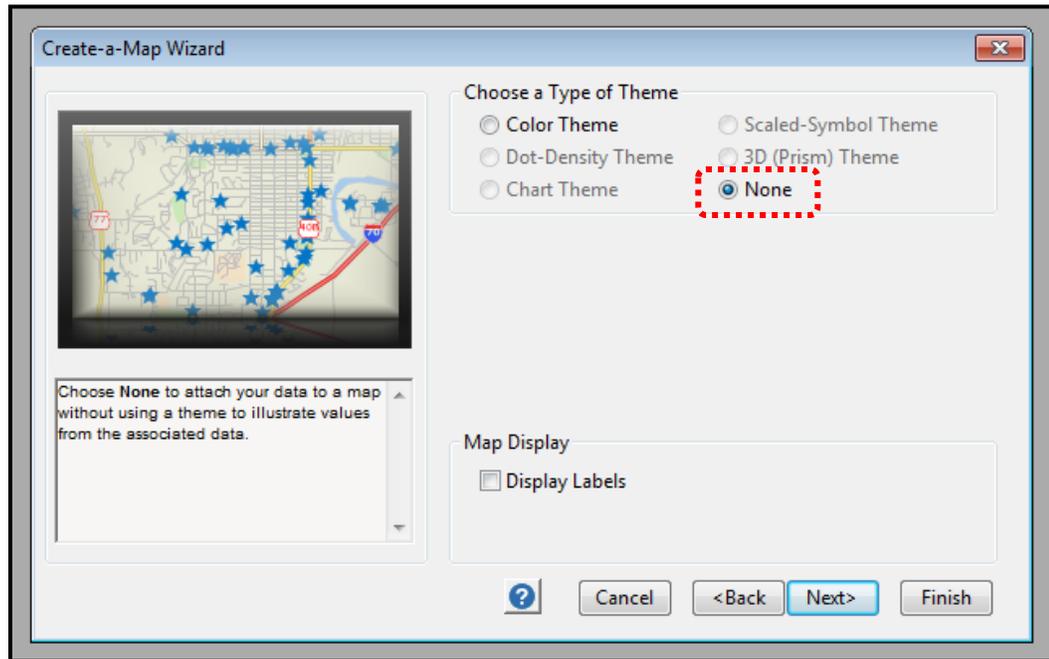
- Your next step is to select the type of location search/map you would like to generate from your Chipotle address file. Maptitude can search by address (most precise results, but can fail if an exact address match is not found), ZIP code, or city/state (least precise result but most likely to lead to a location match). The most flexible search attempts to search by address first, then by ZIP code, and then finally (if no address or ZIP code match made) by city/state. Please chose the highlighted “Address, ZIP Code or City” option below and click “Next”.



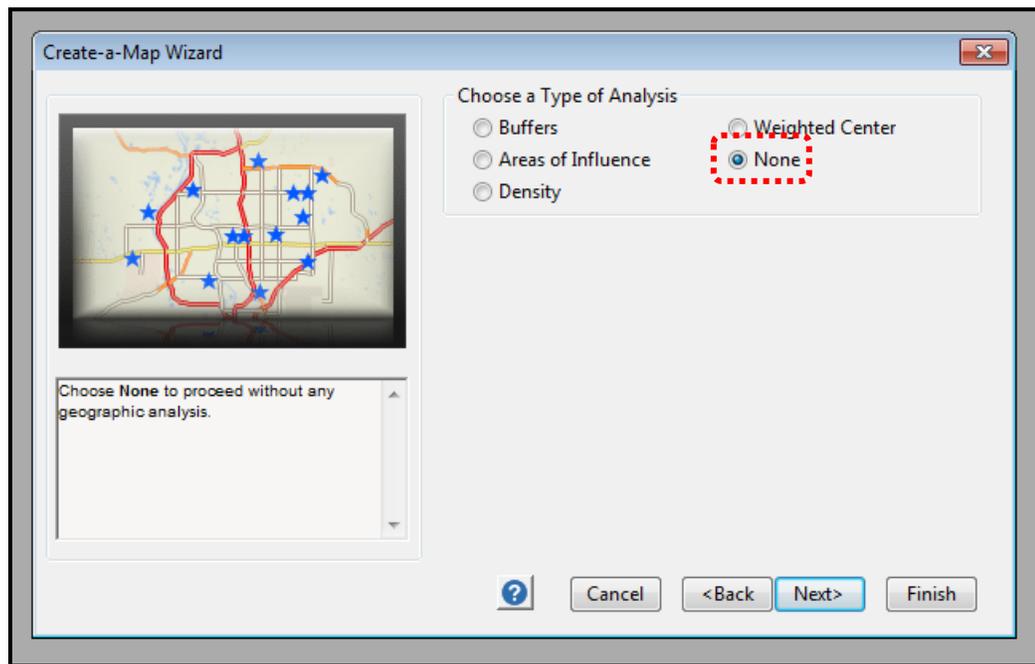
- Now you can save the resulting geographic file (use “Chipotle” as your file name) on your own personal drive this and all other files that you create in this lab.



6. Choose a theme. Since you're just mapping locations, "none" is the best option here.



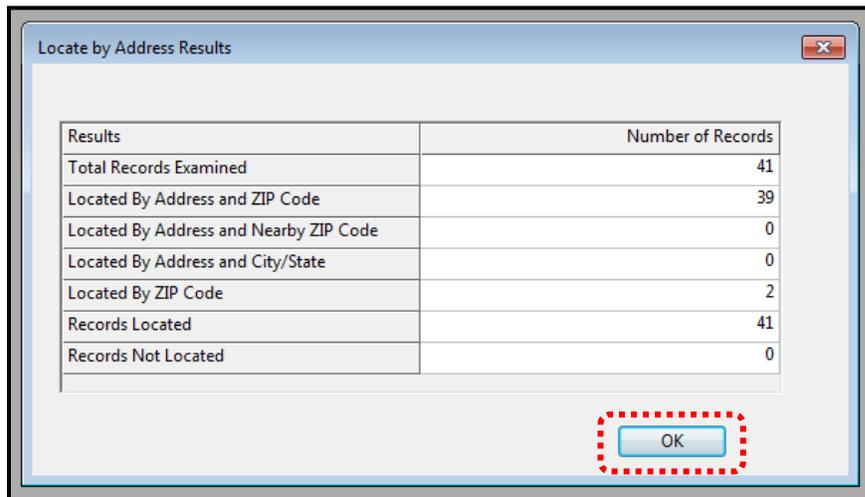
7. The next dialogue box provides a number of analytical options. We will explore several of these capabilities yet, but since we only want to map locations in this step the best option is "None" again. Click "Finish" to display the resulting Chipotle location map.



8. Before displaying the resulting map, Maptitude shows you statistics for its “Address, ZIP Code or City” location matching process.

Your results dialogue box should look similar (but not necessarily identical) to the below. The box below indicates that out of the 41 Chipotle records examined,

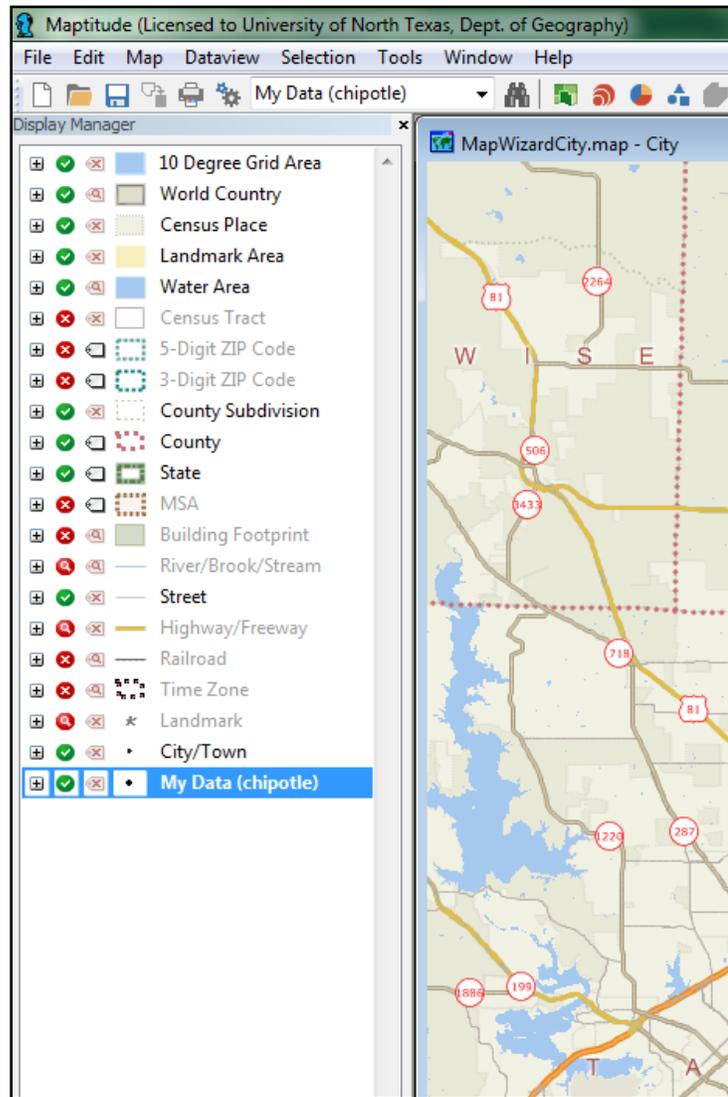
- 39 were fixed to a specific, known address location, while
- 2 were located at the ZIP code level (assigned to a general area, rather than precise location).



Results	Number of Records
Total Records Examined	41
Located By Address and ZIP Code	39
Located By Address and Nearby ZIP Code	0
Located By Address and City/State	0
Located By ZIP Code	2
Records Located	41
Records Not Located	0

Click “OK” to finally display the Chipotle location map for D-FW.

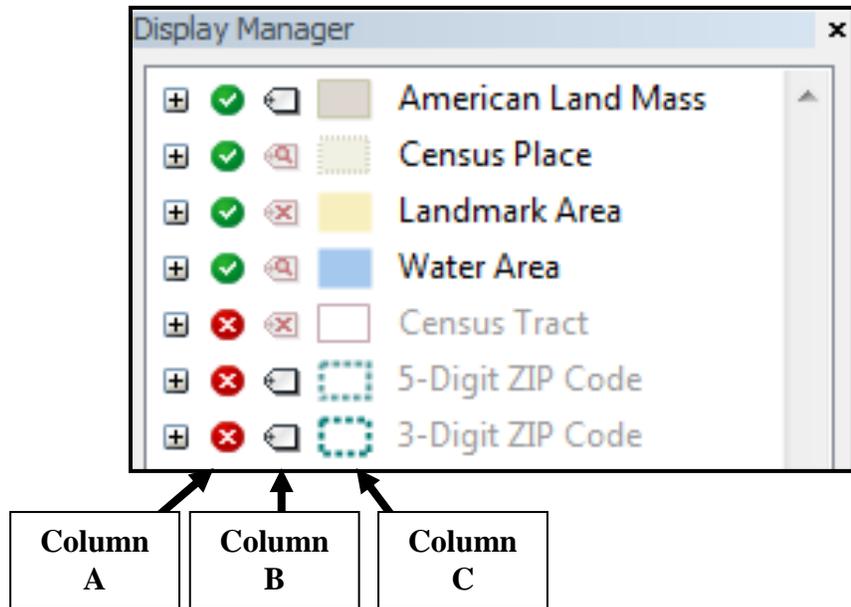
9. With the map displayed we can also see the full Maptitude map screen, including all map layer display indicators. The “Display Manager” is located in a vertical, white bar along the left side of the screen.



Note the various geographic layers incorporated in the Chipotle map, including landmarks, water areas (lakes), state and county boundaries. Maptitude includes this collection of layers in your map by default to help to orient and provide geographic context for the Chipotle locations that are the central focus of the map.

10. You can use the display manager to customize the look of your map:

- The layers included in the map
- Whether they are labeled, and how
- What colors, borders, or symbols are used to represent each layer



Column A (with green check marks and red X marks): turns each layer (row) on or off in the map. Click on any layer (row) with a green checkmark to turn off the layer in the map (turns the green checkmark indicator to a red X). Click on any layer with a red X to turn the layer on (turns the red X to a green checkmark).

Column B (with various clear and red-filled label symbols): turns layer labeling on or off, and brings up a dialogue box to give you option on how the layer is labeled.

Column C (with symbols/colored rectangles): clicking on these symbols/rectangles to bring up a dialogue box allows you to change how a point, line, or area layer appears on the map (Points: can edit symbol type, color, and size; Lines: can edit line width, color, and style; Areas: can edit area fill color, transparency, pattern, and border color/width)

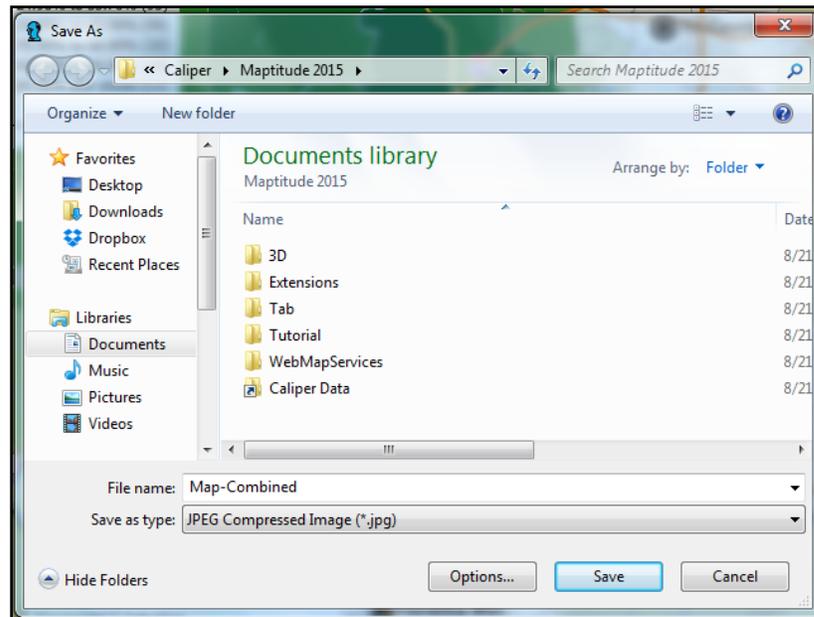
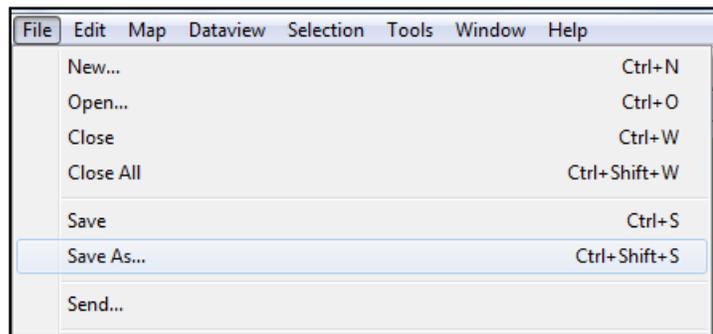
Assess your map and use your judgment to decide on what layers would be best to include in this map (which layers on/off) and how you would like the map layers to appear (what colors/styles).

Rough Notes Step: Provide a brief overview and explanation of your map layer logic and choices here. A single, 1-paragraph discussion here is sufficient.

11. **Rough Notes Step:** Describe the geography of the Chipotle locations you see in the map you have produced. Are Chipotle’s restaurants distributed broadly across the D-FW region? Are there clusters of Chipotle restaurants? Are there any parts of the region that Chipotle appears to be avoiding? Provide 1-2 paragraphs of description and interpretation.

12. With the Chipotle locations on the map, repeat this procedure to import the restaurant address file for Pei Wei. This time, you will import and map addresses from the file “peiwei.xls”, but all other steps will be the same. Please ensure that both sets of locations (Chipotle and Pei Wei) end up appearing on the same map – feel free to see me if you have any trouble doing this.

When you have completed this combined location map (displaying the Chipotle and Pei Wei locations), use the “Save As...” menu entry to save the resulting map in JPG format as “Map-Combined.jpg”.



13. **Rough Notes Step:** Describe what you see in this map. Specifically,
- What is the relationship between Chipotle and Pei Wei locations – geographically speaking, how do they relate to each other? Are they close by, or far apart from each other?**
 - Where are the Chipotle locations that are not close to a Pei Wei? In other words, identify the Chipotle locations (cities) that have no local Pei Wei competition – a potential coverage gap for McAlister's to address?**
 - Where are the Pei Wei locations that are not close to a Chipotle (i.e. a local market advantage that Pei Wei now enjoys)?**
 - Based on this map alone, which area within the D-FW region appears to have the best opportunity for a new Pei Wei location? Name the location, and what causes you to highlight this as a particular opportunity.**

Provide 1 paragraph of description/interpretation for each of the four sub-questions listed above.

Task 7: Maptitude GIS – Advanced Location Analysis & Visualization Routines

This part of the assignment will continue using the Maptitude software. In this part we will implement three different analyses to give insight into the location and distribution of Pei Wei locations across the D-FW metroplex:

- Drive Time Zones
 - Areas of Influence (also known as “Thiessen Polygons”)
 - Density Grid
- Bring up your map of Pei Wei and Chipotle locations. Disable the Chipotle locations by clicking on the Maptitude screen (change the Chipotle layer “green checkmark” to a “red X”). This should leave only Pei Wei locations displayed on your map.

2. The first analysis we will complete is creation of drive time zones for the entire D-FW Pei Wei restaurant network. Rather than giving detailed instructions here on how to do this and the other analyses, I will point you to two resources:

- *A. The Maptitude User Guide.* This guide is available in PDF form from our GIS lab computers and via the Maptitude help menu. For an excellent overview of all drive time analysis options, refer to the guidelines and examples given in Chapter 11, beginning on page 335.

Creating Drive-Time Rings

A drive-time ring encloses an area in which all or selected links or nodes in a line layer are within a certain cost, or value limit, of one or more origins. You can create drive-time rings that show the locations that are within a certain amount of time from the origins, or you can create distance rings that show the locations that are within a driving distance of the origins.



The area inside this ring is within a one-mile drive of an elementary school

Five rings were created at 1-mile intervals



The area inside this ring is within a 15-minute drive of a store

Three rings were created at 15-minute intervals

On page 338 of the guide there is a helpful, written “60-second tutorial” that outlines the basic steps involved in doing a drive time analysis.

Try It Yourself: Creating Drive-Time Rings

1. Choose **File-New** and create a general purpose map of the city where you live.
2. Click  on the Standard toolbar to display the Drive-Time Rings toolbox.
3. Click  in the Drive-Time Rings toolbox to activate the Click Locations tool.
4. Click on your location on the map.
5. Verify that **[Travel Time]** is chosen from the Field drop-down list, change the number of rings to 3, and change the size of the rings to 10 minutes.
6. Click  in the Drive-Time Rings toolbox, verify that the **Calculate Demographics** and **Create Report** boxes are checked, and click **OK**.
7. Click  in the Drive-Time Rings toolbox. Maptitude creates the rings and adds them to the map along with a color theme to illustrate the driving times. Now you can see the areas that are 0-10, 10-20, and 20-30 minutes from the location you clicked. Any portion of the map that is not covered by a ring is greater than 30 minutes from your location.
8. Click  in the Drive-Time Rings toolbox. Maptitude computes the demographics, displays them in a dataview, and opens a Report showing the results.
9. Scroll down the report to see a map of the drive-time rings on the first page and demographic information on the second page. The demographics will vary depending on the Country Package you are using.
10. Close the report window and choose **File-Close All** to close the map and dataview. Choose **No to All** to close them without saving the changes.

- *B: Maptitude Video Tutorials.* An extensive collection of useful, step-by-step demonstration tutorials are available on the [Maptitude website](#) and on our [GEOG 4220 R network drive directory](#) on our CSAM computers.

The page linking to all Maptitude video tutorials is located here:

<http://www.caliper.com/maptitude/mapping-software-video-tutorials.htm>

Here is the drive time video tutorial link from the Caliper website:

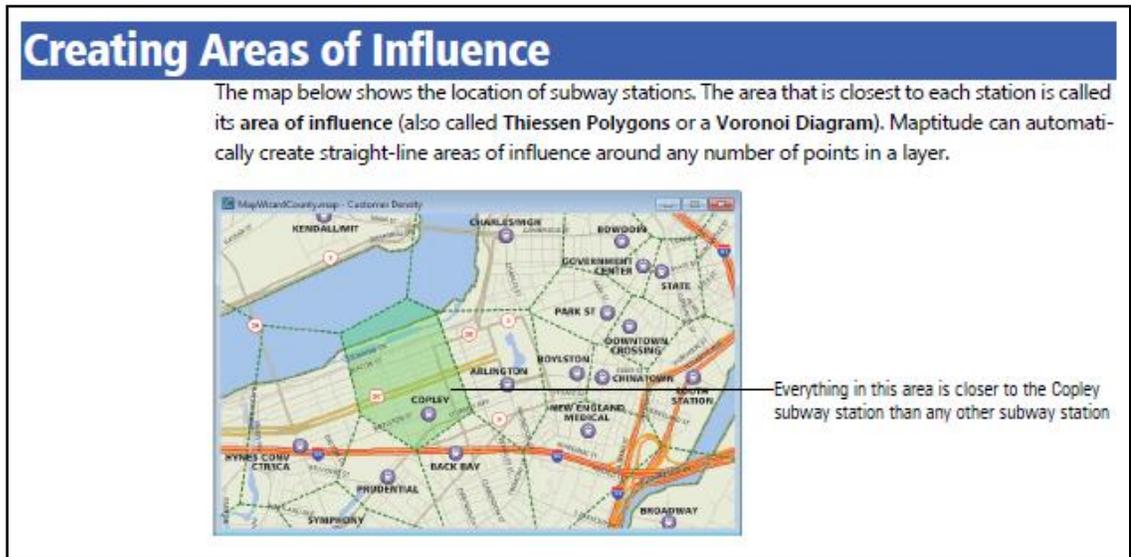


<http://www.caliper.com/video/maptitude/maptitude-drive-time-rings-video/maptitude-drive-time-rings-video.html>

3. Use the reference guide and video tutorial resources given to become familiar with the drive time analysis, and implement this analysis for the entire set of D-FW McAlister's locations.
4. *When you have completed the analysis, use the display manager to make any needed adjustments to the map and save as Map7-4.png.*
5. **Rough Notes Step:** Please answer the following questions with regard to this map.
 - a. **What observations can you make about the coverage reflected in the map? Where are there overlaps in drive time territories? Where are there holes? Be as specific as you can in describing and defining the patterns you see (place names, helpful terms).**
 - b. **What does this map add to your insight that the maps you have generated previously (focused only on point locations alone) did not provide?**

6. The next step is to complete an “Area of Influence” analysis. Another name for this is the “Thiessen Polygon” term we have used in class (same thing). As with the drive time analysis, both the *Maptitude User Guide* and the *Maptitude Video Tutorial* page has excellent resources to teach you how to do this analysis and use all relevant options.

A. *Maptitude User Guide*: an overview of all area of influence analysis options can be found in Chapter 10, beginning on page 316 (see tutorial on page 317).



B. *Maptitude Video Tutorials*: the Maptitude website has an excellent area of influence tutorial that goes through every necessary step.



<http://www.caliper.com/video/maptitude/maptitude-areas-of-influence-video/maptitude-areas-of-influence-video.html>

7. Use the reference guide and video tutorial resources given to become familiar with the area of influence analysis, and implement this analysis for the entire set of D-FW Pei Wei locations.

8. When you have completed the analysis, use the display manager to make any needed adjustments to the map and save as Map7-8.png.

9. **Rough Notes Step:** Please answer the following questions with regard to this map.

a. What does this map add to your insight that the Pei Wei location map and the drive time territory map did not provide?

b. What observations can you make based on the area of influence polygons featured in this map? What clues can you pick up from this map that could indicate coverage problems for Pei Wei? Be as specific as you can in describing and defining the patterns you see (place names, helpful terms).

10. The last analytical step is to complete a “Density Grid” analysis. As with the two previous analyses, you can find excellent *Maptitude User Guide* and *Maptitude Video Tutorial* resources to teach you how to do this analysis and use all relevant options.

A. *Maptitude User Guide*: an overview of density grid options can be found in Chapter 10, beginning on page 294 (“Try it Yourself” tutorial on page 295).

Creating Density Grids/Heat Layers

Density/heat layers are a way to visualize and analyze point data by transforming the points into a regular grid. Each resulting grid cell is assigned a value that is determined by the density of nearby points, optionally weighting each point using a weighting value.



The highest concentration of customers is here

Density/heat layers are useful for:

- Mapping crimes to show hot spots
- Mapping vehicle miles traveled to show hot spots for congestion and air pollution
- Showing the distribution of real estate sales, weighted by the sale price
- Analyzing the pattern of clients around a store, weighted by the cost of their purchases

- B. *Maptitude Video Tutorials*: the Maptitude website has an excellent density grid (“hot spot”) tutorial that goes through every necessary step.



<http://www.caliper.com/video/maptitude/maptitude-density-grid-hot-spot-video/maptitude-density-grid-hot-spot-video.html>

11. Use the reference guide and video tutorial resources given to become familiar with the density grid analysis, and implement this analysis for the entire set of D-FW McAlister’s locations.
12. *When you have completed the analysis, use the display manager to make any needed adjustments to the map and save as Map7-12.png.*
13. **Rough Notes Step**: Please answer the following questions with regard to this map.
 - a. **What does this map add to your insight that the other maps (location, drive time, area of influence) did not provide?**
 - b. **What observations can you make about the density grid pattern reflected in the map? What clues can you pick up from this map that could indicate coverage problems for Pei Wei? Be as specific as you can in describing and defining the patterns you see (place names, helpful terms).**

Putting It All Together: The Final Report (Covering Parts 1 and 2)

Now is the time to make sense of the evidence you have assembled so far for the entire applied assignment (including work completed in part 1 and in part 2). Remember that the “Common Features of Applied Assignments in GEOG 4220/5220” document specifies that your final report needs to include the following components (please label each clearly):

1. Exercise scenario
2. Question to be solved
3. Analytical approaches used
4. Results obtained
5. Application

As you prepare to write this report, review the steps you took for each analysis and all of your rough notes. Consider the following as you prepare to write the application section of your final report:

1. Take time to carefully examine the entire set of evidence you gathered from both part 1 and part 2 of this applied assignment: your pre-analysis reflections (task 1), field observations (tasks 2 and 3), and your GIS analysis (tasks 4, 5, 6, and 7). Make note of the major products you produced in each section (maps and reports), as well as your observations (answers to all questions in all tasks 1-7).
2. Your “results obtained” discussion should summarize the most important findings of all that you have uncovered throughout tasks 1-7.
3. Your “application” discussion should provide your bottom-line recommendation: which factors and evidence are most important from tasks 1-7, what does this collective evidence tell you, and how does that take you to a recommendation as to what locational strategy Pei Wei should be pursuing in Denton and the overall D-FW market?

To Submit this Applied Assignment Part 2:

1. Ensure all of your rough note question responses (for all steps highlighted in bold) are typed into a single Word document named "*Exercise2-RoughNotes.docx*". Please place your responses in order (by task and step number) within this file. Each question response should begin with a heading giving the task and step number to which the response refers (e.g. "Task 1, Step 1a").
2. Collect all of the map attachments requested in this part of the assignment (from the steps where you were asked to save a file, and you were given a file name to save under).
3. Complete your final report and save in a single Word document named "*Exercise2-FinalReport.docx*".
4. Attach all of the above material (your questions responses, your map and report attachments) to a single e-mail to be sent to my special assignment submission email address (rice@unt.edu). Please make the e-mail subject line "Your last name – Exercise 2" (e.g. "**Smith – Exercise 2**").