GIS & Spatial Thinking for Social Sciences at HBCU's

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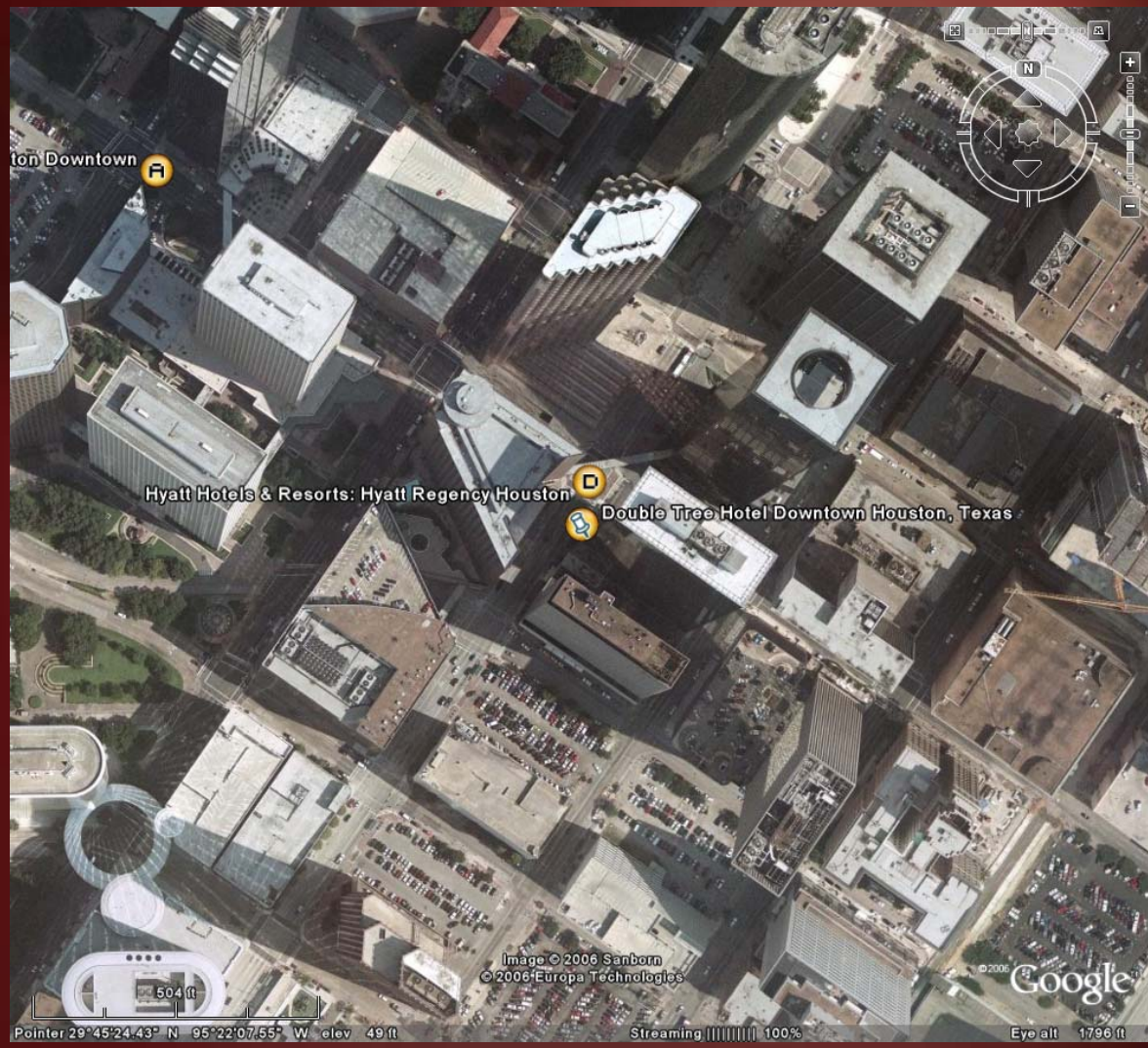
Overview

- GIS and Spatial Thinking in Social Sciences
- Issues for HBCU's
- Class GIS Project:
  - Spatial Analysis of Drug Arrests & Juvenile Delinquency
- Locating GIS Databases
- Data Visualization Exercises:
  - Environmental Justice
  - Redistricting
- Data Sources & References
- Where to Learn More About GIS…..

GIS and Spatial Thinking in Social Sciences

According to geospatial scholars and experts, most problems facing the world today, cultural, environmental, economic, political, or social—exist in a geographic context.



GIS and Spatial Thinking in Social Sciences

Geographic Information Systems, Interactive Electronic Databases and Data manipulation and Data Visualization software properly utilized can give students, academics and activists tools needed to conceptualize socio-economic and political problems accurately and therefore create appropriate solutions.

Issues for HBCU's to establish GIS

- GIS Lab setup:
  - Hardware
  - Software
  - Network Issues (data storage, access…)
  - Data (City/County GIS; Downloads….)
- Faculty Training
- GIS Emphasis: Analysis only vs GIS Skills
- With GIS Skills: Analytical vs Technical

Issues for HBCU's: What you will need

1. A laptop and desktop computer and/or access to computers and fast data networks (DSL, Cable Modem, TI, Wireless).
2. A Gigbyte Flash Drive for storing and retrieving working files.
3. A PDA or some sort of device to aid with time management and project scheduling.
4. Microsoft Office Suite: Word, Excel, Access, Publisher, Frontpage.
5. Data Analysis Software such as SPSS or SAS.
6. Bibliographic Utility to store and retrieve references and manage note taking.
7. Adobe Document Reader
8. WinZip or some other Compression/Decompression Utility.
9. Photo Editing Software
10. A digital camcorder and camera.
11. Spatial Analysis and data visualization software such as ArcExplorer2 Java Education Version Geographic Information Systems (GIS) Dataviewer or full GIS software such as ArcExplorer, ArcGIS, Maptitude, GeoDa, and Flow Mapper.
12. Communications software such as Outlook, Gmail, Hotmail, and or Yahoo.

Spatial Analysis of Drug Arrests & Juvenile Delinquency

- Emphasis of Project
- Project Learning Goals
- The Process:
  - Samples of Process and Output

Emphasis of Project

Project focus – Upon completion, the student will be able to:

- **Use GIS tools to analyze a relevant and contemporary social issue;**
- **Effectively present the results;**
- **Understand how to interpret or use results for problem solving and decision making;**
- **Identify data limitations and needs for further investigation.**

Emphasis of Project

Ethical Thinking Focus:

In assessing Risk factors, there is an ethical responsibility for understanding issues contributing to delinquency for purposes of program development and resource deployment to better the lives of children, their families and communities.

Also the need for understanding messages of different output products and potential for mis-interpretation by others.

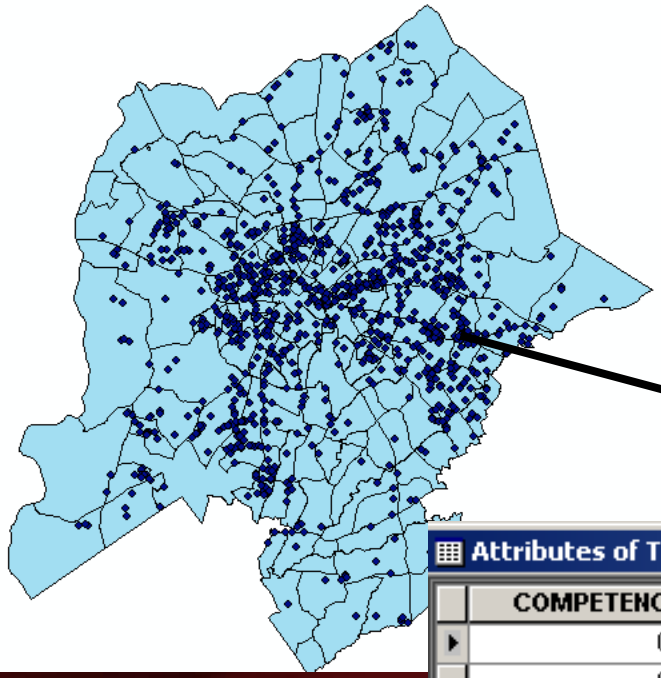
Project Learning Goals

- Content: **Observe offender patterns and evaluate social/environmental factors possibly influencing at-riskness for delinquency**

- Reasoning Skills: **analyze data, spatial patterns, correlations, and formulate responses based upon facts and statistical evidence; Ethical thinking, analyzing, and graphic representation**

- Technical Skills: **Hot Spot/Density mapping, spatial joins, tabular joins, graduated color and symbol mapping, queries, clips, buffers, select by location; honest and appropriate cartographic representation.**

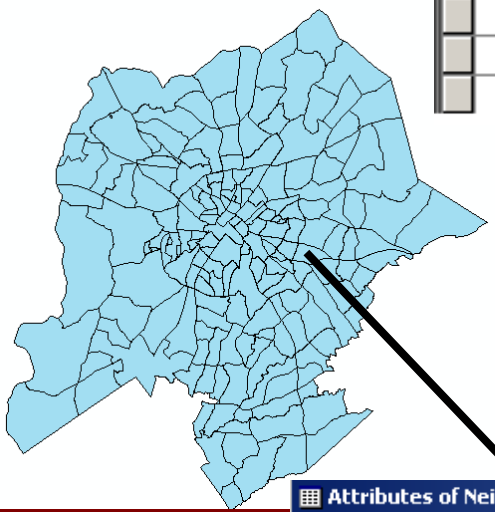
Data Preparation: Data Joins



Spatial Joins by instructor: Juvenile Offense Point Locations & Neighborhood polygons for Total Juvenile Offenses per Neighborhood; Out of school suspensions (point) for totals per neighborhood.

Attributes of Total Juvenile Offenders per Neighborhood

	COMPETENCE	DROPOUT	KINDERGART	YOUTH	Total Juvenile Offenses
▶	0.824	0.018	3.4	Medium	4
	0.767	0.015	3.1	Medium	18
	0.779	0.016	3	Medium	0
	0.833	0.149	2.7	Medium	8
	0.77	0.014	2.9	Medium	9

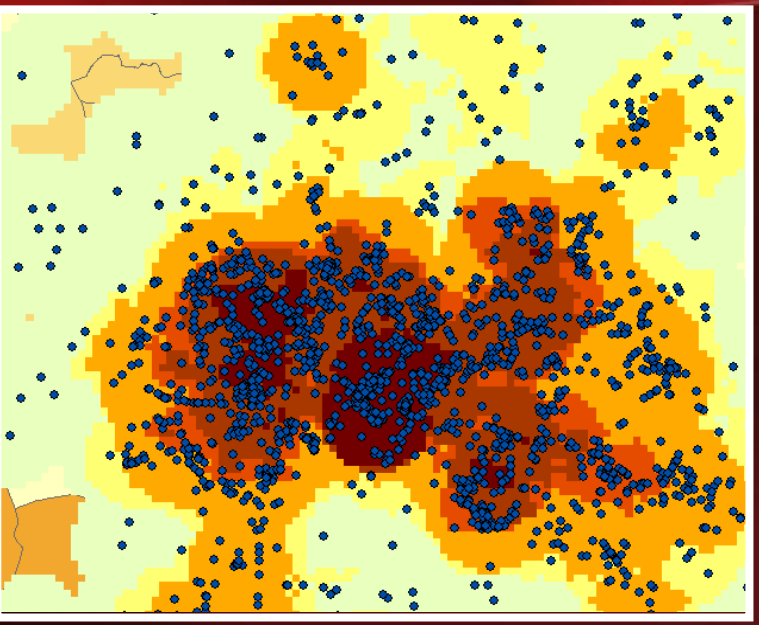


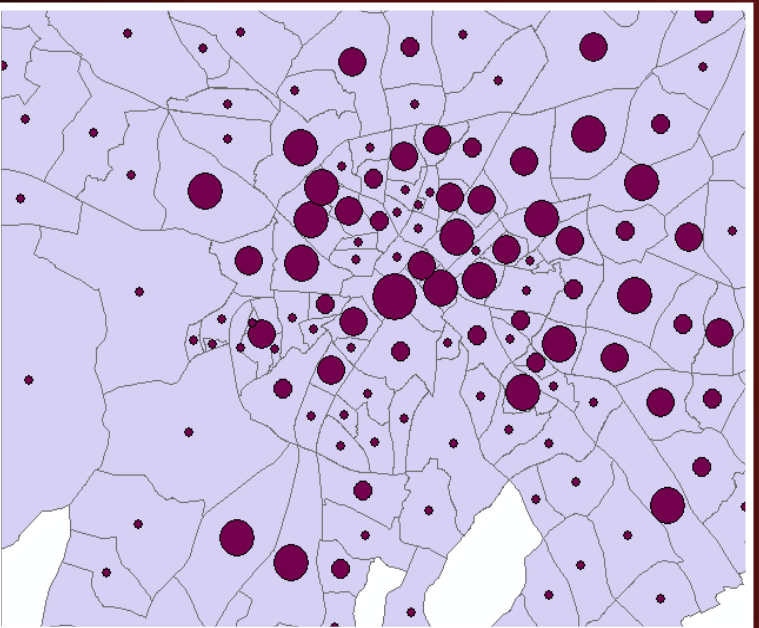
Tabular Join: Students join Quality of Life Variables (in dbf format) to Attribute Table For Neighborhood Boundary Shapefile – for Choropleth Mapping and Overlay Analysis

Attributes of Neighborhoods w/2004 Quality of Life Indicators

	COMPETENCE	DROPOUT	KINDERGART	YOUTH	OID1	NSA_12	Sum_RES_UN	Sum_Youth_	Youth_Inde
▶	0.824	0.018	3.4	Medium	0	130	3628	707	0.19
	0.767	0.015	3.1	Medium	1	127	3055	629	0.21
	0.779	0.016	3	Medium	2	131	1713	166	0.1
	0.833	0.149	2.7	Medium	3	126	174	37	0.21
	0.77	0.014	2.9	Medium	4	122	1734	174	0.1

Comparative Drug Arrest Mapping





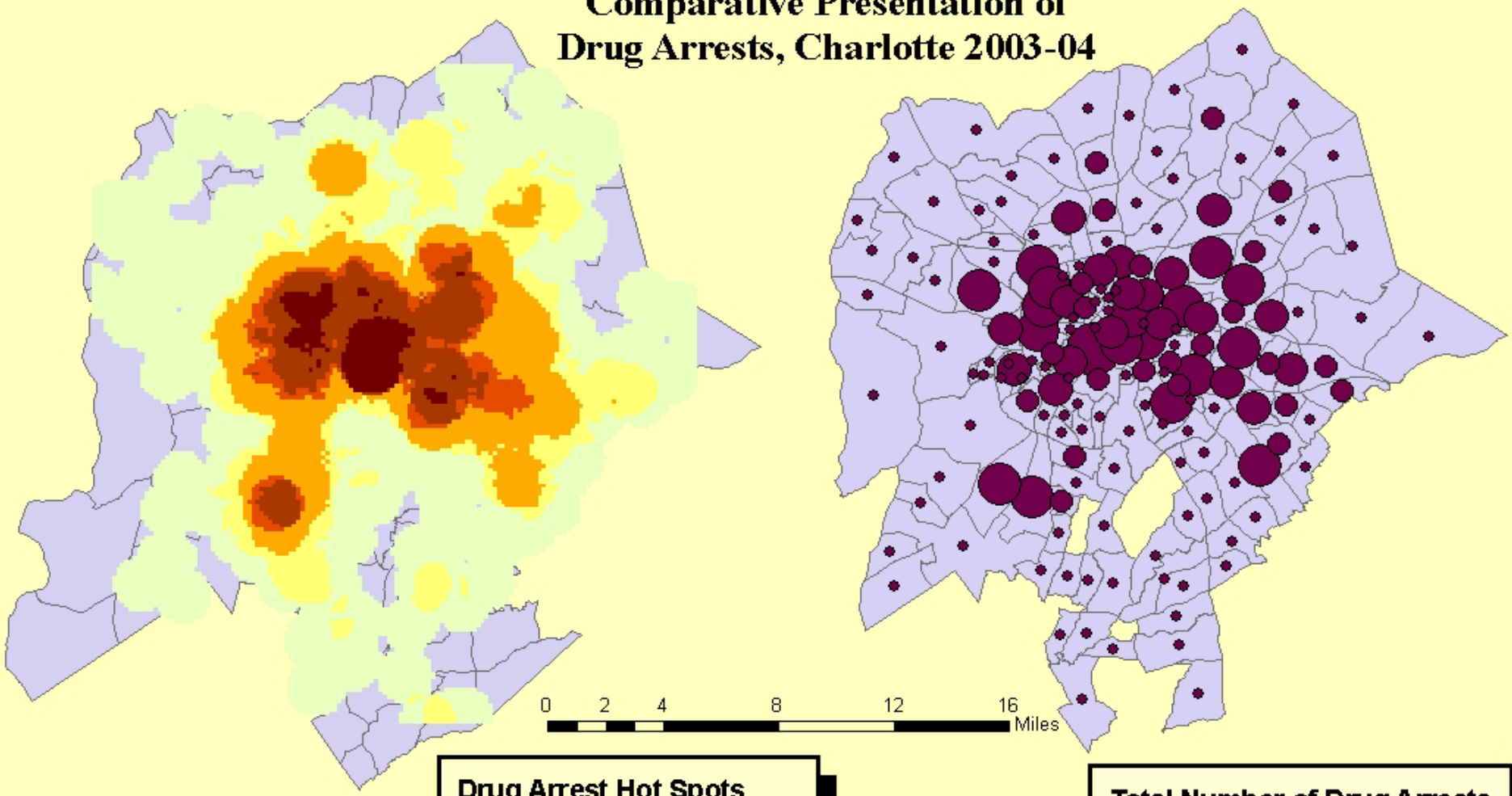
1. Students query and combine drug Arrests for July 2003-June 2004 then create density (Hot Spot) maps of Adult Drug Arrests.

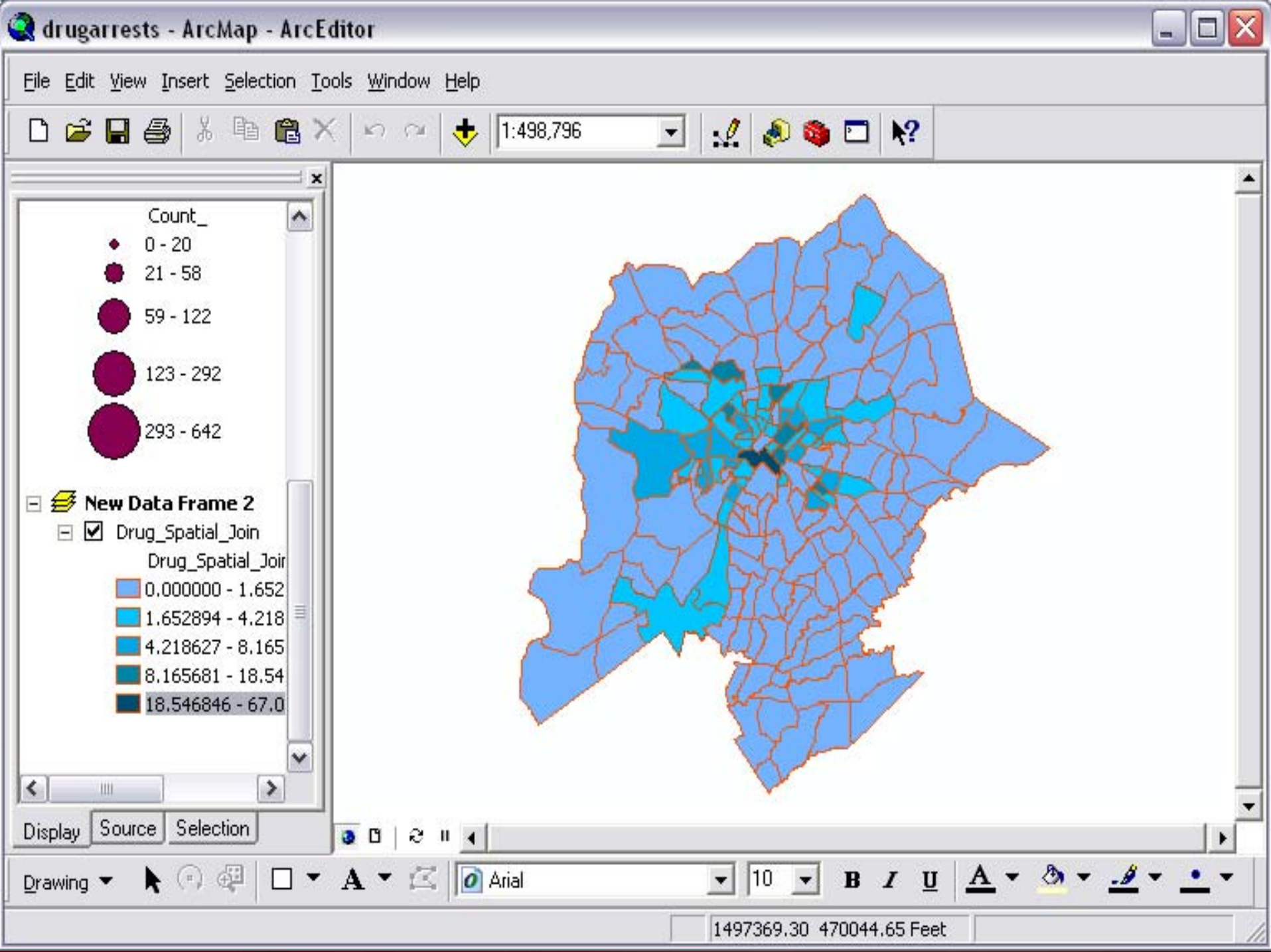
Discuss merits and limitations to density mapping for determining at-riskness for juvenile delinquency.

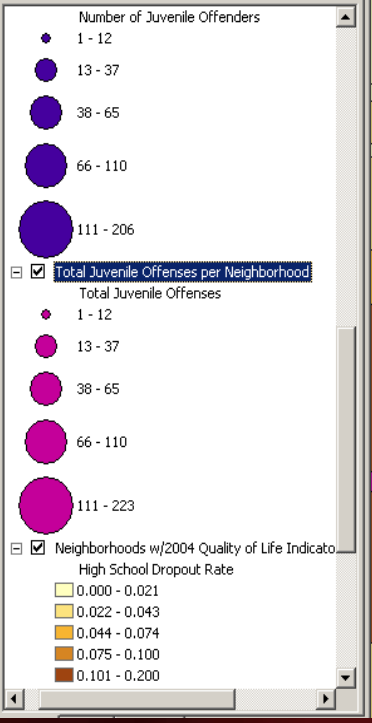
2. Create a spatial join with neighborhoods and drug arrests to obtain total drug arrests per neighborhood. Mapped as proportional symbols.

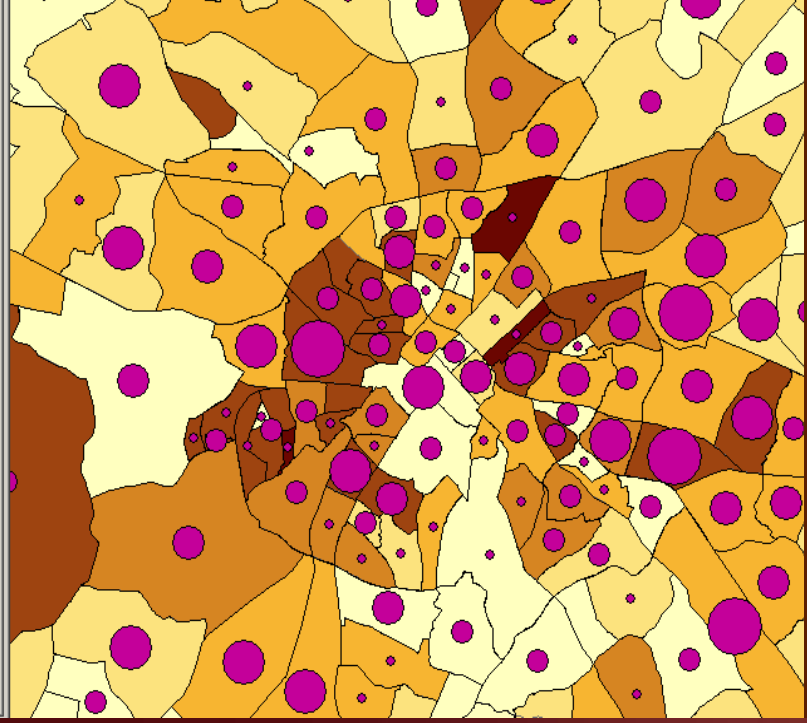
In the next slide, a comparative map layout is created for students to compare mapping methods of drug arrests.

Comparative Presentation of Drug Arrests, Charlotte 2003-04




drugarrests - ArcMap - ArcEditor
File Edit View Insert Selection Tools Window Help
1:498,796
Count_
0 - 20
21 - 58
59 - 122
123 - 292
293 - 642
New Data Frame 2
Drug_Spatial_Join
Drug_Spatial_Joir
0.000000 - 1.652
1.652894 - 4.218
4.218627 - 8.165
8.165681 - 18.54
18.546846 - 67.0
Display
Source
Selection
Drawing
Arial
10
1497369.30 470044.65 Feet

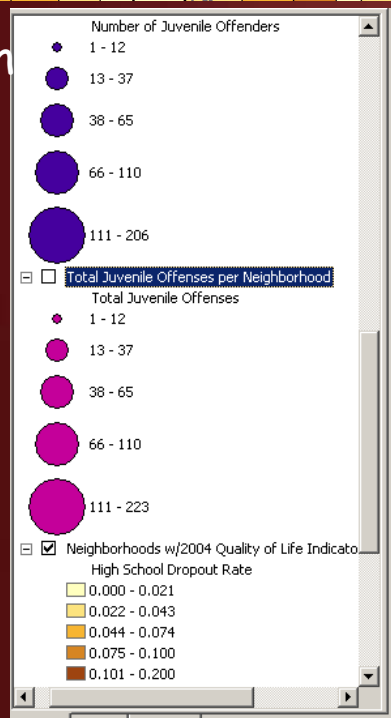


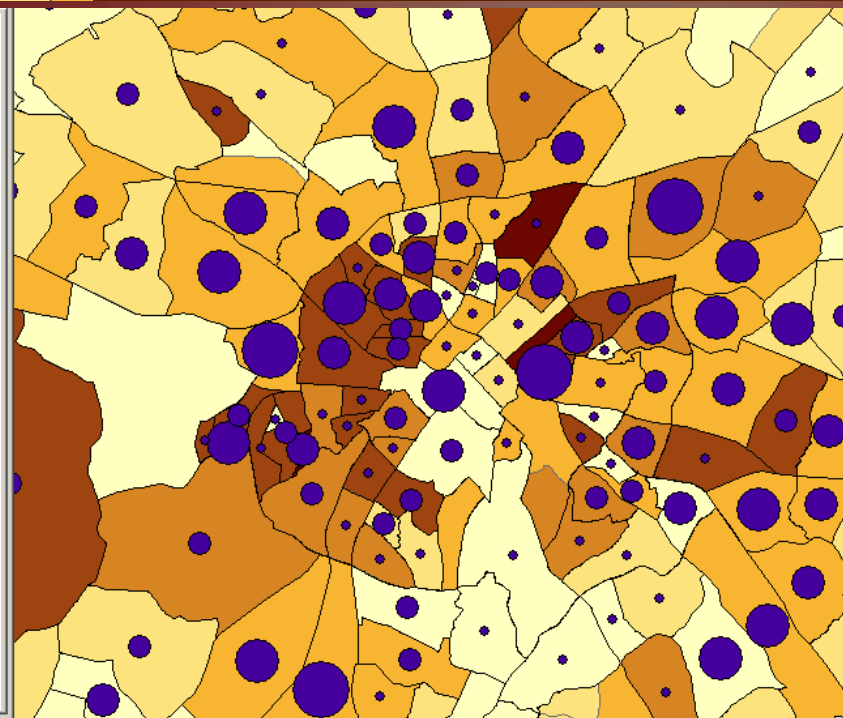


Bi-Variate maps are created using Dropout Rate per Neighborhood as a Choropleth Map (background), with Number of Juvenile Offenses per Neighborhood as a Graduated Symbol Map.

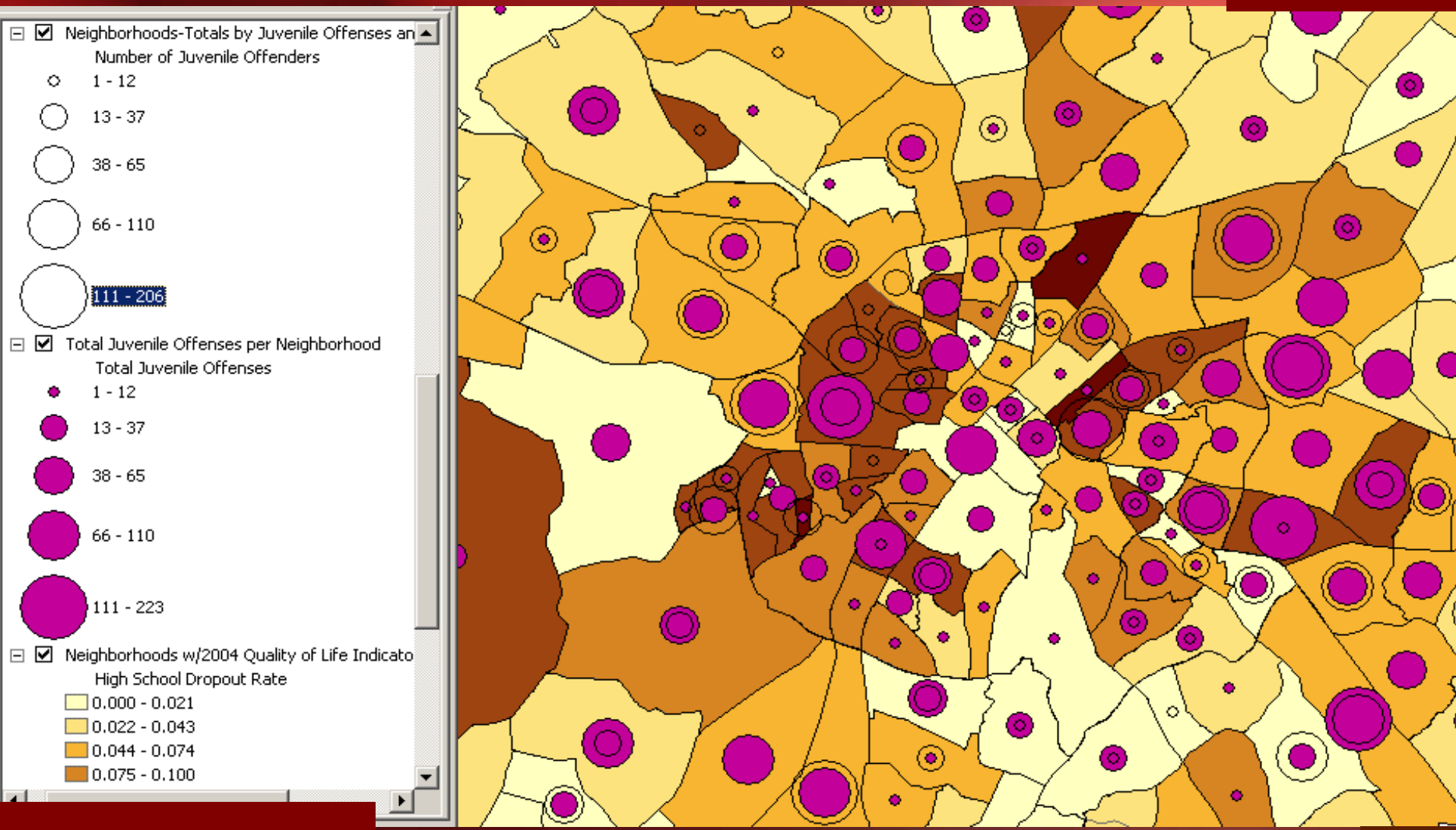
Students analyze the results and discuss patterns as well as limitations.

The same bivariate comparison is done using total number of Juvenile offenders per Neighborhood, mapped on Top of the High School Dropout Rate.
(They may select other quality of life variables to compare., e.g., adolescent birth rate, Youth opportunity index, etc).



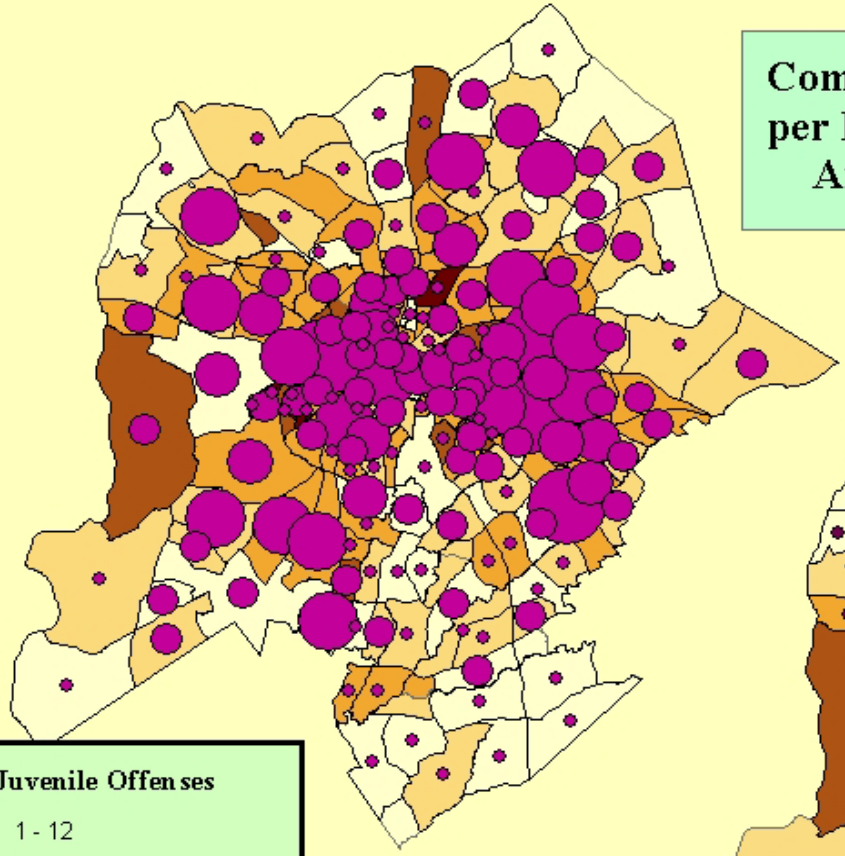


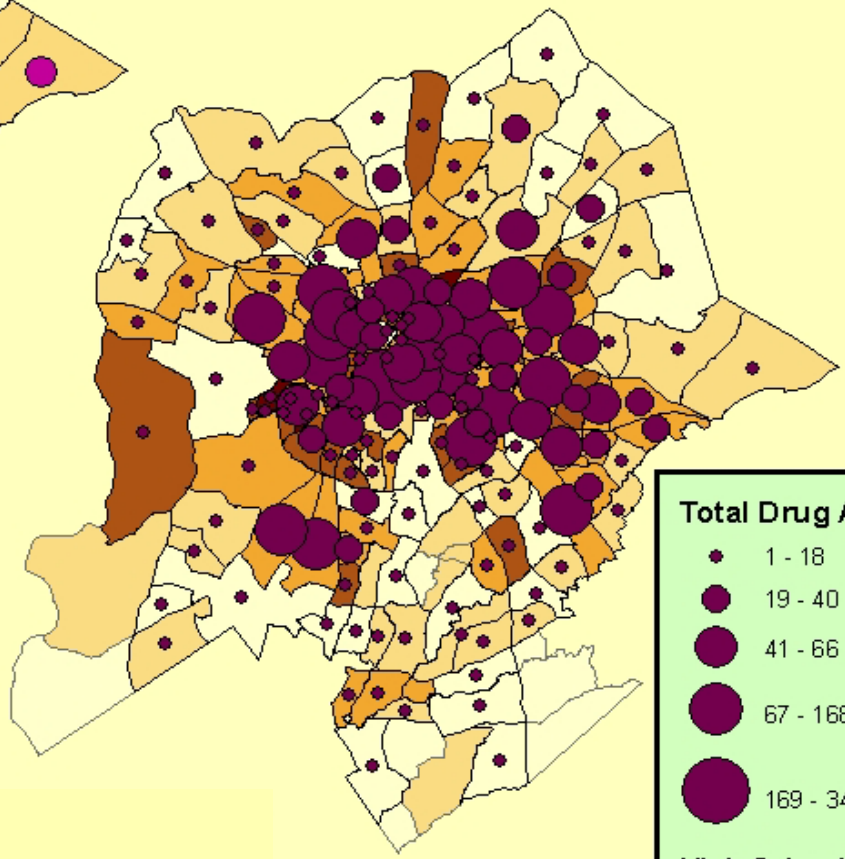
Visual Pattern Recognition and Comparative Analysis



Students compare number of offenses vs number of offenders to determine where offenders may possibly be offending outside of their home neighborhood; also to compare numbers of offenders/offenses and dropout rate.

Comparison: Total Number of Juvenile Offenders per Neighborhood & Total Number of Adult Drug Arrests in Charlotte Neighborhoods, 2003-04





Total Juvenile Offenses

- 1 - 12
- 13 - 37
- 38 - 65
- 66 - 110
- 111 - 223

High School Dropout Rate

- 0.000 - 0.020
- 0.021 - 0.043
- 0.044 - 0.093
- 0.094 - 0.163
- 0.164 - 0.333

N

0 2.5 5 10 15 20 Miles

Total Drug Arrests

- 1 - 18
- 19 - 40
- 41 - 66
- 67 - 168
- 169 - 344

High School Dropout Rate

- 0.000 - 0.020
- 0.021 - 0.042
- 0.043 - 0.082
- 0.083 - 0.162
- 0.163 - 0.333

Hands-On: Accessing GIS Data

Websites for data downloads and browsing spatial data for social science issues analysis;

Data Visualization Exercises

Data Visualization Exercises:

- **Redistricting:** democratic representation in North Carolina. The study uses GIS to produce alternative Congressional Districts.

http://www.ncga.state.nc.us/GIS/Redistricting/index.html

http://www.fairdata2000.com

Data Visualization Exercises:

- **Environmental Justice:—the purpose is to examine the location of hazardous waste and air pollution and toxic releases in communities populated by people of color.**

http://maps.epa.gov/enviromapper/

http://www.environmentaldefense.org/

http://www.scorecard.org/

ArcGIS: ESRI.com

- ESRI also makes the most popular software packages available for GIS analysis: *ArcView, ArcGIS, ArcIMS* and other products.
- http://www.esri.com
- The free GIS dataviewer, *ArcExplorer 9.1 Java Edition for Education*, allows you to view and query local data sets as well as access ARCIMS Server services. You can download this software along with instruction manuals.
- http://www.esri.com/software/arcexplorer/about/arcexplorer-education.html

The US Census Bureau American FactFinder

- http://www.census.gov
- http://factfinder.census.gov/home/saff/main.html?_lang=en
- http://www.census.gov/Press-Release/www/2005/katrina.htm
- http://www.census.gov/popest/counties/CO-EST2005-02.html
- http://www.census.gov/hhes/www/poverty/poverty.html
- http://www.census.gov/population/www/cen2000/briefs.html

Sources

- <u>Data Sources:</u> Charlotte-Mecklenburg Police Department, Mecklenburg County Sheriff's Department, Department of Juvenile Justice and Delinquency Prevention, Quality of Life Study (Furuseth, 2004)

- Dr. Claude W. Barnes, 2006: Spatial Analysis, Interactive Databases, Geographic Information Systems and Social Science Research

Where to Learn More: GIS Workshop for HBCU Faculty

- Center for Spatially Integrated Social Science CSISS is one the best and most comprehensive resources on spatial analysis and data visualization. The site provides a GIS Cookbook, Course Syllabi, free software, and information about workshops and training.

http://www.csiss.org/

Handouts available on Summer 2007 Workshops

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