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CRP 570: GEOGRAPHIC INFORMATION SYSTEM (GIS)  
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Term Project Paper  
on

**5 Real-Life cases analyzed through GIS**

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## 1. INTRODUCTION :-

Maps have been used since hundreds of years to represent geographical features. The maps contained limited amount of information related to those features as well as to the map itself. During the last few decades, many science fields are becoming of great importance such as geographical changing, environmental problems, and regional planning problems as an example. Maps were not capable of handling greater amounts of attributes to those specific geographical features, thus delaying any possible improvements with this regard. Also maps were completely rigid when it came to performing any analyses.

The idea of having a system combining both geographical presentations as well as presenting all the possible related attributes, was placed under actual testing in the early 1960's when the Canadian government started a nation wide project to do so.

This idea was continuously shaped with time, and formed what was later known as the Geographic Information System (GIS). The system has been shaped much on which it is now able to perform endless number of analyses operations concerning many aspects, such as regional planning, map production, environmental control...etc.

The following definition for Geographic Information Systems (GIS), has become increasingly adopted in many subject-related literatures:

GIS is a system of hardware, software and procedures designed to support the capture, management, manipulation, analyses, planning and display of spatially-referenced data for solving complex planning and management problems \*.

With the enormous advancement in the computer technology, this had become an interesting field for many governments as well as many private sector firms.

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\* This definition has been quoted from Dr.Baquer Al Ramadan Notes on the GIS subject, CRP 570Course, fall 99 semester, KFUPM, Dhahran, Saudi Arabia.

## 2. PROBLEM STATEMENT: -

In this project I will try to show five real-life situations where a solution can be obtained quite efficiently through using a geographic information system.

These five situations are described-briefly- as follows: -

- I. A location is required to construct a new chemical plant on, within the US territory. The site should have the following characteristics:
  - ☞ Exactly on a lake (having a minimum area of 5000 square meters as required by federal regulations to avoid any environmental hazards, such as pollution).
  - ☞ Near to a highway, by no farther than 5 miles.
  - ☞ Away from any main city, by not less than 50 miles.
  - ☞ The nearest city should not have a population more than 50,000 people.
  
- II. A marketing firm wishes to launch a 30 SECOND-TV COMMERCIAL campaign in some US cities, for some new Asian products. It will be displayed on local TV channels every 30 minutes between 4PM & 10PM. It hopes to have the biggest response from the Asian community. As such, and due to the limited budget for the campaign, the firm wishes to know the best US cities to implement the campaign.
  
- III. An Olympic games committee is searching for five main cities to sponsor a boat race next to them. These five cities should have the following characteristics :
  - ☞ Next to the Canadian border (within 100 miles of the boarder on the US side).
  - ☞ Next to a river/lake or both, having a straight section not less than 10 miles.
  - ☞ Each city should have a population not more than 75,000 people.
  - ☞ All of these cities should be accessible from any major highway by not more than 25 miles.
  
- IV. The department of health in USA is planning a three-day campaign for poliomyelitis for children under 5 years of age. It estimates that a medical team consisting of one doctor and two nurses will be able to attend 200 child-on average - during this three-day

campaign. The department wishes to plan its resources (required medical teams/required amount of vaccine), in advance to make the necessary arrangements.

V. A real estate office in USA is planning to prepare a summary list of vacant homes available in major US cities. The summary should contain details of average purchase prices for homes offered as ownership, including all details concerning their location and any other related information about them. Also he would like to have a less detailed idea about vacant homes offered as rent.

### 3. AREA OF STUDY: -

The area of study for the entire five situations that we are trying to resolve is "The United States of America - USA".

#### 4. DATA COLLECTION: -

The data required for the analysis was obtained from Environmental Systems Research Institute - ESRI. This data was placed inside a CD-ROM titled ArcView GIS, version 3.0a for windows. The directory to reach these data is ESRI\ESRIDATA/USA. This directory contains a project named usa.apr on which it contains the following: -

- A view for continental United States.
- Attribute tables for the following:
- Attributes of major US cities.
- Attributes of major US lakes.
- Attributes of major US Highways.
- Attributes of major US Rivers.
- Attributes of major US countries.
- Attributes of major US States.
- Attributes of US City level demography.
- Attributes of US County level demography.
- Attributes of US State level demography.

In one of the above situation, the boat-race case, extra data about Canada is required. The directory for this data within the aforementioned ESRI - CD - ROM is ESRI \ ESRIDATA\ NAMERICA. A project named namerica.apr will open and it will contain exactly the above contents of usa.apr in addition to similar views & tables for both Canada and Mexico.

## 5. TOOL OF ANALYSIS: -

The tool of analysis for this project is ArcView GIS software.

ArcView GIS software is a desktop GIS with an easy-to-use point-and-click graphical user interface that lets the user easily load spatial and tabular data in order to display those data as maps, tables and charts. Arc View provides the tools a user needs to query and analyze the data and present his results as presentation-quality maps.

Environmental Systems Research Institute, Inc. (ESRI), California, USA, makes this software.

Version 3.0a shall be used in this project.



## 6. ANALYSIS: -

In the following lines I will try to explain some of the important steps taken in the analysis of each of the five projects, as detailed as possible.

### I. **PROJECT NO. (1) :-**

#### SUBJECT: LOCATION FOR CHEMICAL PLANT IN USA.

1. Open project usa.apr, then save it as chemical-plant.apr.
2. Make the major lakes (USA) theme active.
3. Open the attribute table for the major lakes theme.
4. Build a query for ( $[Area] \geq 5000$ ), in order to select lakes that have a minimum area of 5,000 square miles.
5. Promote the selected lakes (5-records).
6. Make the name field, within the table of attributes, active, and then summarize the selected records.
7. Save the selected records as "selected lakes area more than 5000", and add the following fields to the summary table:
  - Shape field: summarized by merging
  - Name field: summarized by the first.
  - Area field: summarized by the summation.
8. Include the new shape file for the latter summary table within "Allocating a proposed location for a chemical plant in USA" view, as a new theme.
9. By double clicking on the legend of the new theme, the legend editor opens.
10. Select an appropriate color to show the selected lakes that have an area more than 5,000 square miles, in the view.
11. Open the attribute table for the new theme, then by opening the table properties from the table pull-down menu, the area field name is changed through the alias, and the count and avg-count fields are hidden by ticking them off.
12. Select all records within this theme, "Selected lakes area more than 5000", then close the attribute table.
13. Make the major cities (USA) theme active.
14. From the theme pull-down menu, choose the select by theme option.

15. In the select by theme dialog box, prepare a new set for “ USA major cities that are within 50 mile distance from the selected features of selected lakes having area more than 5000 square miles” , then build a query for another set within this set for those cities having a 1990 population less than 50,000.
16. Open the major cities (USA) attribute table, then promote the selected cities.
17. Make the city-name field active, then summarize the selected records into a new table saved as “selected cities next to selected lakes” and contain the following fields: shape/name/state/type/capital/elevation/pop1990. This new summary table shall be placed as a new theme within the “Allocating a proposed location for a chemical plant” view.
18. By opening the attribute table of this new theme, then opening its properties from the table pull-down menu, renaming of the fields is done in the alias as well as hiding unnecessary fields. The table is then closed.
19. The legend of this new theme is also adjusted in its shape, size and color through the legend edition, which opens its dialog box by double clicking on the legend of the theme.
20. Another selection for cities that have a 1990 population more than 50,000 is made out of the previous new theme ,in the same manner as described in steps 12 to 19 , above. The new theme is titled “ Nearby cities pop more than 50”.
21. The highway features that are within 5 miles from the selected lakes having an area of 5000 square miles, are also selected in the same manner described in steps 12 to 19, above, except that the target theme is the “major highways (USA)”. The new set is shown as a separate theme titled” Highways-Selected lakes 5 miles”, which has its own table of attributes and its new legend (type/color/size).
22. By showing all the features of the following themes:  
US counties/US States/Selected lakes area more than 5000/Selected cities next to selected lakes/nearby cities pop more than 50/ highways-selected lakes 5 miles , which is done by ticking on each of these themes, and keeping the US counties theme over the US states theme, visual inspection of the possible areas to contain a location for the chemical plant is made.
23. Four counties seem to have good location for this chemical plant, especially when checking for the distance between the nearest city and the vicinity of each of these four counties by using the “measure” icon , which proves that the

nearest city to the suggested area within these four counties is more than 50 miles.

These countries are: Lake, Cook, Emmet and Mackinac.

24. Make the US counties theme active, then select all these four counties by the "Select feature" icon and the shift key.
25. Open the US counties theme, then promote the selected records and summarize them after making the name field active, and putting them as a new theme named "Selected counties" within the project view, in the same manner as detailed in steps 3 to 10 , above.
26. Label all the selected features of lakes that have an area more than 5000 square miles, selected counties and the US states containing the selected counties ,by using the label icon and adjusting its font, size and color by opening the font pallet from the show symbol window option in the window pull-down menu. The location of each label is adjusted by the mouse by dragging each title to the appropriate location after clicking on the "pointer" icon.
27. Close the view.
28. Open the tables summary within the project.
29. Open the selected counties table of attributes.
30. Click on the "Create Chart" icon, and name the chart "US counties having the proposed location for the chemical plant - area details", add the area group, and label the series using names.
31. By clicking on the "chart element properties" icon , adjustments for the title name, x-axis label, y-axis label and scale units is made as seen in the final chart layout.
32. Steps 28 to 31, above, are repeated to accommodate the population details instead of the area details of the selected counties. The new chart is name US counties having the proposed location for the chemical plant- population details".
33. Close the chart view.
34. Click on the layouts summary within the project window, and open a new layout.
35. Setup the layout page to a landscape orientation from the page setup option in the layout pull-down menu.
36. From the "view frame" icon select the appropriate view/legend/scale bar/north arrow/table of attributes/chart, each in a separate command then selecting a presentation area within layout, for the already available views, tables, charts.
37. By using the "Text" icon, a title for the layout is made "Proposed location for the chemical plant", which is

adjusted by the font pallets from the show symbol windows option on the windows pull-down menu.

38. From the layout properties, rename the layout from "Layout 1" to "Layout for the proposed location for the chemical plant".
39. Adjustments for the final size and locations of the view, table, chart, scale bar, legend, north arrow, and the title are made by dragging them with mouse after pointing at each.
40. Close the layout window.
41. Save the project, as it is now ready.

## II. PROJECT NO. (2):-

### SUBJECT: ASIAN PRODUCTS MARKETING CAMPAIGN

1. Open project usa.apr, then save it as asian-marketing.apr.
2. Delete the major rivers, major lakes, major highways themes, as they are not necessary.
3. Make the US states theme active.
4. Open the attribute table for the US States theme.
5. Make the Asian-Pi field active, then open its statistics from the field pull-down menu. We observe the following :  
The mean = 142,621.  
Close the statistics table by clicking OK.
6. Build a query for:  
([Asia-Pi] >= 142,621)  
to select US states having a minimum asian population of 142,621 people.
7. Promote the selected States (10-records).
8. Make the name field, within the table of attributes, active, then summarize the selected records.
9. Save the selected records as "High Asia-Pop states", and add the following fields to the summary table:  
Shape field: summarized by merging  
State-name field: summarized by the first.  
Sub-Region field: summarized by the summation.  
State-abbr field: Summarized by first.  
Pop 1990 field: Summarized by summation.  
Asian-Pi field: Summarized by summation.
10. Include the new shape file for the latter summary table within "Location survey for marketing Asian products" view, as a new theme.

11. From the table pull down menu, click on start editing.
12. From the edit pull down menu add new fields:  
One to be named: Asian Population.  
The second to be named: Total 1990 Population.
13. Make the Asian Population field active.
14. From the "calculate" icon, prepare the following:  
Sum-Asian-pi.Abs, to have the absolute value.
15. Repeat the same steps 13-14, above, for the total 1990 population.
16. Close the table.
17. By double clicking on the legend of the new theme, the legend editor opens.
18. Select an appropriate color to show the selected High Asia-Pop. States , in the view.
19. Open the attribute table for the new theme, then by opening the table properties from the table pull down menu, some field names are changed through the alias, while other unnecessary fields are hidden by ticking them off.
20. Select all records within this theme, " High Asian-Pop states" then close the attribute table.
21. Make the major cities (USA) theme active.
22. Open its table of attributes and make the asian-Pi field active.
23. Open its statistics from the field pull down menu.  
We find that.  
Mean = 1,928.  
Standard deviation = 13,680.  
The total of them = 15,608 (mean plus one standard deviation). We shall target the cities that have a minimum Asian population of 15,000 people, as such.
24. Make the major cities (USA) theme active.
25. From the theme pull-down menu, choose the select by theme option.
26. In the select by theme dialog box, prepare a new set for:  
USA major cities that are within the selected features of high Asian Pop.states , then build a query for another set within this set for those cities that have an Asian Population less than 15,000.
27. Open the major (US) cities attribute table, and promote the selected cities.
28. Make the city-name field active, then summarize the selected records into a new table saved as "High Asian-Pop. Cities" , and add the following fields:  
Shape/ city-tips/state/type/capital/elevation/pop 1990/ Asian-Population.

This new summary table shall be placed as a new theme within the “Location survey for marketing Asian products” view.

29. By opening the attribute table of this new theme, then opening its properties from the table pull-down menu, renaming of the fields is done in the alias as well as hiding unnecessary fields. The table is then closed.
30. The legend of this new then is also adjusted in shape, size and color through the legend editor which opens its dialog box by double clicking on the legend of the theme.
31. Make the US states theme active.
32. Double click on the legend to open the legend editor.
33. Choose a graduated color legend type, and classify it within 2 classes through the classify button, then make the value for the first graduation as 0 - 142620, and the other as 142,621 to 2850 000, then change the label to < 142,621 and > = 142,62 respectively. Give them appropriate colors, then press on the apply button.
34. Close the view.
35. Open the tables summary within the project.
36. Open the high Asian Pop.cities table of attributes.
37. Click on the “Create Chart” icon, and name the chart “proposed campaign cities having the highest Asian population”, then add the asian-population group, and label the series using names.
38. By clicking on the “chart element properties” icon, adjustment for the title name, x-axis label, y-axis label and scale units is made as seen in the final chart layout.
39. Steps 28 to 31, above, are repeated but for the states having the highest Asian population. The new chart is named “US states having the Asian Campaign”.
40. Close the chart view.
41. Click on the layout summary within the project window, and open a new layout.
42. Setup the layout page to a landscape orientation from the page setup option in the layout pull-down menu.
43. From the “view frame” icon select the appropriate view/legend/scale bar/north arrow/table of attributes/chart, each in a separate command then selecting a presentation area within layout, for the already available views, tables, and charts.
44. By using the “Text” icon, a title for the layout is made “Asian Products Marketing Campaign in 10 US States “, which is adjusted by the font pallets from the show symbol windows option on the windows pull-down menu.

45. From the layout properties, rename the layout from "Layout 1" to "proposed major cities to have the Asian Products campaign".
46. Adjustments for the final size and locations of the view, table, chart, scale bar, legend, north arrow, and the title are made by dragging them with mouse after pointing at each.
47. Repeat steps 41 to 46, above, to make another layout named " US states having the Asian Products campaign".
48. Close the layout window.
49. Save the project, as it is now ready.

### **III. PROJECT NO. (3):-**

#### **SUBJECT: OLYMPIC GAMES, BOAT-RACE, CITIES LOCATION**

1. Open project usa.apr, then save it as boat-race.apr.
2. Delete all the themes related to Mexico
3. Make the US States theme active.
4. Give a separate color for the US States legend through the legend editor and the color palette.
5. Do the same for Provinces (Canada) after making this theme active.
6. Make the US States theme active again.
7. Within the select feature icon, select the US states next to the Canadian boarder.
8. Open the attribute table for US States theme.
9. Promote the selected States (10-records).
10. Make the name field, with the table of attributes, active, then summarize the selected records.
11. Save the selected records as "US-Canada boarder States", and add the following fields to the summary table:
  - Shape field: summarized by merging
  - State-name field: summarized by the first.
  - Area field: summarized by the summation.
  - State fips: summarized by the first.
  - State region: Summarized by the first.

State abbr: summarized by the first.

1990 Pop: summarized by the summation.

12. Include the new shapefile for the latter summary table within "Location survey for boat-race during the coming Olympic games" view, as a new theme.
13. By double clicking on the legend of the new theme, the legend editor opens.
14. Select an appropriate color to show the selected US States next to the Canadian boarder, in this view.
15. Open the attribute table for the new theme, then by opening the table properties from the table pull down Menu, some field names are changed through the alias, while other unnecessary fields are hidden by ticking them off.
16. Make the major cities (US) theme active.
17. Adjust the shape, size and color of the legend for this theme through the legend editor.
18. By adjusting the view scale to almost 2,500,000, which will give an approximate distance within the upper and lower ends of the view around 100 miles, we start selecting the cities (features) that are within this view along the US-Canada boarder within the 10 US States already selected, and by dragging the view to all areas by using the "Pan" icon. All the cities lying within this view shall be selected through the "select feature" icon and the shift key.
19. Open the attribute table of major cities.
20. Promote the selected records.
21. Make the name field within the table of attributes, active, then summarize the selected records.
22. Save the selected records as " cities within 100 miles from Canadian boarder", and add the following fields to the summary table [shape / name / area].
23. Include the new shapefile of this summary table within the project view.
24. Select an appropriate color for the selected lakes, throughout the legend editor.
25. Open the attribute table of the new theme then select the table properties to change some field names, and to hide the unnecessary fields.
26. By making this new theme active, and building a query for those who have a population less than 75,000 people, another list is obtained which is given a new summary table and placed in the project view as a new theme named " boarder cities less than 75".
27. Keep this new theme active and select all its records after opening its table of attributes.



28. Make the major Highways (USA) theme active, then from the theme pull-down menu, choose select by theme option for selecting features of major Highways that are within 25 miles distance from the selected boarder cities less than 75.
29. Open the table of attributes for major highways (USA), then promote the selected features, summarize it, and place it as a new theme within the project view. Name this theme as " Highways 25 miles to boarder cities".
30. Adjust its legend through the legend editor.
31. By repeating steps 27-31, above, a new theme for "US for major rivers 10 miles near boarder cities" is also prepared.
32. Make the major lakes (USA) active, and select the lakes exactly on the US-Canada boarder and save them in a separate theme named "Boarder Lakes" in the same manner for US-Canada boarder states.
33. Make all the following themes displayed within the view: -
  - Border cities less than 75.
  - Highways 25 miles to boarder cities.
  - Border lakes.
  - US major rivers 10 miles near boarder cities.
  - Provinces (Canada).
  - US Canada Boarder States.
34. Make the Boarder cities less than 75, theme active.
35. By checking in the view we can select the best group of cities which can sponsor the intended boat race.
36. The selected features are summarized and placed as a new theme within the view, named as "Proposed cities for race".
37. The states that contain these selected cities are also selected and placed under a separate theme named as " State-race".
38. Label most of the selected features within the view by the label icon and adjust its font, size and color by opening the font pallet from the show symbol window option in the window pull-down menu. The location of each label is adjusted by the mouse by dragging each title to the appropriate location after clicking on the "pointer" icon.
  39. Close the view.
39. Open the tables summary within the project.
40. Open the State-race table of attributes.
41. Click on the "Create Chart" icon, and name the chart "States sponsoring the race", add the area group, and label the series using names.

42. By clicking on the “chart element properties” icon, adjustment for the title name, x-axis label, y-axis label and scale units is made as seen in the final chart layout.
43. Close the chart view.
44. Click on the layouts summary within the project view, and open a new layout.
45. Setup the layout page to a landscape orientation from the page setup option in the layout pull-down menu.
46. From the “view frame” icon select the appropriate view/legend/scale bar/north arrow/table of attributes/chart, each in a separate command then selecting a presentation area within layout, for the already available views, tables, charts.
47. By using the “Text” icon, a title for the layout is made “Proposed US States and cities to sponsor the 2002 Olympic games-Boat race” which is adjusted by the font pallet from the show symbol windows option on the windows pull-down menu.
48. From the layout properties, rename the layout to “Layout of proposed location for Boat race”.
49. Adjustments for the final size and locations of the view, table, chart, scale bar, legend, north arrow, and the title are made by dragging then with mouse after pointing at each.
50. Close the layout window.
51. Save the project, as it is now ready.

## **IV. PROJECT NO. (4):-**

### **SUBJECT: POLIO VACCINATION CAMPAIGN IN USA**

1. Open project usa.apr, then save it as polio\_usa.apr.
2. Delete the major rivers, major lakes, major highways themes, as they are not necessary.
3. Make the US states theme active.
4. Open the attribute table for the US States theme.
5. Start editing by selecting this option table pull-down menu, and adding a new field from the edit pull-down menu, to label it “MD TEAMS”.
6. By using the calculate icon, the values of this field is calculated as the absolute value of dividing the Pop\_under5 field value over 200.

7. By using the edit icon, all the zero values in the MD TEAM field can be changed to a value of 1, then saving the edits made.
8. Repeating steps 3 to 7 for the US counties theme, and the major cities in USA, will result in new fields in these tables of attribute for the no. of medical teams in them.
9. By double clicking on the legend of the US states theme, the legend editor opens.
10. Change the legend type to a graduated color using the MD TEAM criteria, to three categories. Give it an appropriate color.
11. Repeat steps 9 and 10 to do the same for the US counties theme, except that the legend shall be consisting of four categories.
12. Change the theme name of US states and US counties to MD TEAMS / US States and MD TEAMS / US Counties, respectively, through the theme properties.
12. Close the view.
13. Open the tables summary within the project.
14. Open the major cities (USA) table of attributes.
15. Click on the "Create Chart" icon, and name the chart "polio campaign in USA", then add the medical teams group, and label the series using names.
16. Due to the big amount of data it was not possible to create a chart.
17. Close the chart view.
18. Click on the layout summary within the project window, and open a new layout.
19. Setup the layout page to a landscape orientation from the page setup option in the layout pull-down menu.
20. From the "view frame" icon select the appropriate view/legend/scale bar/north arrow/table of attributes/chart, each in a separate command then selecting a presentation area within layout, for the already available views, tables, and charts.
21. By using the "Text" icon, a title for the layout is made "polio vaccination campaign in USA ", which is adjusted by the font pallets from the show symbol windows option on the windows pull-down menu.
22. From the layout properties, rename the layout from "Layout 1" to "polio campaign in USA".
23. Adjustments for the final size and locations of the view, table, scale bar, legend, north arrow, and the title, all are made by dragging them with mouse after pointing at each.
24. Close the layout window.
25. Save the project, as it is now ready.

## V. PROJECT NO. (5).

### SUBJECT:HOME VACANCIES ( OWNERSHIP/RENTAL)

1. Open project usa.apr, then save it as realestate\_vacant.apr.
2. Make the major cities (USA) theme active.
3. Open the attribute table for the major cities (USA) theme.
4. Build a query for:  
([Median value] < 25000)

to select major cities (USA) having an average maximum ownership value for vacant homes of \$ 25,000.

5. Promote the selected major cities (USA).
6. Make the name field, within the table of attributes, active, then summarize the selected records.
7. Save the selected records as “vacant own-home value less than 25”, and add all the fields available in the original table to the summary table.
8. Include the new shape file for the latter summary table within “vacancies in owned/rented homes in major US cities” view, as a new theme.
9. Repeat the same steps 2-8, above, for the following ranges of average median ownership value of vacant homes; [\$ 25,000-\$ 50,000 / \$50,000-\$100,000 / \$100,000- \$200,000 / >\$200,000].
10. Close the table.
11. Adjust the shape, size, and color of legend for all the five new themes, earlier made, by using the legend editor that opens its dialog box by double clicking on the legend in each theme.
12. Make a copy for the major cities (USA) theme, then past it in the same view, through the edit pull-down menu.
13. By double clicking on the legend of the major cities (USA) copied theme, the legend editor opens.
14. Change the legend type to a graduated color one, on the basis of median rent for vacant rent home.
15. Select an appropriate color, shape, and size to show the different grades of vacant rent homes within the major cities (USA) theme, in the view.
14. Close the view.
15. Open the tables summary within the project.
16. Open the “vacant own-homes value less than 25” table of attributes.
17. Click on the “Create Chart” icon, and name the chart “vacant own-homes value less than 25, then add the vacant group, and label the series using names.
18. By clicking on the “chart element properties” icon, adjustment for the title name, x-axis label, y-axis label and scale units is made as seen in the final chart layout.
19. Close the chart view.
20. Click on the layout summary within the project window, and open a new layout.
21. Setup the layout page to a landscape orientation from the page setup option in the layout pull-down menu.

22. From the “view frame” icon select the appropriate view/legend/scale bar/north arrow/table of attributes/chart, each in a separate command then selecting a presentation area within layout, for the already available views, tables, and charts.
23. By using the “Text” icon, a title for the layout is made “location of vacant homes in major US states”, which is adjusted by the font pallets from the show symbol windows option on the windows pull-down menu.
24. From the layout properties, rename the layout from “Layout 1” to “locational details of vacant homes in major US cities”.
25. Adjustments for the final size and locations of the view, table, chart, scale bar, legend, north arrow, and the title are made by dragging them with mouse after pointing at each.
26. Close the layout window.
27. Save the project, as it is now ready.

## 7. PROBLEMS FACED: -

During the work of this project, I faced the following problems:

- 1) Showing tables & charts within the final layout for each project was not possible. Instead a gray box area was shown.

Although I have tried it much, I was not able to solve this problem. I even contacted Mr. Razi of the GIS laboratory in the University whom he was kind enough to spend almost one hour and a half , yet without a positive result.

- 2) The sudden computer hardware failure resulting in ending the work in the project unwillingly with the lose of plenty of unsaved operations. I have repeated the first three projects almost for three times. This had an advantage however: In every time I repeat a project I was able to point new approaches to the problem solution, faster than the ones before it, yet it was on the cost of extremely extra time & effort. The last of these failures in the computer hardware was during preparing this final report on which I was delayed for almost four hours of work , causing a delayed submission to the next day from the set submission date.

## 8. CONCLUSION :-

A geographic information system is a powerful tool to make analysis of endless number of relationships between the geographic features and their attributes.

This ofcourse is dependant on the amount of available data within the system, its integrity, consistency, and triunes.

The human decision should not be overlooked in any time.



# **PROJECT'S LAYOUTS**