

Using GIS to Improve the Services of a Real Estate Company

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Abstract

A picture may be worth a thousand words but a map tells a story. It speaks to the viewer by exposing its many relationships. Its testimony is unquestioned making it a powerfully persuasive tool. This report will discuss how this tool will be used by a real estate company to improve its services, woo prospective clientele, and ultimately contribute to the company's bottom line. A Geographic Information System (GIS) captures, analyzes, and displays data in a visual, spatial context. In essence, the product of a GIS is a map. Use of GIS technology is particularly fitting to the application of real estate practice considering that property is geospatial in nature, its associated attributes are plentiful, and the relevance of location is key. This paper describes how a large map was produced using GIS technology. The map depicts over 1,000 properties displaying the property owner's last name, assessor's parcel number, acreage, Williamson Act status, and it indicates which properties have been sold by Shane P. Donlon, Incorporated. The paper describes how GIS can use prior sales data to illustrate current market trends and create customized maps for market perception. The results will aid investors so that they may be well informed while contemplating expensive decisions.

Introduction

The nature of real estate brokerage is to arrange an agreement between the parties involved and administer its consummation. For this service, a commission is paid when a title company delivers title and distributes funds. So how does a real estate company get itself into a position where a title company ultimately writes it a check? With neighborhood rumors about a surreal market tantalizing buyers and sellers, payday can be frighteningly

erratic for a real estate agent. The role of GIS amongst the instability of real estate possibilities is to supply visual, factual evidence to its users thereby providing quality service.

Real estate transactions do not flow alike. The people factor alone threatens the integrity of an agreement when dealing with the emotional ups and downs associated with buying and selling property. Suppose a GIS could produce a map that afforded peace of mind to a principle about his or her decision. Effectively, a client's

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insecurities would be appeased. The persuasive capability of an omniscient map could combat remorse and consequently solidify a pending agreement.

While maintaining the sanity of a client throughout a potential transaction is vital, winning a client's trust in the first place is important too. Clients are gained by various methods. A recommendation from a previously satisfied customer is probably the most secure. However, the focus for the production of the large wall map was to target new clientele that may be shopping for a real estate agent. The objective is to impress that individual and subtly solicit the birth of a fiduciary relationship.

GIS Cartography

Software Used

Although much time was spent using Microsoft Excel and Access, the driving software for spatial data operation was ArcGIS, developed by a company called Environmental Systems Research Institute (ESRI). ESRI is the leading GIS software company in the industry (ESRI, 2007a).

Data Acquisition

The majority of data collected for this project were purchased from three county governments in California. The counties charged for the data because according to a provision in the California Public Records Act, a county government may charge a fee for data maintained in an electronic format as long as the fee represents the cost of production of the data (Lockyer, 2005). In this case, San Joaquin County charged

\$200 for one shapefile containing limited attribute information. Chicago Title Company's customer service department provided supplementary tabular data gratis. Stanislaus County delivered the shapefiles for free but charged \$570 for three years of sales data in TAB delimited text files. Merced County charged \$1,000 for GIS data in multiple formats.

Data acquired from these counties included: roads, creeks, canals, rivers, railroads, zoning, cities, lakes, and parcels. Although much data contributed to this project, the parcels shapefiles were the spatial foundation. The parcels shapefiles contained the visual representation of property boundaries and its attributed information. One attribute of significance was the assessor's parcel number (APN), which is a reference number commonly used to identify a parcel. These numbers were used to connect tables for join operations in ArcMap.

Other data utilized for this project came from the public land survey system, the multiple listing service (MLS), and Shane P. Donlon, Inc. The public land survey system provided section line data for free online. The multiple listing service contributed sales and listing data. A membership fee of \$140 per quarter is extended to licensed real estate agents. Finally, sales data from Shane P. Donlon, Inc. was used for display of in-house sales.

Data Configuration

Using ArcGIS, the first objective was to establish a geodatabase and subsequent feature datasets for data consolidation and organization. ArcCatalog was used to establish a common projected

coordinate system for all spatial data which were then appropriately grouped as feature classes according to category.

In ArcMap, the data were reduced in size for efficient processing. Only the study area from the feature classes were selected and exported to a working geodatabase. The tabular data, however, were not easily manipulated. Stanislaus County, for example, sent four TAB delimited text files with 162,629 total records. The data were opened in Microsoft Excel and Access so that it could be edited for a one to one join to the parcels attribute table. The APN columns from each table needed to match exactly in order for the join to be successful. But the APN field in the parcels feature class was formatted as a string (000-000-000) and the data from the TAB delimited text file was read as a number in Microsoft Excel without hyphens. In Excel, hyphens were added with a custom expression using the format cells tool. The data type was then converted to a string for equivalency.

Also in Excel, another text field was manipulated in preparation for the upcoming map display. A column displaying the property owner's full name in upper case letters needed to be altered. A new column was created with the desired outcome of populating it with the owner's last name only in lower case letters, except for the first letter. To eliminate every other word in the string other than the first word, the find and replace method was used with a character code. First, all spaces in the column were replaced with the end parenthesis (") key. This key was chosen because in no situation could this key casually appear thereby spoiling the outcome of the operation for even one record. Secondly, another find and

replace operation was executed wherein the asterisks symbol was used to represent any character or characters. With the focus on the find input box, *)* was entered to be replaced by a no value entry. The result left only the first word of the original string value which was almost always the owner's last name. The data was then ready to be joined in ArcMap.

Symbology

In the beginning, raw, unpolished data populated ArcMap according to random assignments and default settings. Since the objective was to print a map for display, each layer was meticulously symbolized for logical, realistic representation. The Zoning layer was unique because it was categorized into multiple divisions according to specific descriptions in a field. Once each layer was satisfactorily displayed, the features were ready to be labeled and converted to annotation layers.

Labeling and Annotation

Additional skills were required to fulfill the task of specialized labeling in the map. ESRI's virtual campus (ESRI, 2007b) offered two courses entitled, *Labeling in ArcMap: Tips and Tricks*, and *Creating and editing Labels and Annotation*. The courses were detailed and even provided sample code for advanced labeling. The programming language used in the courses and in ArcMap was VB Script. A sample of code was harvested from the *Labeling in ArcMap: Tips and Tricks* course and modified to fit the needs of this project. The code converts all uppercase text in a field to all lower case text except for the first letter of each word. For example,

instead of labeling 'VINEYARD AVE', the code converted it to 'Vineyard Ave', a more appealing display. The code used for this operation is found below:

```
Function FindLabel ([STNAME] )
Dim t, newS, i

t = [STNAME]
newS = UCase(Mid(t, 1, 1)) 'Ucase 1st char
i = 2
Do While i <= Len(t)
' check if previous char is a space
If InStr(1, Mid(t, i - 1, 1), " ",
vbTextCompare) > 0 Then ' space found
newS = newS & UCase(Mid(t, i, 1))
Else
newS = newS & LCase(Mid(t, i, 1))
End If
i = i + 1
Loop

FindLabel = newS
End Function
```

The same outcome could also be accomplished in Microsoft Excel using the PROPER function; however, since the quantity of data did not always cooperate with Excel, it was easier to utilize ArcGIS to debug the code above.

Labeling Solutions

Data obtained from Stanislaus County were incomplete. For example, one of the desired labeling outputs was acreage but the acreage field from the county's TAB delimited text file had some zero values instead of the actual acreage on record. Ideally, the acreage displayed on the map would be consistent with that figure on record at the county, but a "0" value display for a property's area makes no sense. ArcMap contains a shape area field automatically created at the birth of a polygon shapefile. The values were easily converted to acreage using the field calculator supplying two, slightly different values for acreage. The

labeling instructions were coded to use the county's values unless it was a "0" in which case the shape area value would be substituted. To distinguish the difference on the map display, county values were concatenated with 'Ac.' and the few shape area values needed were concatenated with 'AC'. Figure 1 shows an example of the resulting difference.

| | |
|--------------------|--------------------|
| Martin | Moeller |
| 047-008-008 | 047-008-005 |
| 19.64 AC | 14.72 Ac. |

Figure 1. The label on the left shows the acreage calculated by ArcMap and the label on the right is the acreage on record at the county.

The code below was used to make this possible:

```
Function FindLabel
([Join_Me_Stan_OwnerShort],
[Update_Colony_APN],
[AssAcres_ASSACRES],
[Update_Colony_EST_ACRES])

If ([AssAcres_ASSACRES] <> 0) then

FindLabel = [Join_Me_Stan_OwnerShort] &
VBNewLine & [Update_Colony_APN] &
VBNewLine & [AssAcres_ASSACRES] & "
Ac."

Else

FindLabel = [Join_Me_Stan_OwnerShort] &
VBNewLine & [Update_Colony_APN] &
VBNewLine & [Update_Colony_EST_ACRES]
& " AC"

End if
End Function
```

SQL in Labeling

To avoid labeling polygons in the dataset that were of no significance, such as round-a-bouts and streets, a structured

query language (SQL) statement was used as shown below, which eliminates all untaxed polygons:

```
[Update_Colony_APN]<> "
```

This simple statement includes only those parcels with an existing APN.

Labels to Annotation

Annotation stores text or graphics. It can be saved as a separate feature class and edited independently. New annotation layers were created from each layer's labels and stored in the geodatabase as per the suggestion of the ESRI *Creating and editing Labels and Annotation* course. Using the annotation tool bar, the annotation layer could be queried, individually modified and feature linked. Feature linked annotation requires an ArcInfo license (the highest license level) and maneuvers text to follow the curve of a feature.

Annotation Specialization

By using a table of sales data from Shane P. Donlon, Inc., a new layer was created. The table listed the properties that were sold by the company since its inception. The table was joined to the parcels layer so that the sales data could be queried and selected. By exporting those selected parcels, a new layer could be displayed depicting polygons that represented property previously sold by Shane P. Donlon, Inc.

Subsequently, using the newly created layer, a selection by location operation was executed so that the annotation that was contained within the sold properties could be selected and re-symbolized for a unique presentation on the map. The desired effect was to show the viewer that Shane P. Donlon, Inc.

has sold a lot of property. The intended message is that Shane P. Donlon, Inc. is the most experienced, local real estate company. Figure 2 below displays a regularly labeled parcel and one sold by Shane P. Donlon, Inc. for viewer distinction:

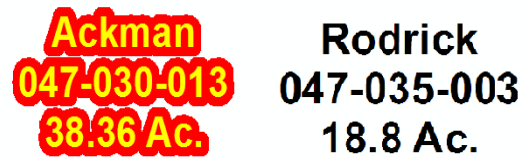


Figure 2. Both labels display property attributes, but the label on the left also shows that the property has been sold by Shane P. Donlon Inc. as indicated by the colored text.

Williamson Act

The California Land Conservation Act of 1965 is commonly referred to as the Williamson Act, which enables local governments to enter into contracts with private landowners for the purpose of restricting that property to agricultural use. In return, landowners receive property tax assessments which are much lower than normal because they are based on farming and open space uses as opposed to full market value (California Conservation, 2007). Williamson Act status was used for map display. A Williamson Act column was populated with a Y or N indicating whether or not the property was or was not under the provisions of the land conservation contract. Another column contained the expiration date if a notice of non-renewal had been filed by the property owner. It was necessary to write additional code to display a meaningful symbol and text to represent this information. Figure 3 shows an example of how the symbol and text was displayed on the map.



Figure 3. This symbol was used on the Patterson Colony Map to indicate that a property was under the Williamson Act contract. A year underneath the symbol was displayed if the contract was scheduled to expire.

The cactus in figure 3 is actually the letter 'Y' in the font ESRI SDS 1.95 1. The 'Y' originated from the Williamson Act column signifying that the property is under the land conservation contract. Rather than label a plain 'Y' inside the polygon, the cactus seemed appropriate considering its representation. The font, however, needed to be converted into legible characters for display of the expiration year. Below is the code used to fulfill this operation:

```
Function FindLabel
([Parcels.Update_Colony_WILLACT],
[Parcels.Update_Colony_WILLYEAR],
[Parcels.Update_Colony_WILLNONREN])

If ([Parcels.Update_Colony_WILLYEAR] > 0)
Then
FindLabel =
[Parcels.Update_Colony_WILLACT] &
VBNewLine & "<FNT name='Arial' size='9'>"
& [Parcels.Update_Colony_WILLNONREN] &
"</FNT>"

End If
End Function
```

Layout

From Science to Art

Once the mechanics of fulfilling layer objectives were achieved, the next milestone was to aesthetically display the map elements. A list of elements

was developed and an 8½ by 11 printout aided in the placement process. Since the map is 67 inches tall and 36 inches wide, eye level positions won elements of higher priority. Two overview maps were included in the layout for reference. Each overview map was assembled in extra data frames in ArcMap. One was of a large scaled map of California identifying the subject area while the other data frame displayed an insert from the California map for additional reference. Data for these data frames were collected from an ESRI media kit wherein a layer file with pre-symbolized data was utilized.

Analysis

Rationale

Since real estate brokerage is a service industry, its product is not tangible. Quality service in the business equates to knowledge, experience and reputation. Prudent clients want to know that they are working with someone who is well informed about the area and its current real estate market trends. Although the question, "What is happening in the real estate market today?" is vague and difficult to answer, customers want a response. Utilizing GIS, a real estate agent could have a few maps prepared for such a moment. Figures 4, 5, and 6 illustrate real estate sales for the last three years.

The maps indicate activity has slowed down dramatically in 2007. In the year of 2005, in Stanislaus County, 14,372 properties were sold. In 2006, 10,394 properties sold and for the first half of 2007, only 470 properties have sold. The credibility of the maps are trustworthy which is exactly how great real estate agents should be.



Figure 4. Each dot represents a property sold in 2005 in Patterson, California, Stanislaus County.

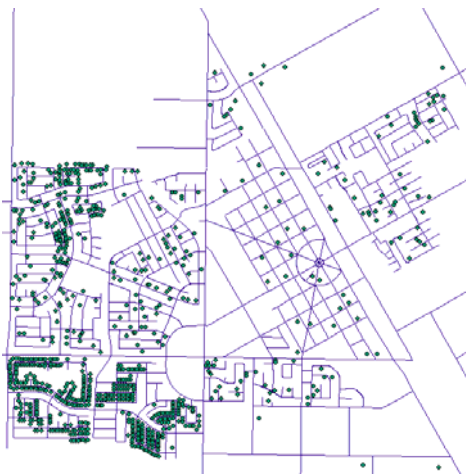


Figure 5. Each dot represents a property sold in 2006 in Patterson, California, Stanislaus County.



Figure 6. Each dot represents a property sold through June of 2007 in Patterson, California, Stanislaus County.

The next question that may be asked from potential customers is, “Why?” Although many factors sway real estate activity, typically, as the cost of money increases, real estate activity decreases. Figure 7 is a graph showing the relationship of one company’s variable loan pricing with time (Yosemite Farm Credit, 2007).

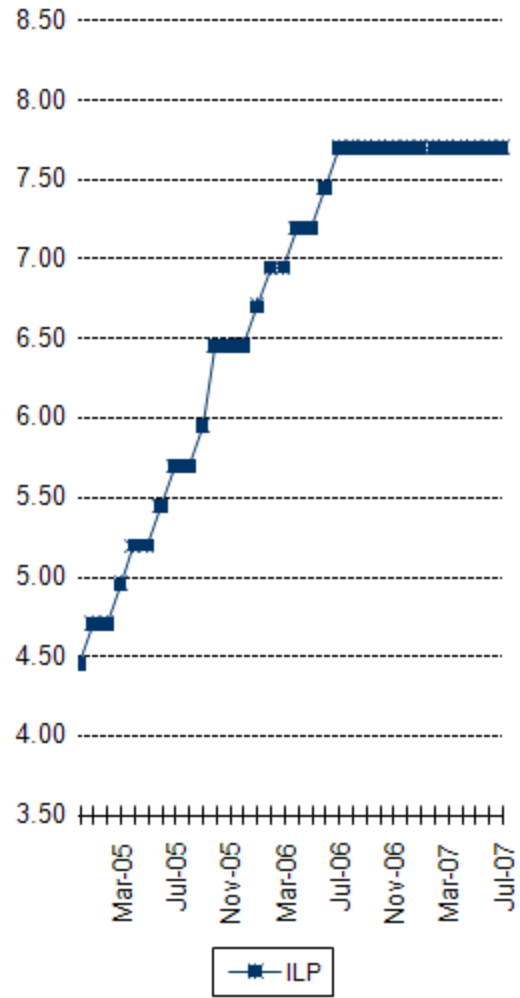


Figure 7. ILP represents Yosemite Farm Credit’s Variable Loan Pricing which is based upon the Libor Index.

The MLS and GIS

Residential Real Estate

Much of a real estate agent’s life is spent

studying the matrix of the multiple listing service (MLS). The (MLS) provides a network of real estate information to real estate brokers and agents in the Northern California Central Valley. Within the geographic service area, real estate professionals have access to every listing and sale within the database (MetroList Services, Inc., 2007). For example, the information about the average price of a home that had between 1,500 and 2,000 square feet sold in Patterson, California in 2004 with at least 3 bedrooms and 2 bathrooms closed at \$316,011. In 2005, the average home under those same criteria sold for \$400,994. In 2006, that same average home sold for \$413,334 and in 2007 it went for \$349,919. The current, average asking price for a home under those same criteria as of September 18, 2007 was \$329,669. Since the current asking price for houses is about 5.8% lower than the sales prices of generally comparable houses from previous year, it is reasonable to conclude that today, property values are depreciating. Information availability of the MLS is impressive and invaluable useful for industry professionals. However, although the MLS allows for a search by area, the selectable boundaries are broad in range, crude and confusing amongst MLS subscribers. The checkbox option for the area of Patterson encompasses approximately 72 square miles. Since the relevance of location is key for clientele, the introduction of GIS seems idyllic. While logged in to the MLS, a vast amount of data can be exported into a .CSV file, opened in Microsoft Excel and added to ArcMap. The very same analyses can be performed by ArcGIS as with the MLS. But the GIS can incorporate a spatial

aspect in a way that the MLS cannot. Suppose a client seeks a home located no further than one half mile away from his or her sister's house. A GIS can operate the same search as discussed earlier but include a distance parameter of any length from any point on earth.

Using MLS data, a GIS can produce a map for a client that could reduce the mystic of house hunting, thereby calming apprehension. Figure 8 illustrates an example of what a client could observe from a GIS.

Agricultural Real Estate

Agricultural real estate differs from urban, residential real estate in many respects. Agricultural real estate usually costs more, has more land, and sometimes does not even come with a home. In a suburb, neighboring properties are relatively similar, whereas in the country, neighboring properties can be very different from one another. Figure 9 conveys an example of how agricultural property can be displayed and labeled using GIS. Since neighboring properties in the county can differ greatly, they are indistinctly comparable. Nevertheless, if a prudent buyer was to consider purchasing one of those green polygons, he or she would want to know about the red ones.

Discussion

The Bottom Line

The underlying, pressing question throughout the development of this project was, "How can GIS make money for a real estate company?" After all, the software does not arrange meetings, negotiate contractual terms, or even

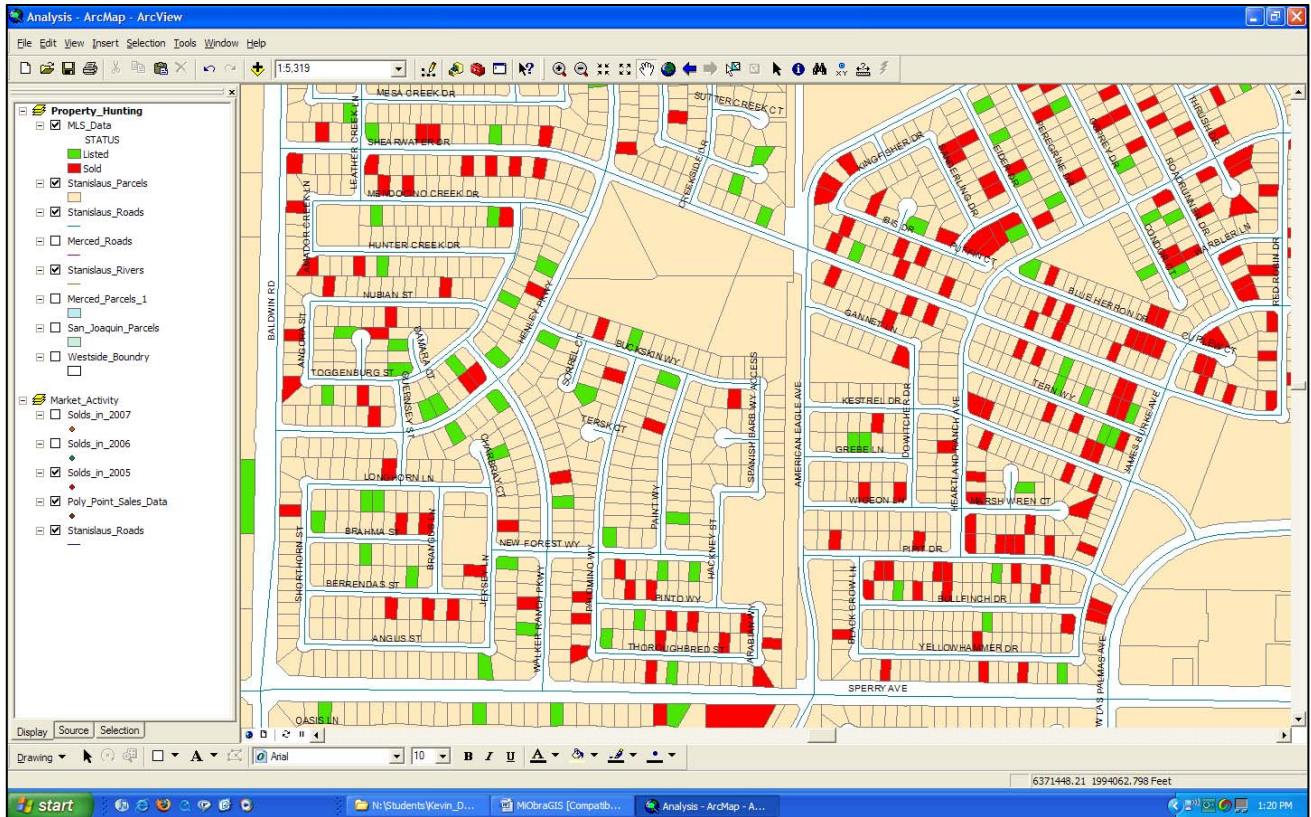


Figure 8. Using ArcMap, a visual understanding of neighborhood real estate activity is gained. The Green Parcels represent properties that are for sale. The red parcels show those properties that have sold.

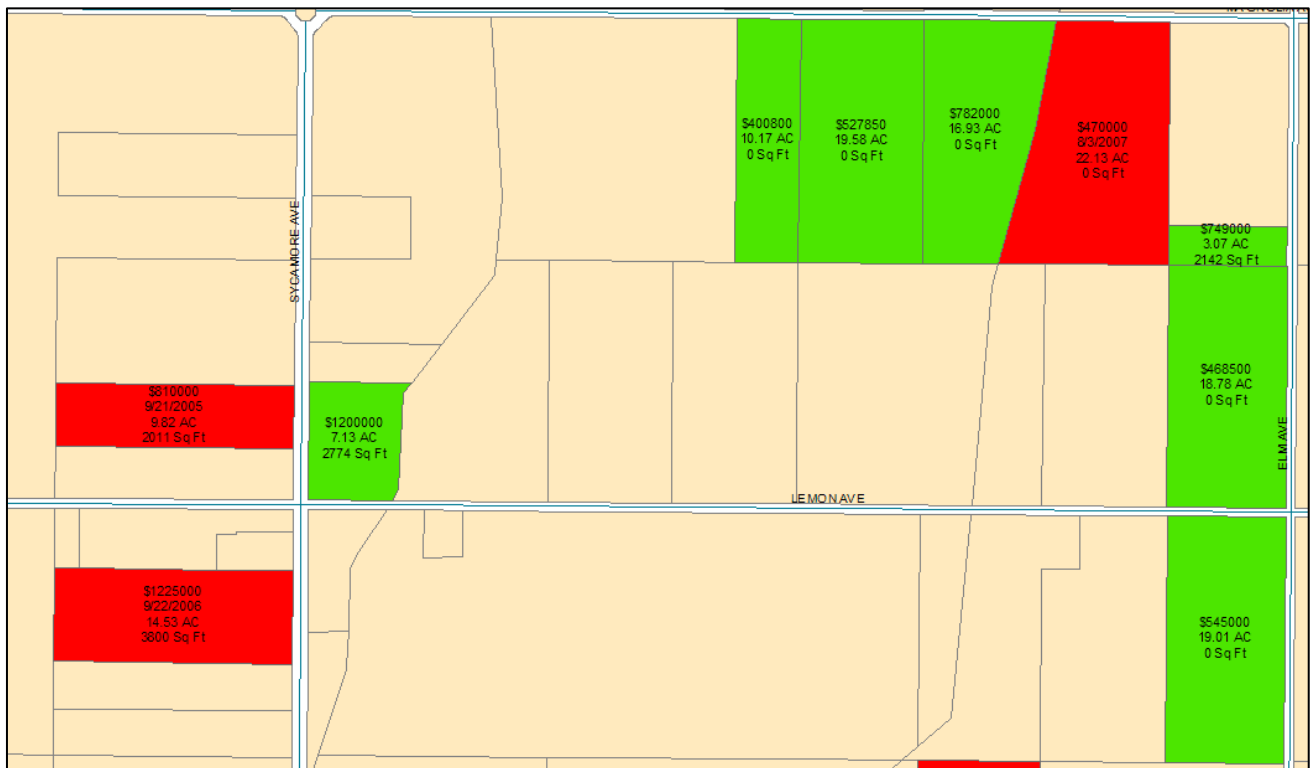


Figure 9. Some of the property's attributes have been labeled for a quick, visual comparison.

smile.

It can, however, serve a real estate company in the arduous process of achieving buyer and seller acceptance. If even one client is procured as a result of the use of this technology which leads to a transaction that is consummated, the investment of GIS will have paid for itself.

Today and Tomorrow

Real estate entrepreneurs would be very interested to know if GIS could forecast real estate values. GIS analysis, however, is only as precise as the data provided. Some details about real estate are not recorded. For example, suppose two new homes next to each other of equal size and design sell on the same day for the same price. One year later, comparable sales data may indicate that those two homes are worth the same. But if one owner added a cement patio and a hot tub while the other poorly maintained his or her residence, that difference would not be reflected in a data analysis of property values. Nevertheless, as technology continues to advance, data acquisition, storage and manipulation become easier and less expensive. The identification of real estate attributes is becoming more detailed. As the precision of this data improves, so will the reliability of GIS analysis.

As for now, the threat of real estate market uncertainty will continue to haunt investors.

Troubleshooting

ArcGIS 9.1 and Microsoft Office Suite 2003 were used at the beginning of this project, but by its completion, ArcGIS was upgraded to 9.2 and Microsoft

Office Suite to 2007. The difference between the two ArcGIS grades was minor, but Microsoft 2007 was superior than 2003 because the newer version of Excel allows for 1,048,576 records of data input. Microsoft Excel 2003 only permits 65,536 records. Since the parcels layer for Stanislaus County contains 162,629 records, data management was challenging.

ArcGIS 9.1 and 9.2 struggled to display even one county of parcel data. The three counties together contained about 500,000 polygons so adding them all to the map was unreasonable. The data had to be clipped into manageable sizes to keep ArcMap from continuously crashing.

Another time consuming aspect to the project was updating the sales spreadsheets obtained from Shane P. Donlon, Inc. The sales data acquired from the real estate company was entered over a period of 10 years. Since then, many of the current APNs have changed. Independent investigation was required to reconcile the sales spreadsheets with ArcMap's attribute table so a one to one join would be successful.

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