

INTRO TO GEOGRAPHIC INFORMATION SCIENCE (GIS_c)

COURSE INTRODUCTION

AGENDA

1. Introductions
2. What We Learn From Maps
3. Syllabus Overview
4. Defining GIS & GISc
5. Introducing the Course Software

1 INTRODUCTIONS

1. INTRODUCTIONS

WHO ARE WE?

- ▶ What is your name?
- ▶ What is your program/major?
- ▶ What are your research interests (if any)?
- ▶ Have you taken GIS class before?
- ▶ Have you used GIS software before?

2 WHAT WE LEARN FROM MAPS

2. WHAT WE LEARN FROM MAPS

ONE CANNOT UNDERSTAND SOCIAL LIFE WITHOUT
UNDERSTANDING THE ARRANGEMENTS OF
PARTICULAR SOCIAL ACTORS IN PARTICULAR
SOCIAL TIMES AND PLACES. . . . SOCIAL FACTS
ARE LOCATED.

Andrew Abbot (1997)

2. WHAT WE LEARN FROM MAPS

VONDERRIT MYERS, JR.



2. WHAT WE LEARN FROM MAPS

VONDERRIT MYERS, JR.



2. WHAT WE LEARN FROM MAPS

VONDERRIT MYERS, JR.



2. WHAT WE LEARN FROM MAPS

VONDERRIT MYERS, JR.



2. WHAT WE LEARN FROM MAPS

POLICE CAMERAS



2. WHAT WE LEARN FROM MAPS

DISCUSSION QUESTIONS

1. What is something that you found surprising or interesting about the data presented here?
2. Do the maps support the idea that the intersection of Shaw Boulevard and Klemm Street is the key hotspot of violent crime in Shaw? Why or why not?
3. How might these data inform policy decisions that aim to reduce crime in Shaw?
4. Based on the data presented here, where would you place police cameras in the Shaw neighborhood?
5. What type of data do you think was needed to produce these maps?
6. What do you like and dislike about the design of this report and the included maps?
7. What is one question you have about the report or these data?

3 SYLLABUS OVERVIEW

3. SYLLABUS OVERVIEW

WEBSITE

<https://slu-soc5650.github.io/>

The screenshot shows a web browser window with the URL <https://slu-soc5650.github.io/> in the address bar. The page title is "SLU SOC 4850/5850". The main content area features a header "Introduction to GISc" with the subtitle "Geographic Information Science". Below this is a section titled "Course Description" which provides a detailed overview of the course's objectives and content. Another section, "Course Objectives", lists five specific goals. A "Core Resources" section is also present, along with links to the syllabus and reading list.

Introduction to GISc Geographic Information Science

Course Description

This class introduces both the theoretical and technical skills that constitute the nascent field of Geographic Information Science (GISc). Techniques introduced include data cleaning and management, map production and cartography, and the manipulation of both tabular and spatial data. The impacts of GISc on public policy, and the effects of public policy on GISc, are also discussed. The course incorporates a wide variety of social, economic, health, urban, meteorological, and environmental data. These data are mapped at a variety of extents, from the City of St. Louis to the St. Louis Metropolitan region, Missouri, all United States counties, and all U.S. states.

Course Objectives

This course has five intertwined objectives:

1. *Fundamentals of spatial data:* Describe the concepts and theories that form the foundation of GISc.
2. *Fundamentals of data management:* Perform basic data cleaning tasks programmatically using Stata, construct geo-databases using ArcCatalog for data organization and storage, and perform basic manipulations of that data using ArcMap.
3. *Fundamentals of data visualization:* Create and present visualizations of spatial data using ArcMap and Microsoft PowerPoint.
4. *GISc and Public Policy:* Describe the ways in which public entities support GISc research and the ways in which GISc research supports public policy goals.
5. *Geospatial research synthesis:* Plan, implement, and present a research project that uses a large, publicly available sociology dataset known as the General Social Survey.

Core Resources

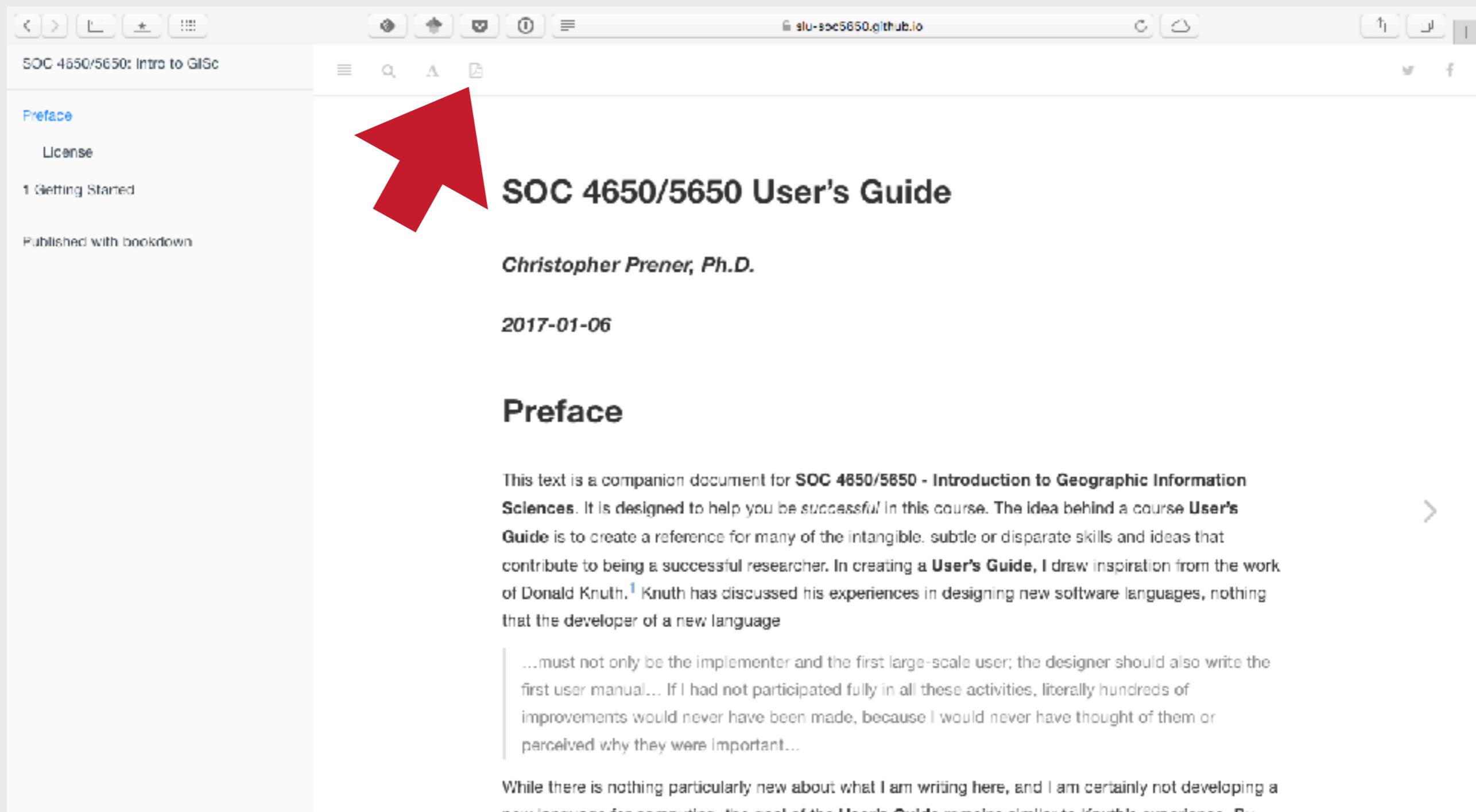
If you want to learn more about the course, you can check out the core course resources.

The [Syllabus](#) sets out core expectations and policies for the course. The [Reading List](#) contains topics,

3. SYLLABUS OVERVIEW

USER'S GUIDE

<https://slu-soc5650.github.io/User-Guide/>



SOC 4650/5650: Intro to GISc

Preface

License

1 Getting Started

Published with bookdown

SOC 4650/5650 User's Guide

Christopher Prener, Ph.D.

2017-01-06

Preface

This text is a companion document for **SOC 4650/5650 - Introduction to Geographic Information Sciences**. It is designed to help you be successful in this course. The idea behind a course **User's Guide** is to create a reference for many of the intangible, subtle or disparate skills and ideas that contribute to being a successful researcher. In creating a **User's Guide**, I draw inspiration from the work of Donald Knuth.¹ Knuth has discussed his experiences in designing new software languages, noting that the developer of a new language

...must not only be the implementer and the first large-scale user; the designer should also write the first user manual... If I had not participated fully in all these activities, literally hundreds of improvements would never have been made, because I would never have thought of them or perceived why they were important...

While there is nothing particularly new about what I am writing here, and I am certainly not developing a new language for computation, the goal of the **User's Guide** remains similar to Knuth's experience. Bu

COURSE OBJECTIVES

1. Fundamentals of Spatial Data
2. Fundamentals of Data Management
3. Fundamentals of Data Visualization
4. GISc and Public Policy
5. Spatial Research Synthesis

COURSE OBJECTIVES

1. Fundamentals of Spatial Data - *describe* the concepts and theories that form the foundation of GISC.
2. Fundamentals of Data Management
3. Fundamentals of Data Visualization
4. GISC and Public Policy
5. Spatial Research Synthesis

COURSE OBJECTIVES

- 1. Fundamentals of Spatial Data**
- 2. Fundamentals of Data Management - *perform basic data cleaning tasks programmatically using Stata, construct geodatabases using ArcCatalog for data organization and storage, and perform basic manipulations of that data using ArcMap.***
- 3. Fundamentals of Data Visualization**
- 4. GISc and Public Policy**
- 5. Spatial Research Synthesis**

COURSE OBJECTIVES

- 1. Fundamentals of Spatial Data**
- 2. Fundamentals of Data Management**
- 3. Fundamentals of Data Visualization - *create and present visualizations of spatial data using ArcMap and Microsoft PowerPoint.***
- 4. GISc and Public Policy**
- 5. Spatial Research Synthesis**

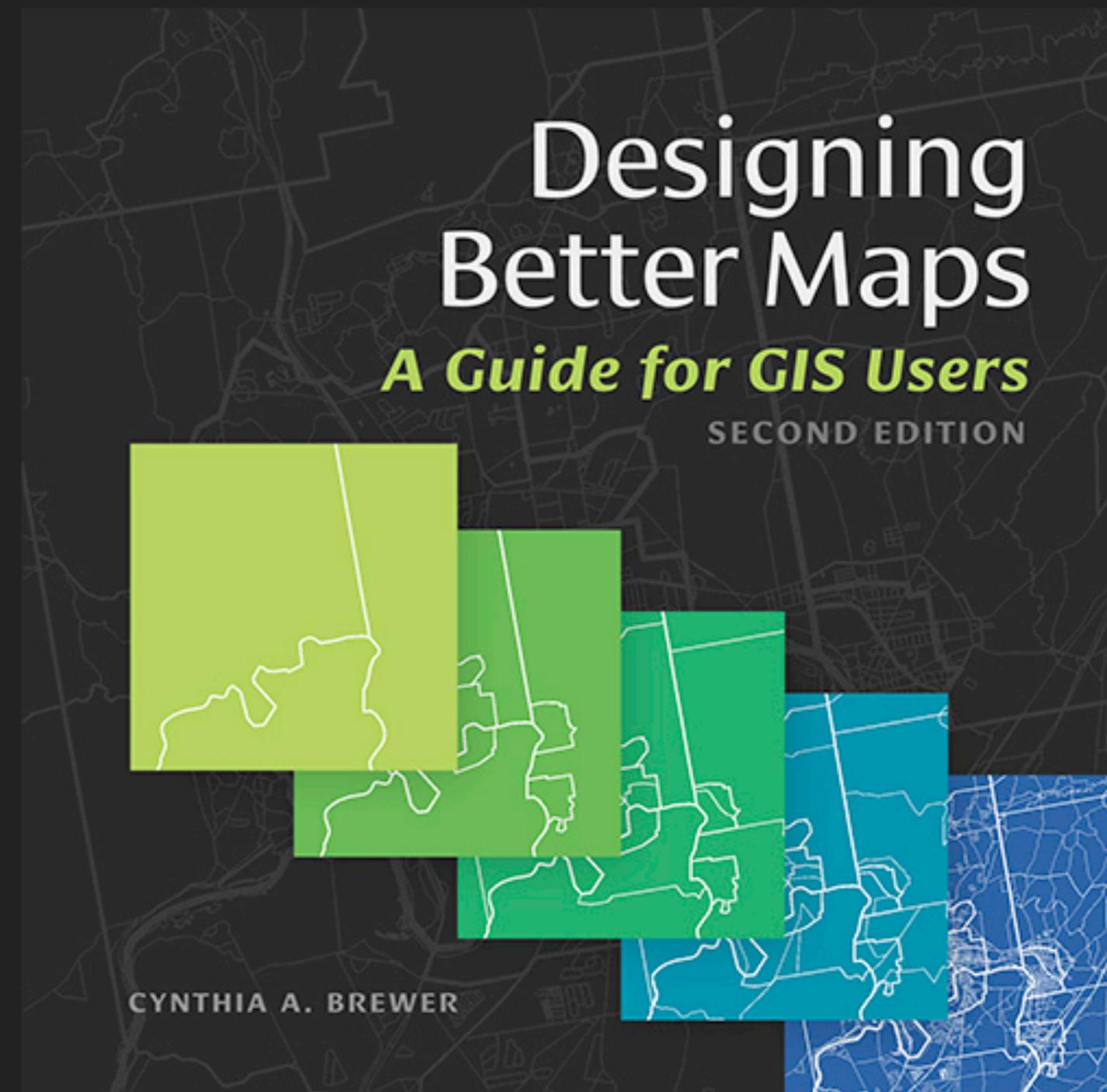
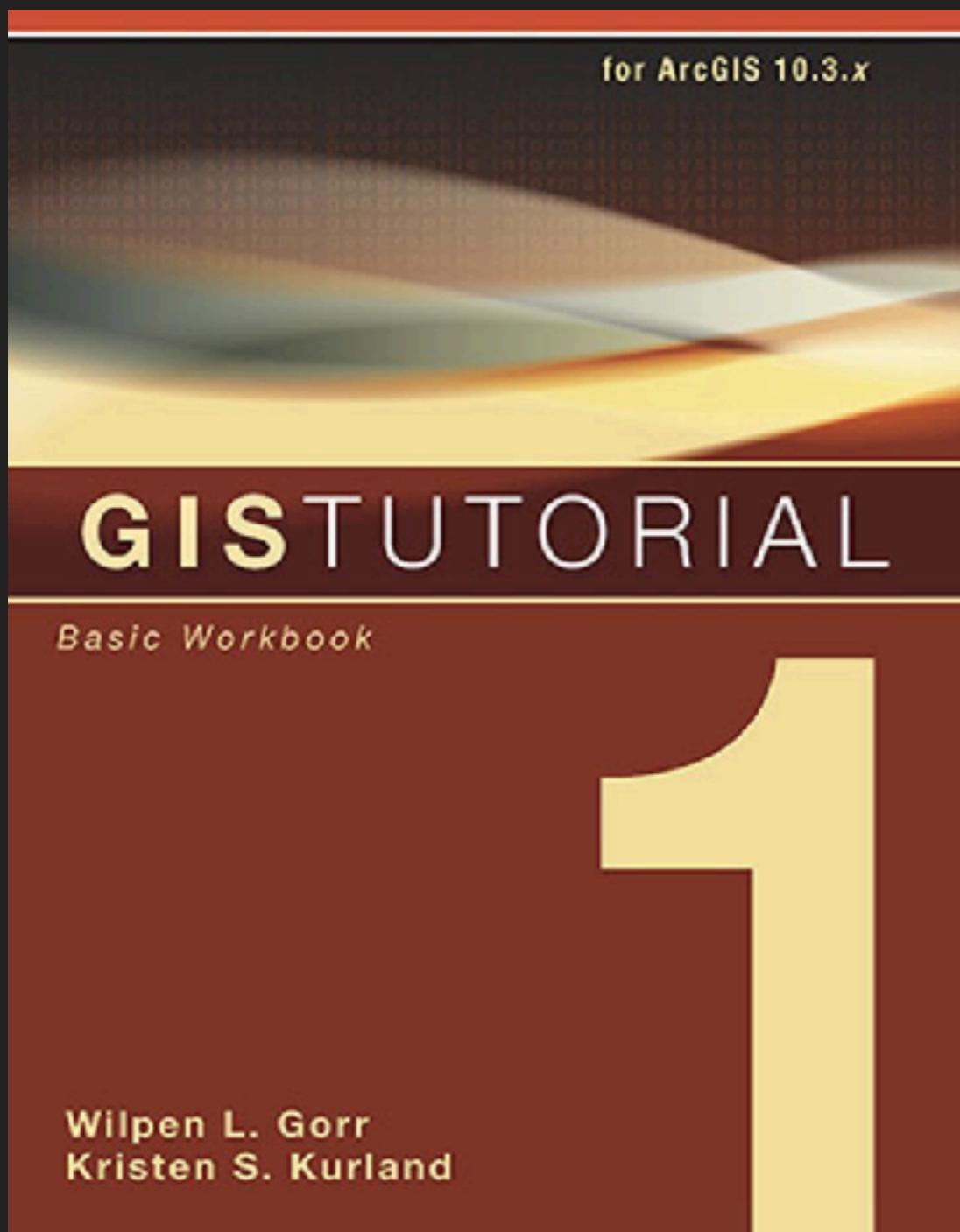
COURSE OBJECTIVES

1. Fundamentals of Spatial Data
2. Fundamentals of Data Management
3. Fundamentals of Data Visualization
4. GISc and Public Policy - *describe the ways in which public entities support GISc research and the ways in which GISc research supports public policy goals.*
5. Spatial Research Synthesis

COURSE OBJECTIVES

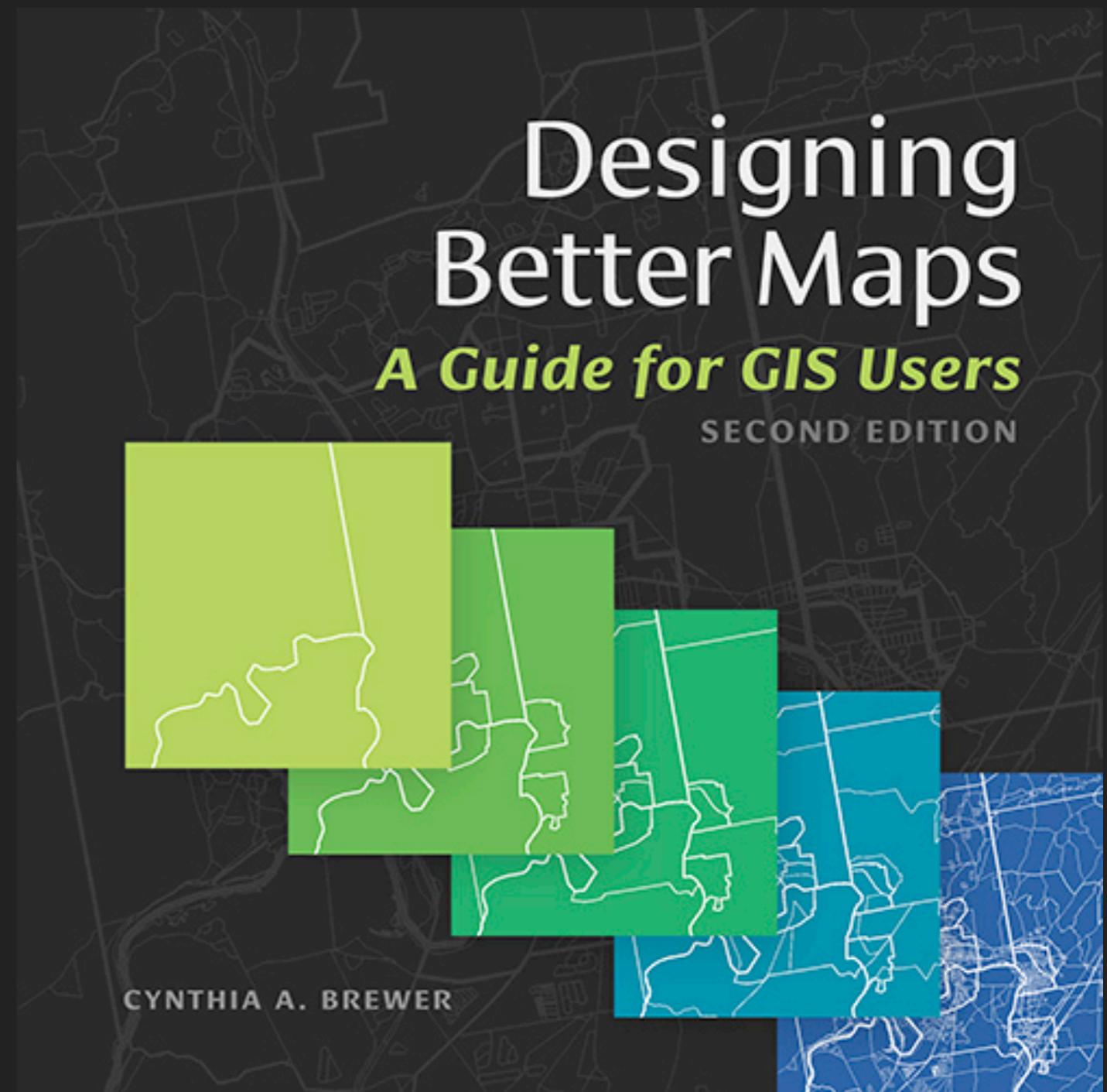
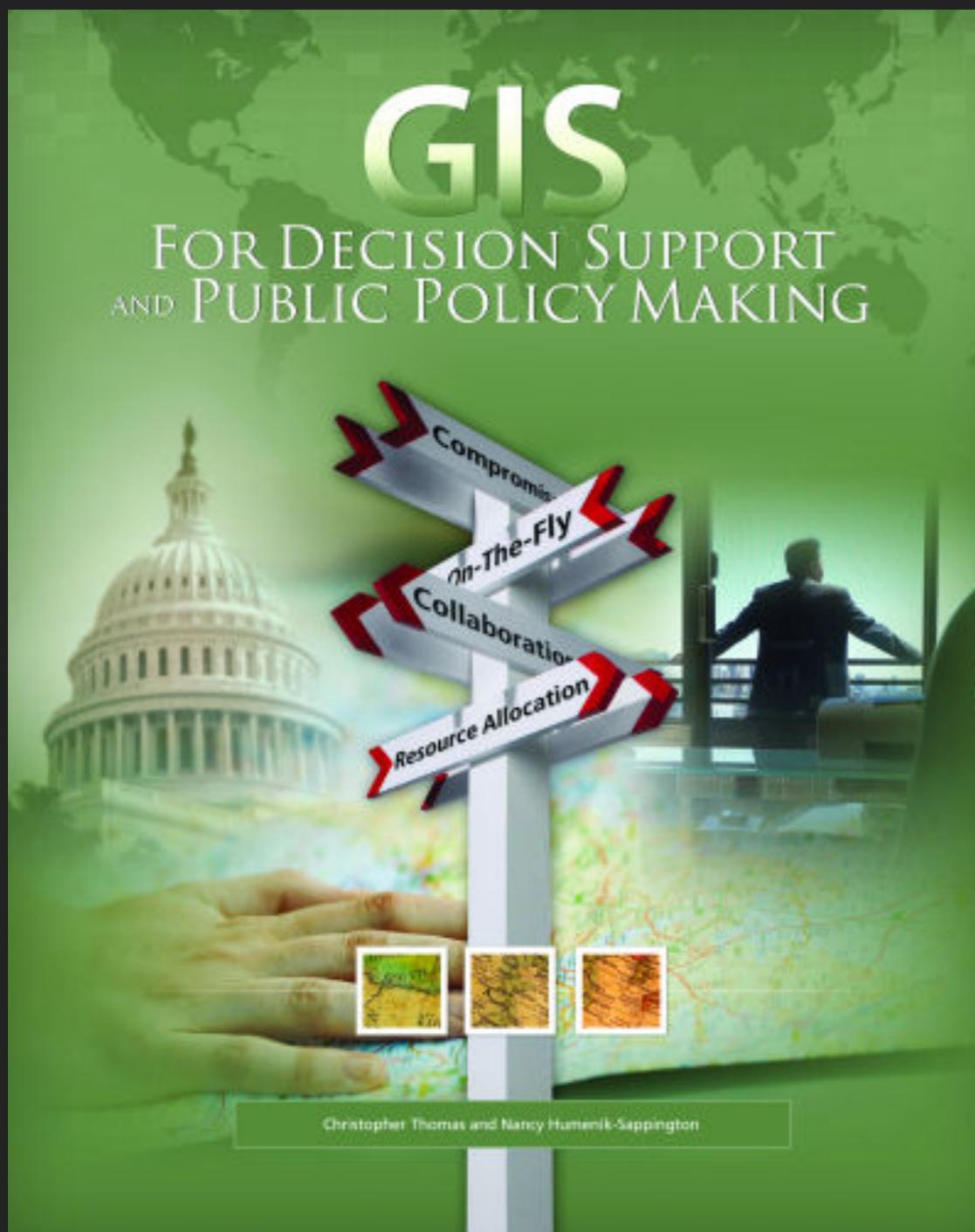
1. Fundamentals of Spatial Data
2. Fundamentals of Data Management
3. Fundamentals of Data Visualization
4. GISc and Public Policy
5. Spatial Research Synthesis - *plan and implement* a spatial data analysis project that utilizes the techniques described throughout the course.

READINGS



3. SYLLABUS OVERVIEW

READINGS



3. SYLLABUS OVERVIEW

The screenshot shows the GitHub organization page for "SLU Introduction to Geographic Information Science". The URL <https://github.com/slu-soc5650> is displayed at the top right. The page features a blue header bar with the organization's name and a pinned repository box for "Core-Documents". Below the header, there are tabs for Repositories, People, Teams, Projects, and Settings. A search bar and filters for Type and Language are available. The main content area displays two repositories: "Core-Documents" and "slu-soc5650.github.io". The "Core-Documents" repository was last updated a day ago and contains links to the Course Syllabus, Reading List, and Wiki. The "slu-soc5650.github.io" repository is a Content for Course Website, last updated 2 days ago, and is written in Ruby. A sidebar on the right shows the top languages (Stata, Ruby, HTML), the number of people (3), and a profile for Christopher Prener.

<https://github.com/slu-soc5650>

This organization Search

Pull requests Issues Gist

Repositories People 3 Teams 1 Projects 0 Settings

Pinned repositories

Customize pinned repositories

Core-Documents

Course Syllabus, Reading List, and Wiki

Search repositories... Type: All Language: All New

Core-Documents

Course Syllabus, Reading List, and Wiki

Updated a day ago

Top languages

Stata Ruby HTML

People 3

chris-prener Christopher Prener

slu-soc5650.github.io

Content for Course Website

Ruby Updated 2 days ago

3. SYLLABUS OVERVIEW



<https://github.com/slu-soc5650/Core-Documents/wiki>

The screenshot shows a GitHub repository page for 'slu-soc5650 / Core-Documents'. The top navigation bar includes links for Pull requests, Issues, Gist, Unwatch, Star, and Fork. Below the header, there are tabs for Code, Issues (0), Pull requests (0), Projects (0), Wiki (selected), Pulse, Graphs, and Settings. The main content area features a heading 'Welcome to the SOC 4650/5650 wiki!'. A paragraph explains the purpose of the wiki, mentioning 'Jotters' which are weekly updates with links to course information. To the right, a sidebar titled 'Pages' lists 'Home' and 'Preview Week'. Below the sidebar are buttons for 'Add a custom sidebar' and 'Clone this wiki locally' with a link to the repository's URL. At the bottom, there is a footer with links to GitHub's Terms, Privacy, Security, Status, Help, Contact GitHub, API, Training, Shop, Blog, and About pages.

This wiki will be one of the core documents for this class. I will be using this to post weekly "Jotters". These jotters will include links to more information, tips, tricks, and descriptions of issues that are arising with particular parts of the course. Please check this page often for updates!

Christopher Prener edited this page 5 days ago · 1 revision

Welcome to the SOC 4650/5650 wiki!

This wiki will be one of the core documents for this class. I will be using this to post weekly "Jotters". These jotters will include links to more information, tips, tricks, and descriptions of issues that are arising with particular parts of the course. Please check this page often for updates!

Christopher Prener edited this page 5 days ago · 1 revision

Pages

- Home
- Preview Week

+ Add a custom sidebar

Clone this wiki locally

<https://github.com/slu-soc5650/Core-Documents>

Clone in Desktop

+ Add a custom footer

© 2017 GitHub, Inc. Terms Privacy Security Status Help

Contact GitHub API Training Shop Blog About

3. SYLLABUS OVERVIEW



<https://slu-soc5650.slack.com>

The screenshot shows the Slack interface for the course channel `#_news`. The sidebar lists various channels, and the main window displays the `#_news` channel. The channel has a dark purple background with white text. It lists several weekly discussion channels: `# week-02-discussion`, `# week-03-discussion`, `# week-04-discussion`, `# week-05-discussion`, `# week-06-discussion`, `# week-07-discussion`, `# week-08-discussion`, `# week-10-discussion`, `# week-11-discussion`, `# week-12-discussion`, `# week-13-discussion`, `# week-14-discussion`, and `# week-15-discussion`. A message at the bottom indicates that Christopher Prener joined the channel. The right side of the screen shows a timeline with messages from September 14th, 2016, to Yesterday.

`#_news`
star | 83 | 0 Course-wide announcements

`# week-02-discussion`
`# week-03-discussion`
`# week-04-discussion`
`# week-05-discussion`
`# week-06-discussion`
`# week-07-discussion`
`# week-08-discussion`
`# week-10-discussion`
`# week-11-discussion`
`# week-12-discussion`
`# week-13-discussion`
`# week-14-discussion`
`# week-15-discussion`

joined `#_news`

September 14th, 2016

the very beginning of the `#_news` channel and announcements. All course members are in this channel.

November 30th, 2016

January 9th

Yesterday

Christopher Prener 8:10 PM
added an integration to this channel: `github`

3. SYLLABUS OVERVIEW

SOFTWARE



ArcGIS



Stata

3. SYLLABUS OVERVIEW

SOFTWARE



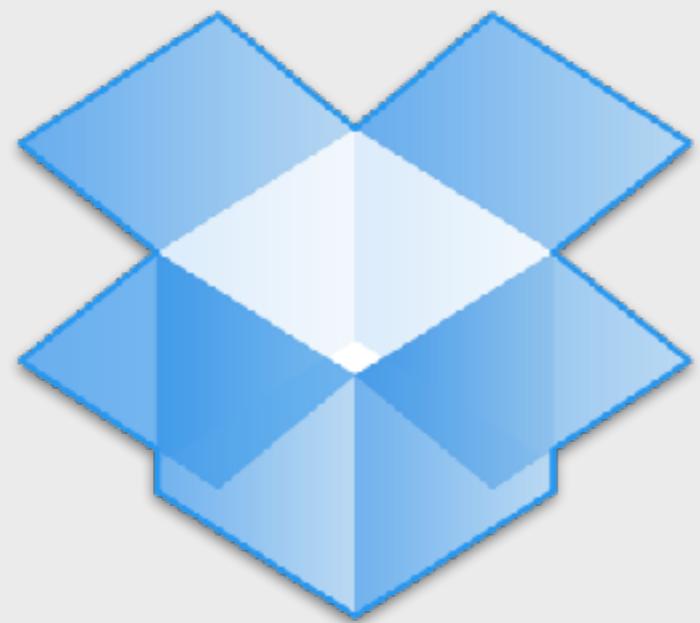
Atom



GitHub Desktop

3. SYLLABUS OVERVIEW

COURSE DATA



Dropbox



COURSE ASSIGNMENTS

1. Attendance and Participation

2. Lab Exercises

3. Problem Sets

4. Final Project

a. Memo

b. Draft Poster

c. Poster

5. Quizzes

SOC 5650 only:

d. Annotated Bibliography

e. Draft Paper

f. Paper

COURSE GRADING

1. Attendance and Participation (100 points)
2. Lab Exercises (6.25 points x 16 = 100 points)
3. Problem Sets (30 points x 10 = 300 points)
4. Final Project (350 points; see syllabus for breakdown)
5. Quizzes (50 points x 3 = 150 points)

Total = 1,000 points

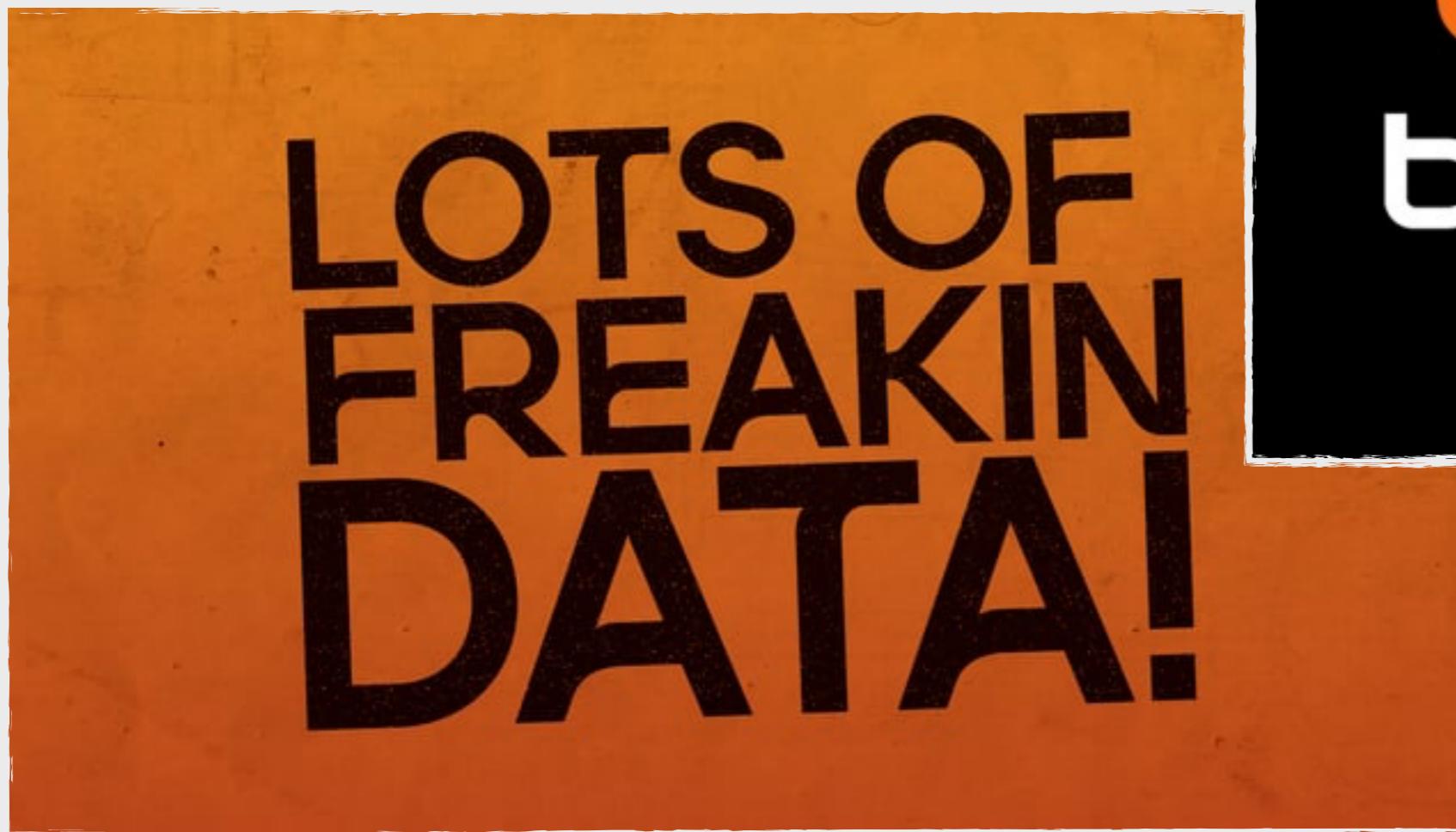
4 DEFINING GIS & GISc

a **FIVE IMPORTANT
TRENDS**

TRENDS: SMARTPHONES



TRENDS: BIG DATA



TRENDS: DEMAND FOR GIS



Christopher Prener

@chrisprener

Twitter and other platforms allow users to embed spatial data in posts #soc4650 #soc5650 #gis

1:50 PM - 11 Jan 2017 from Morrissey Hall



Cartographers and Photogrammetrists

Percent change in employment, projected 2014-24

Cartographers and photogrammetrists

29%

Total, all occupations

7%

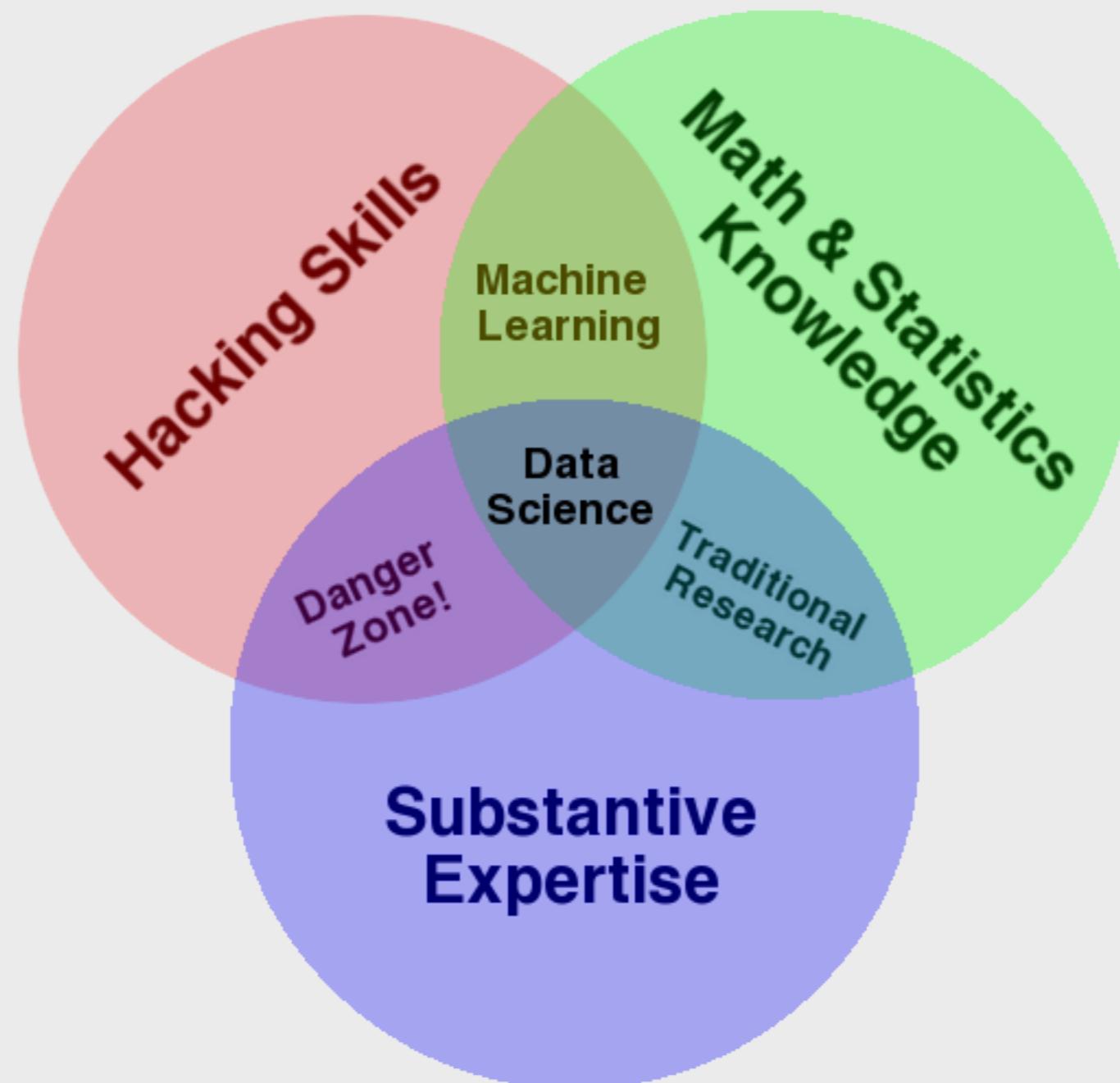
Architects, surveyors, and cartographers

6%

Note: All Occupations includes all occupations in the U.S. Economy.

Source: U.S. Bureau of Labor Statistics, Employment Projections program

TRENDS: DATA SCIENCE



TRENDS: OPEN SOURCE SOFTWARE

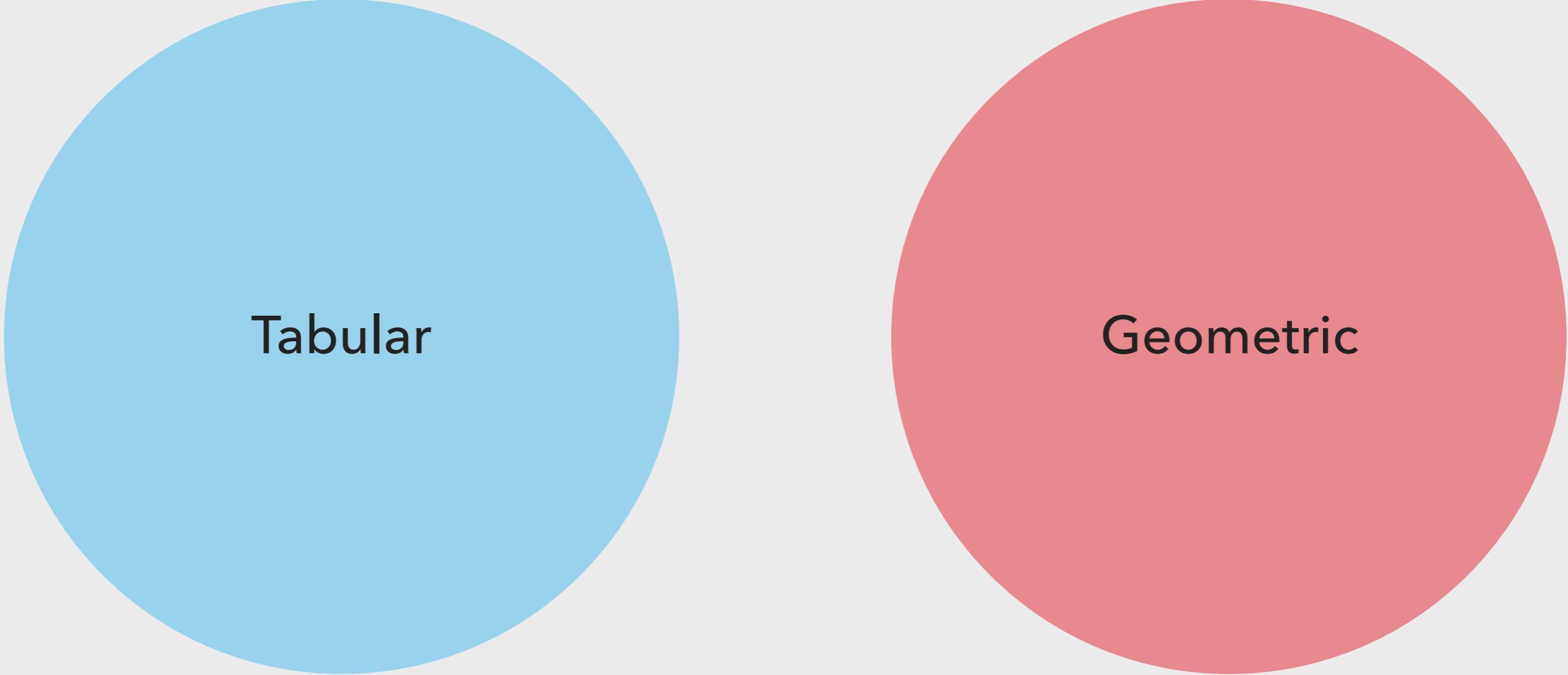


b **WHAT ARE
SPATIAL DATA?**

WHAT ARE SPATIAL DATA?

- ▶ Data that can be represented **spatially**
 - ▶ They therefore have some type of **spatial reference** that locates data in two- or three-dimensional space
- ▶ Data that can (typically) be analyzed using statistical techniques
 - ▶ There is field at the intersection of geography and statistics known as **spatial statistics**

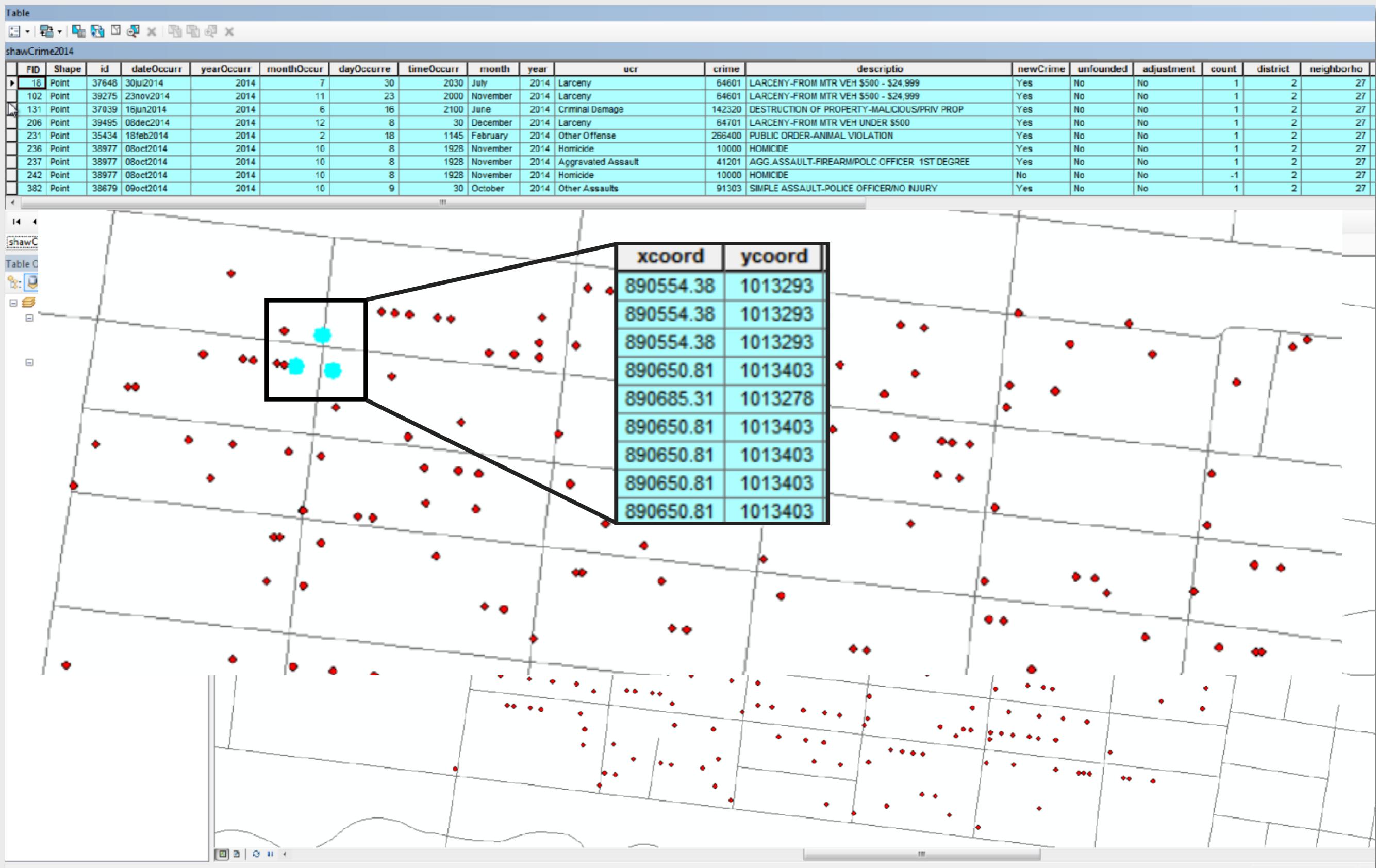
WHAT ARE SPATIAL DATA?



Tabular

Geometric

WHAT ARE SPATIAL DATA?

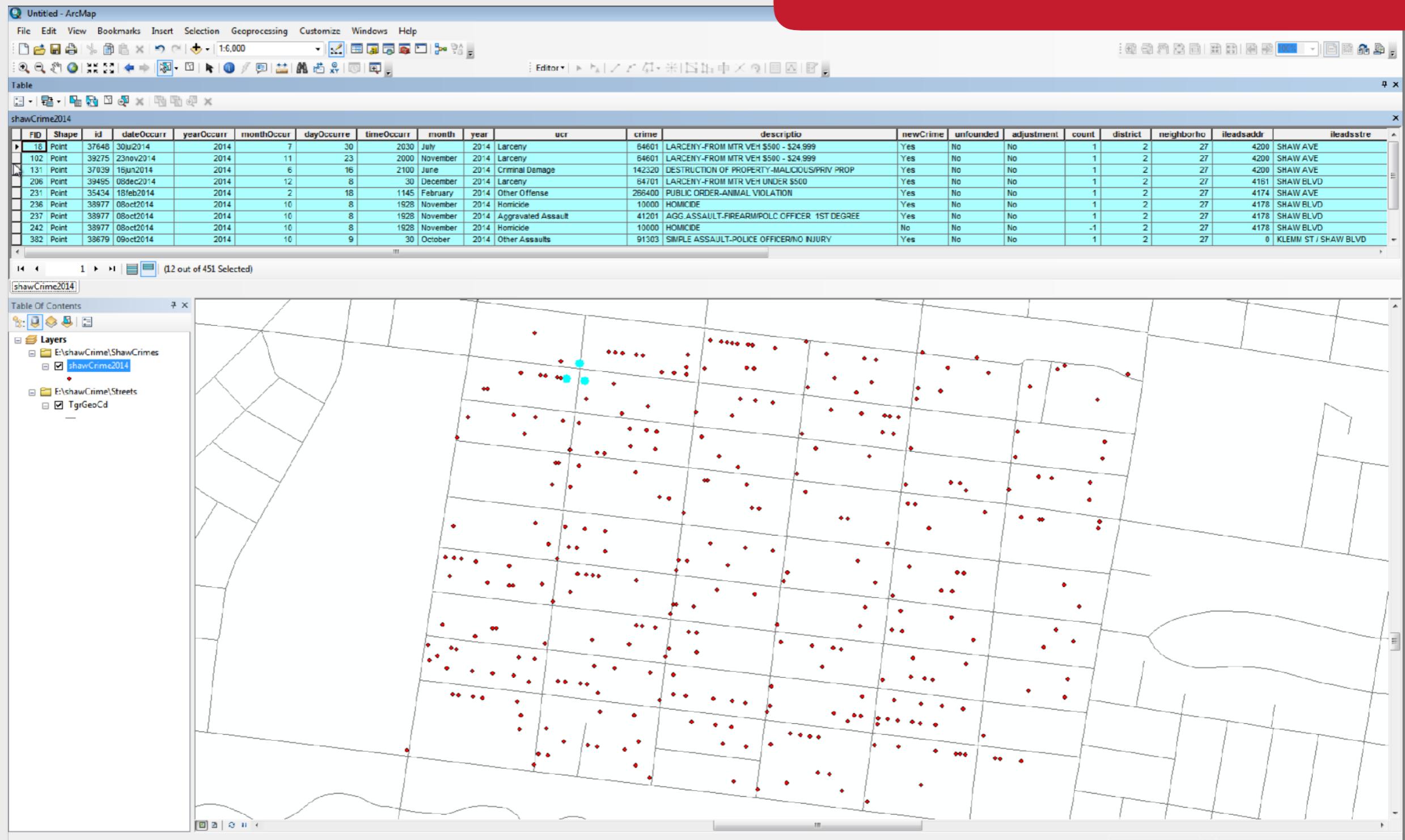


C WHAT ARE GIS AND GIS_c

4. WHAT ARE GIS & GISc

ALPHABET SOUP

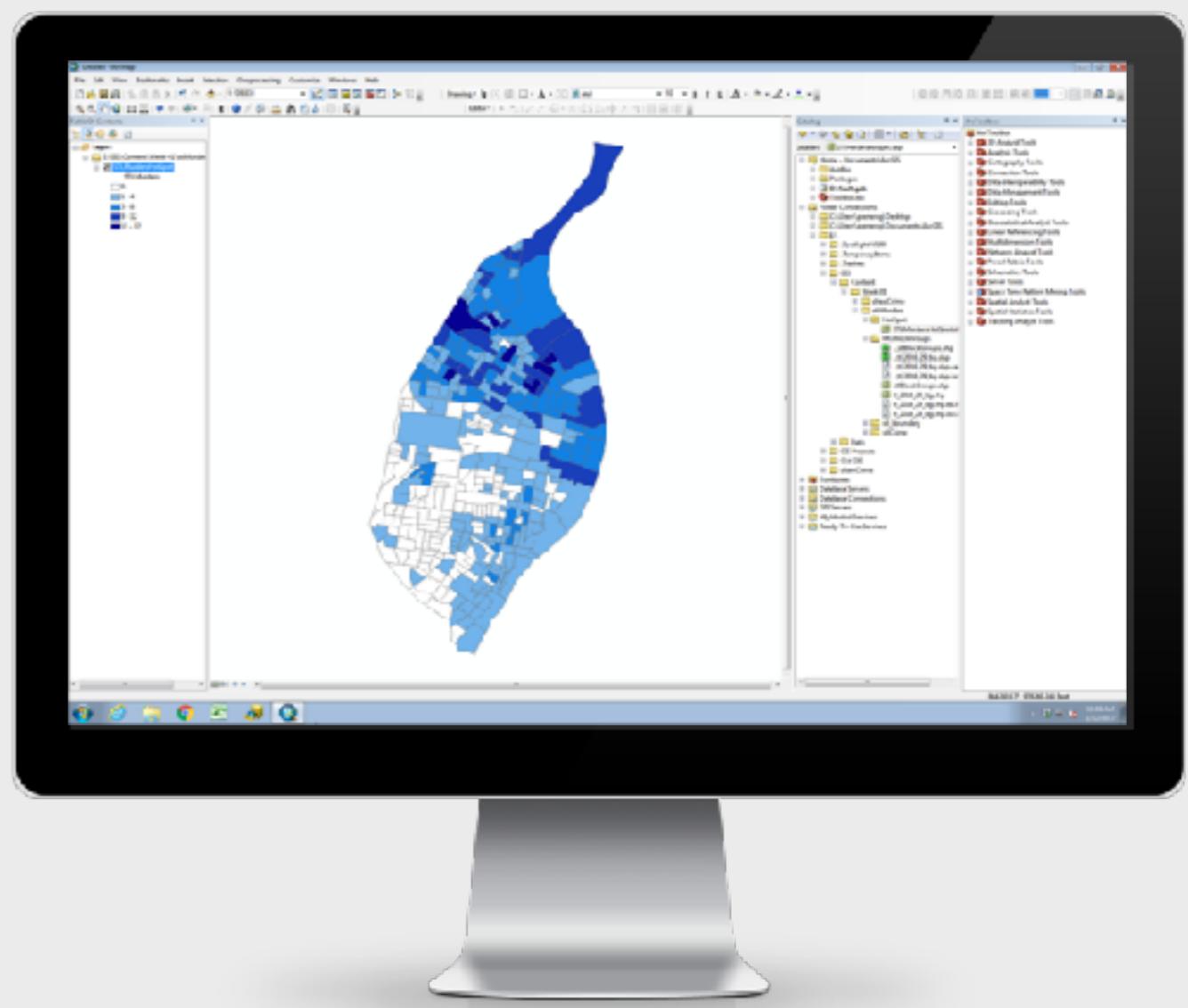
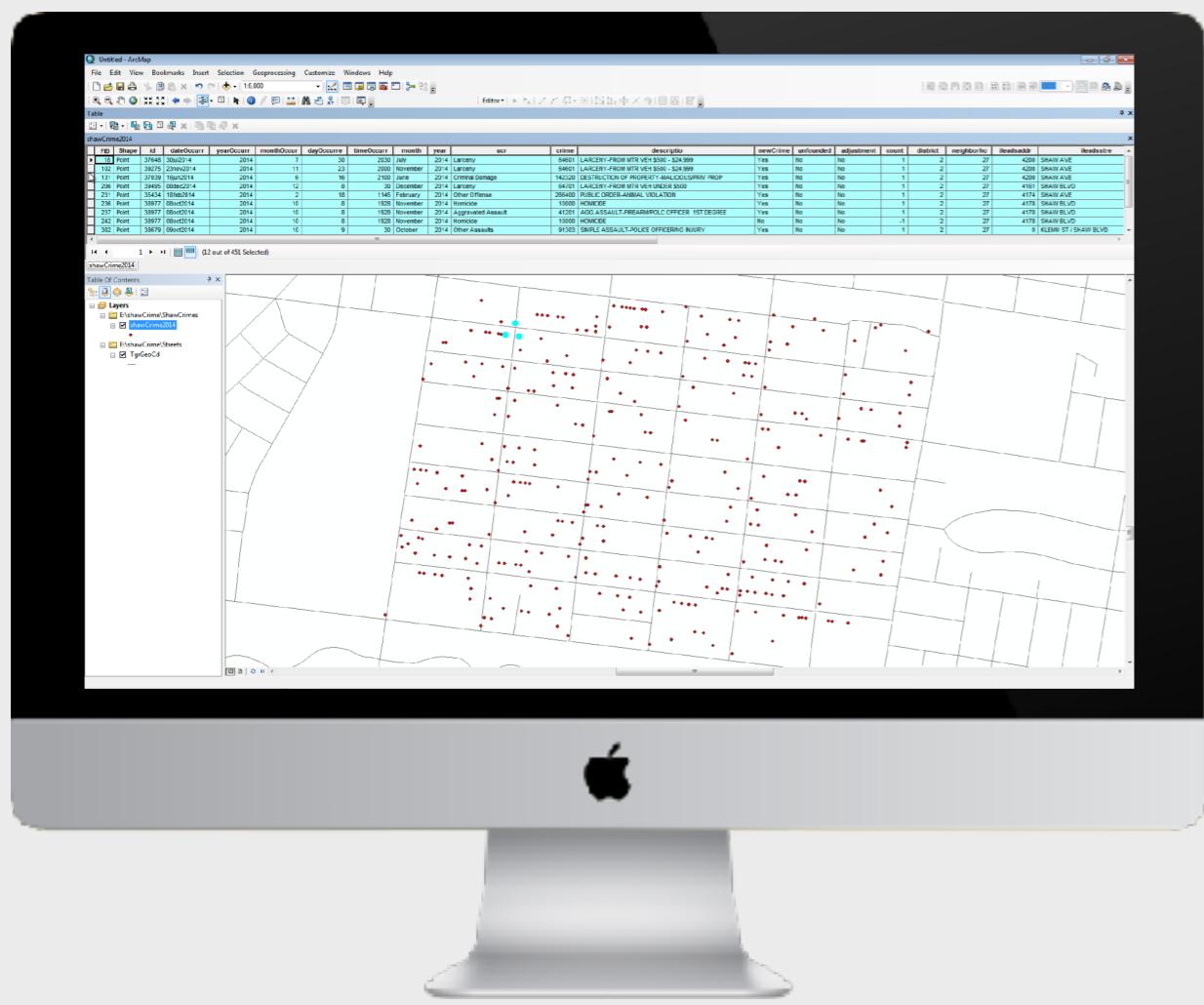
GIS = Geographic Information System



4. WHAT ARE GIS & GIS_C

ALPHABET SOUP

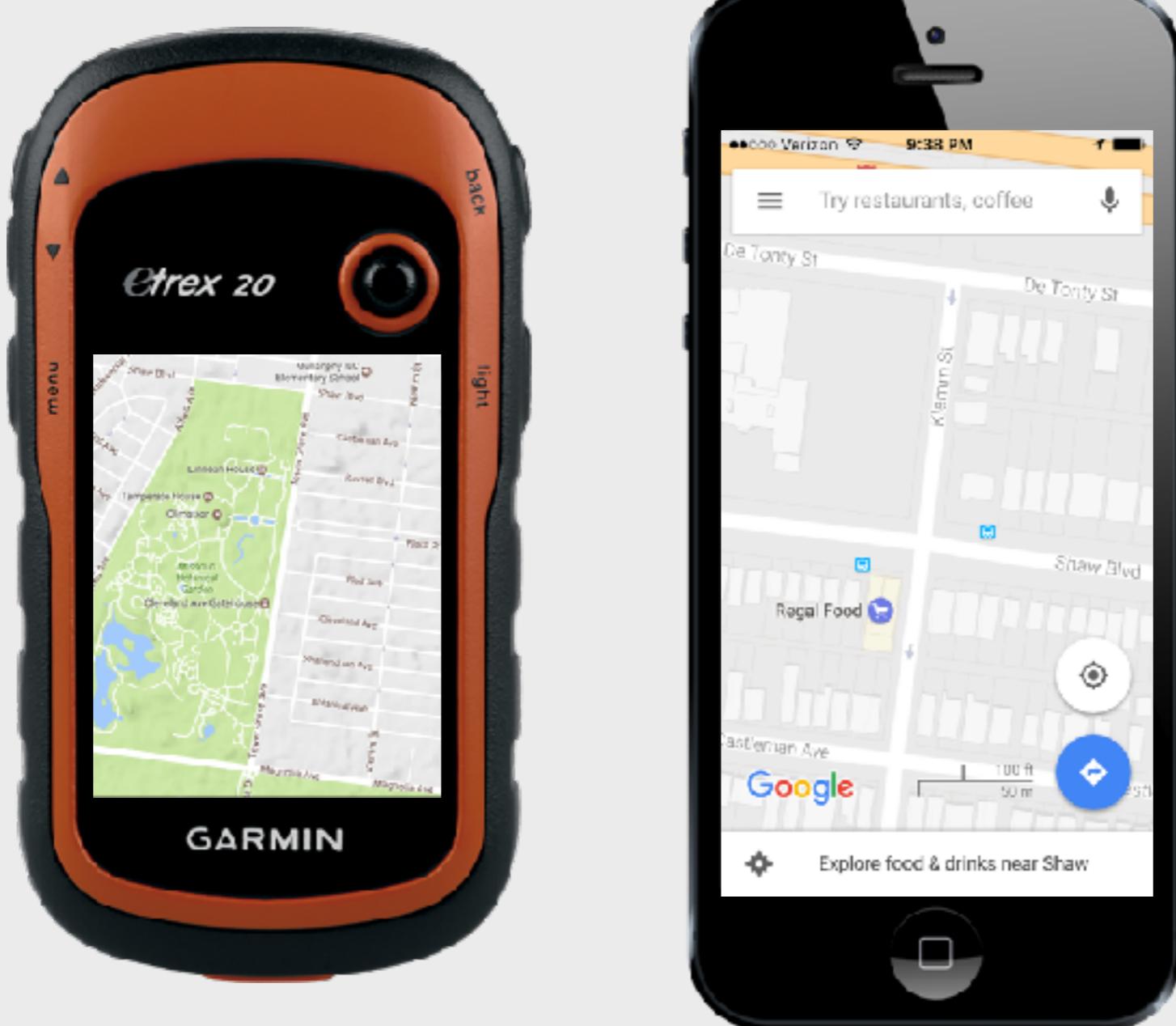
GIS = Geographic Information System



4. WHAT ARE GIS & GISc

ALPHABET SOUP

GPS = Global Positioning System

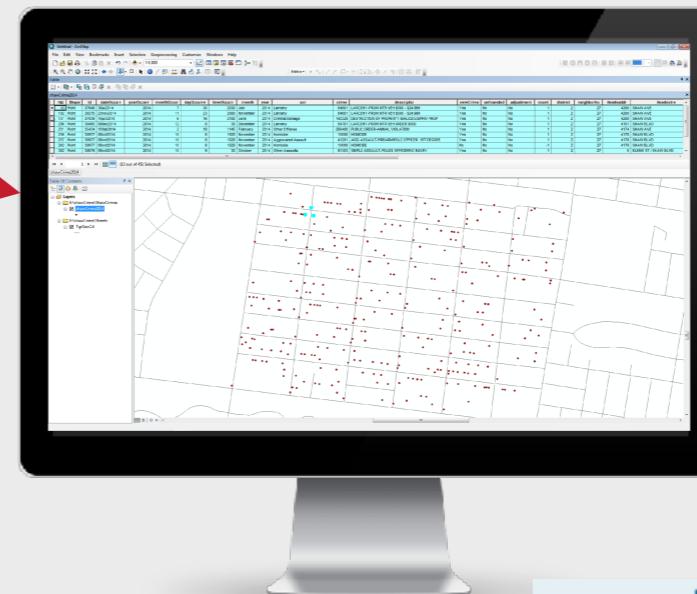
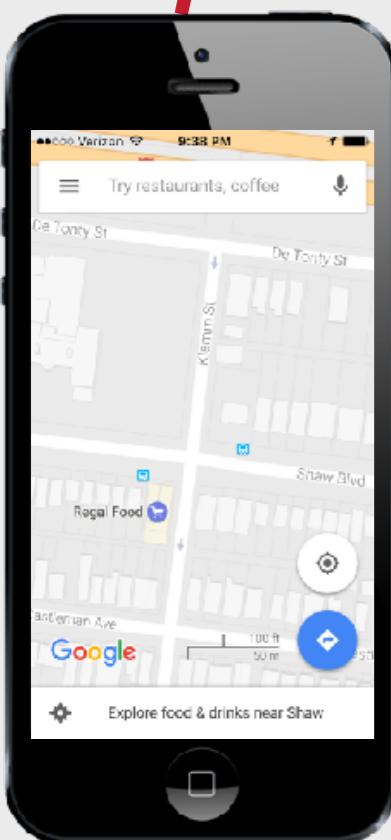


4. WHAT ARE GIS & GISc

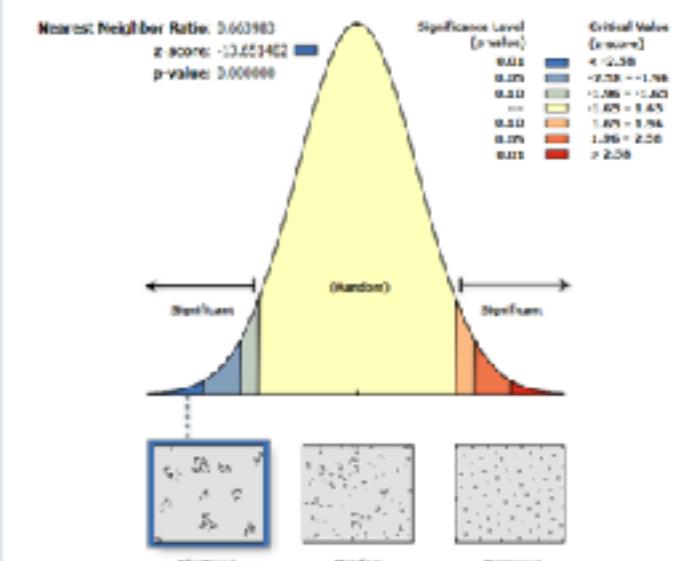
ALPHABET SOUP

GISc = Geographic Information Science

```
29 import delimited shawCrime2016.csv  
30 generate ucr = .  
31 replace ucr = 1 if crime >= 10000 & crime <= 19999  
32 replace ucr = 2 if crime >= 20000 & crime <= 29999  
33 replace ucr = 3 if crime >= 30000 & crime <= 39999  
34 replace ucr = 4 if crime >= 40000 & crime <= 49999
```



Average Nearest Neighbor Summary

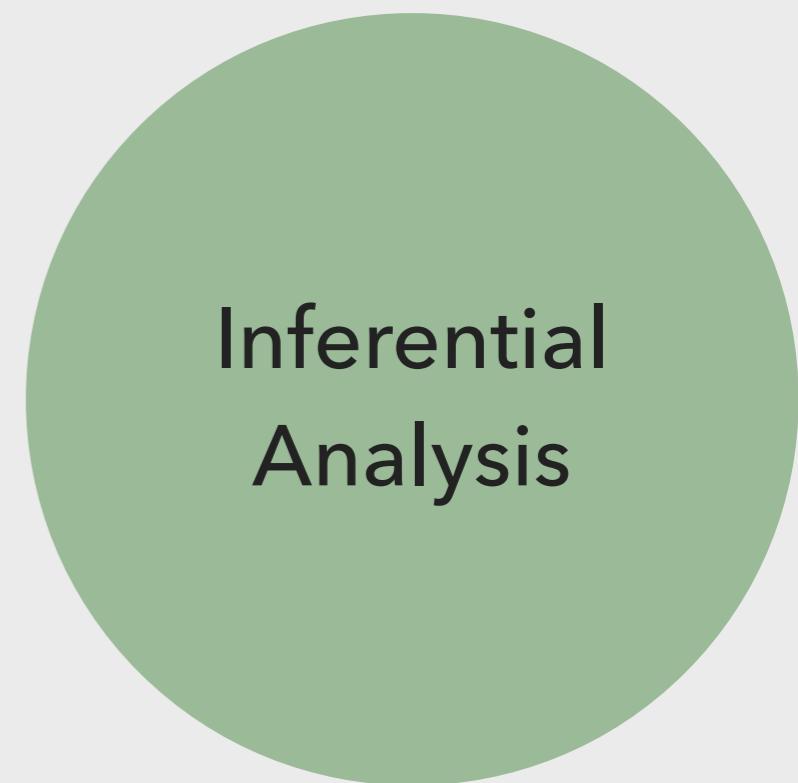
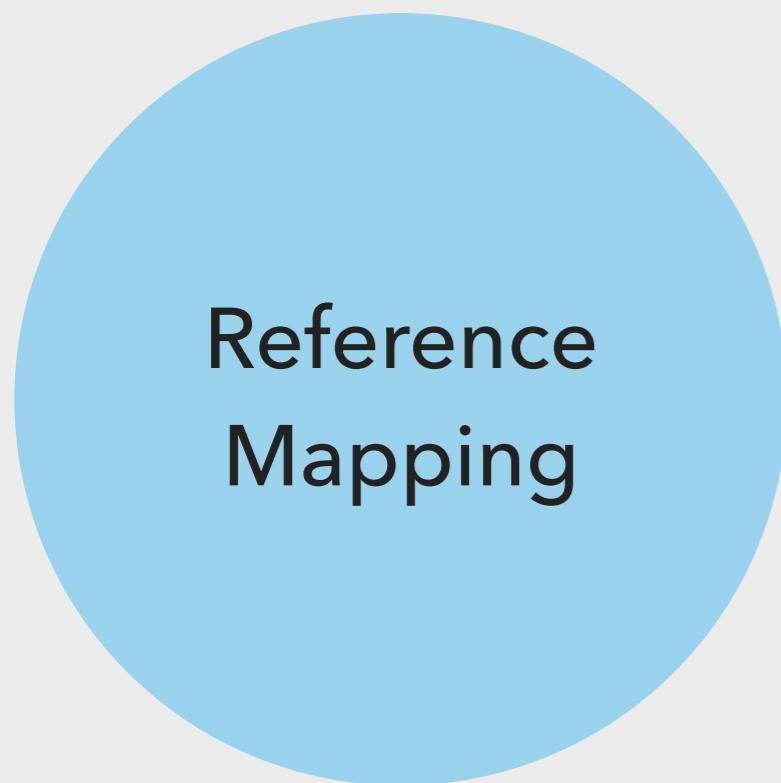


Given the z-score of -13.6514815355, there is a less than 1% likelihood that this clustered pattern could be the result of random chance.

d **WHAT ARE SPATIAL
DATA USED FOR?**

4. WHAT ARE GIS & GISc

THREE MAJOR USES



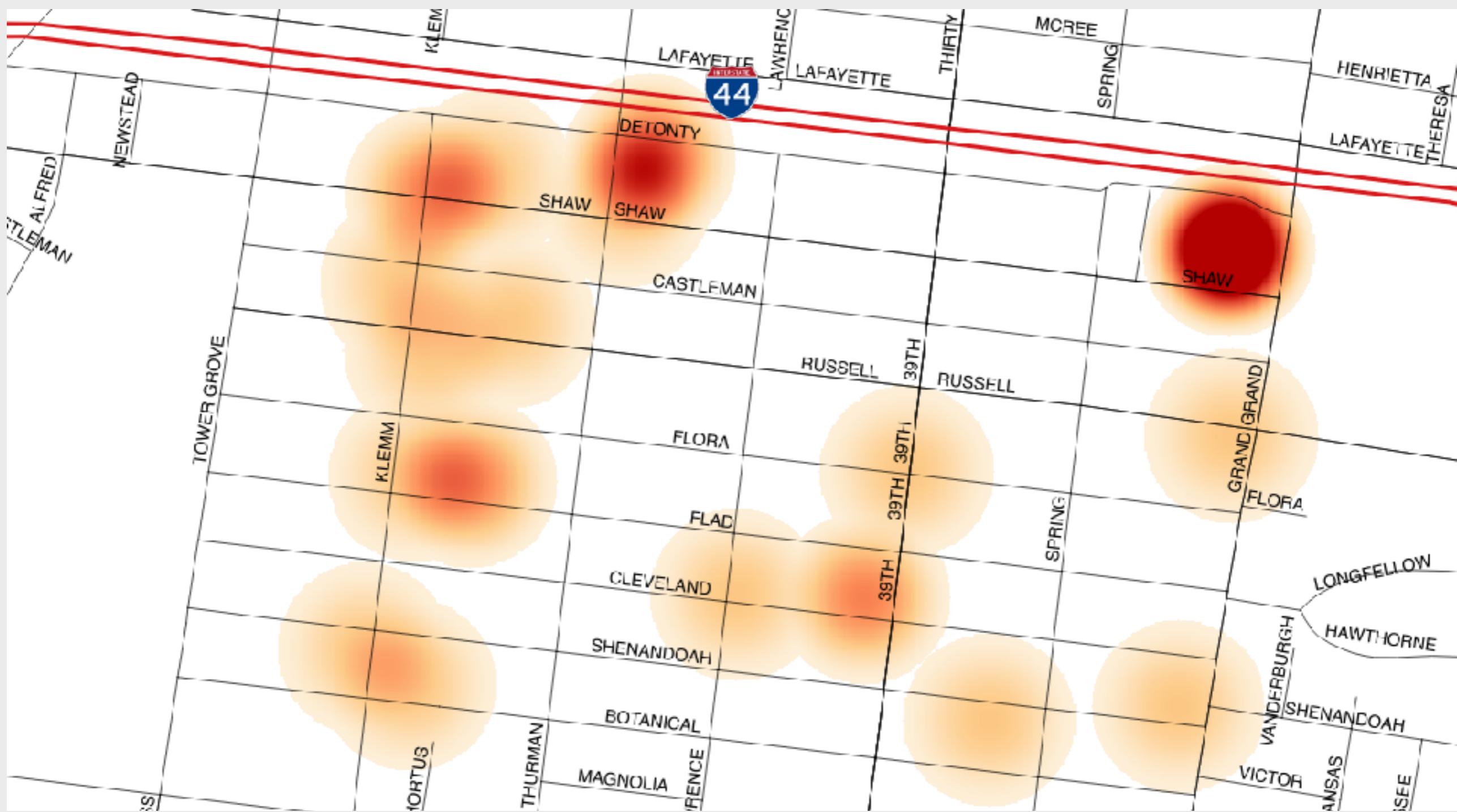
4. WHAT ARE GIS & GISc

REFERENCE MAPPING



4. WHAT ARE GIS & GISc

THEMATIC MAPPING



**EVERYTHING IS RELATED TO
EVERYTHING ELSE, BUT NEAR THINGS
ARE MORE RELATED THAN DISTANT
THINGS.**

William Tobler (1970)

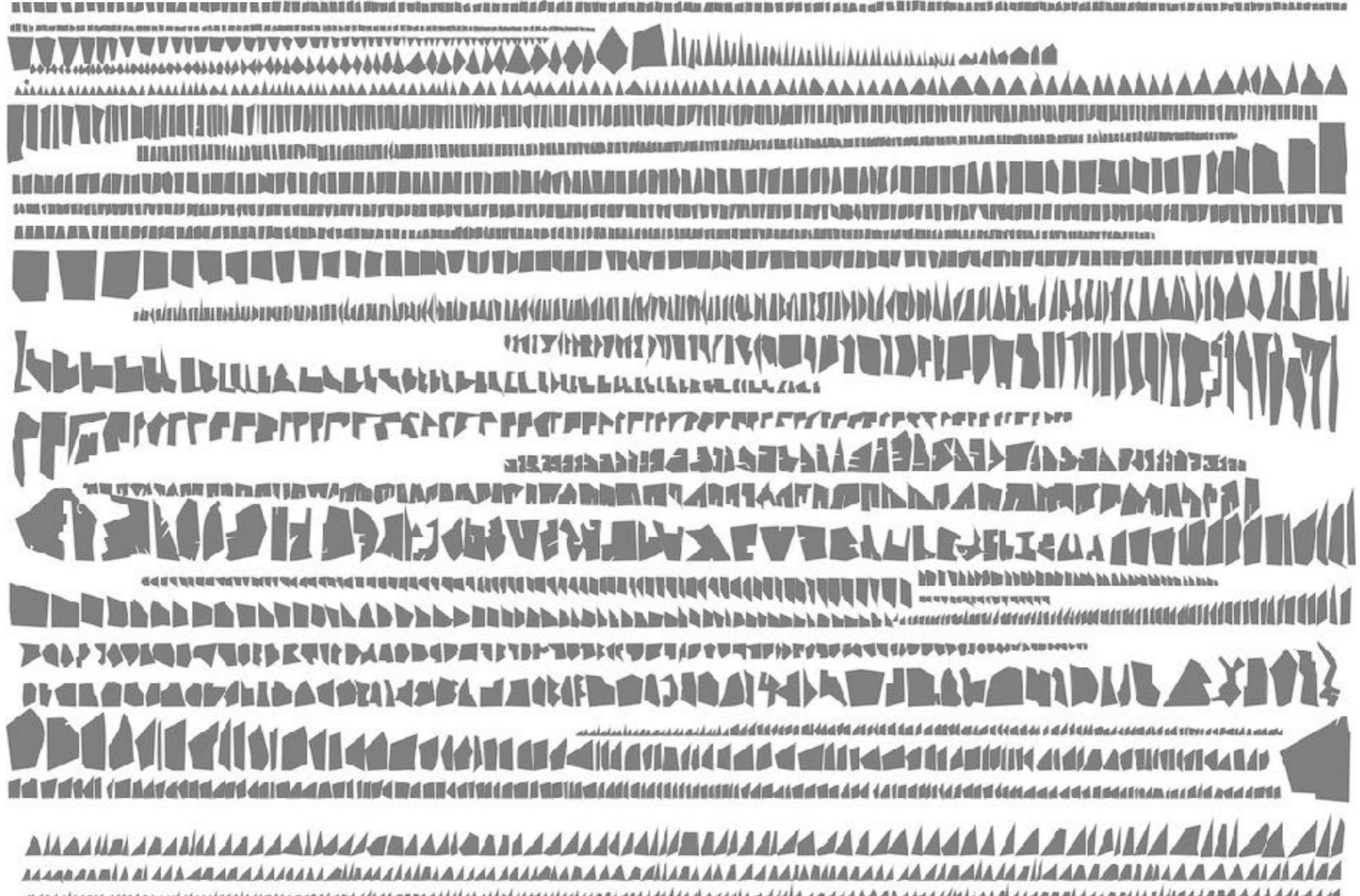
PARIS

Armelle Caron



PARIS

Armelle Caron



PUTTING SPACE IN ITS PLACE

Intuitive Model



Statistical Model



PUTTING SPACE IN ITS PLACE

GIS Model



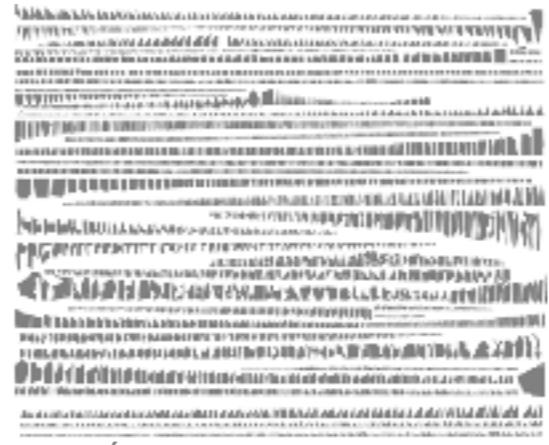
Statistical Model



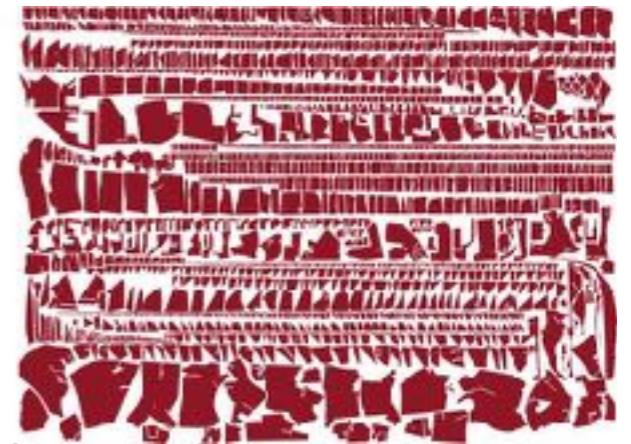
LES VILLES RANGÉES



paris / paris rangé



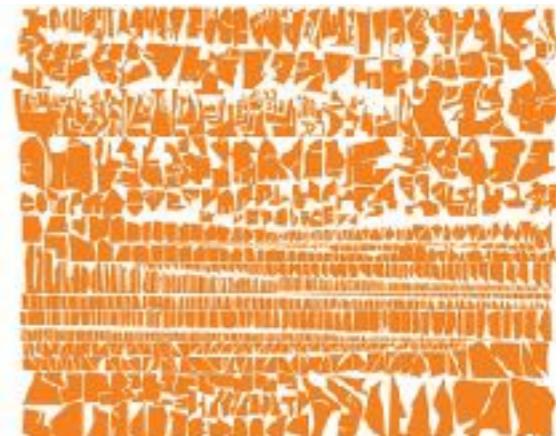
bordeaux / bordeaux rangé



tamarac / tamarac rangé



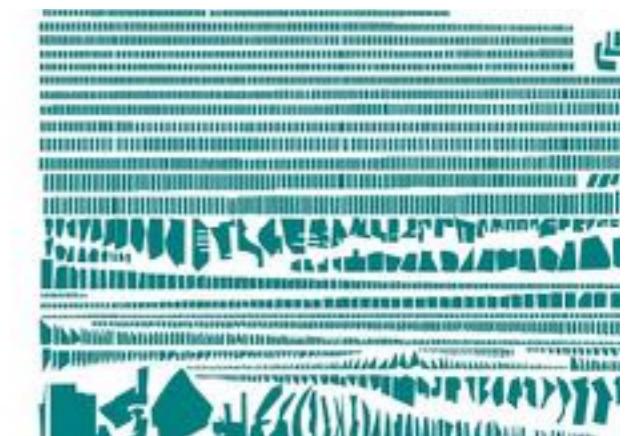
montpellier / montpellier rangé



berlin / berlin rangé

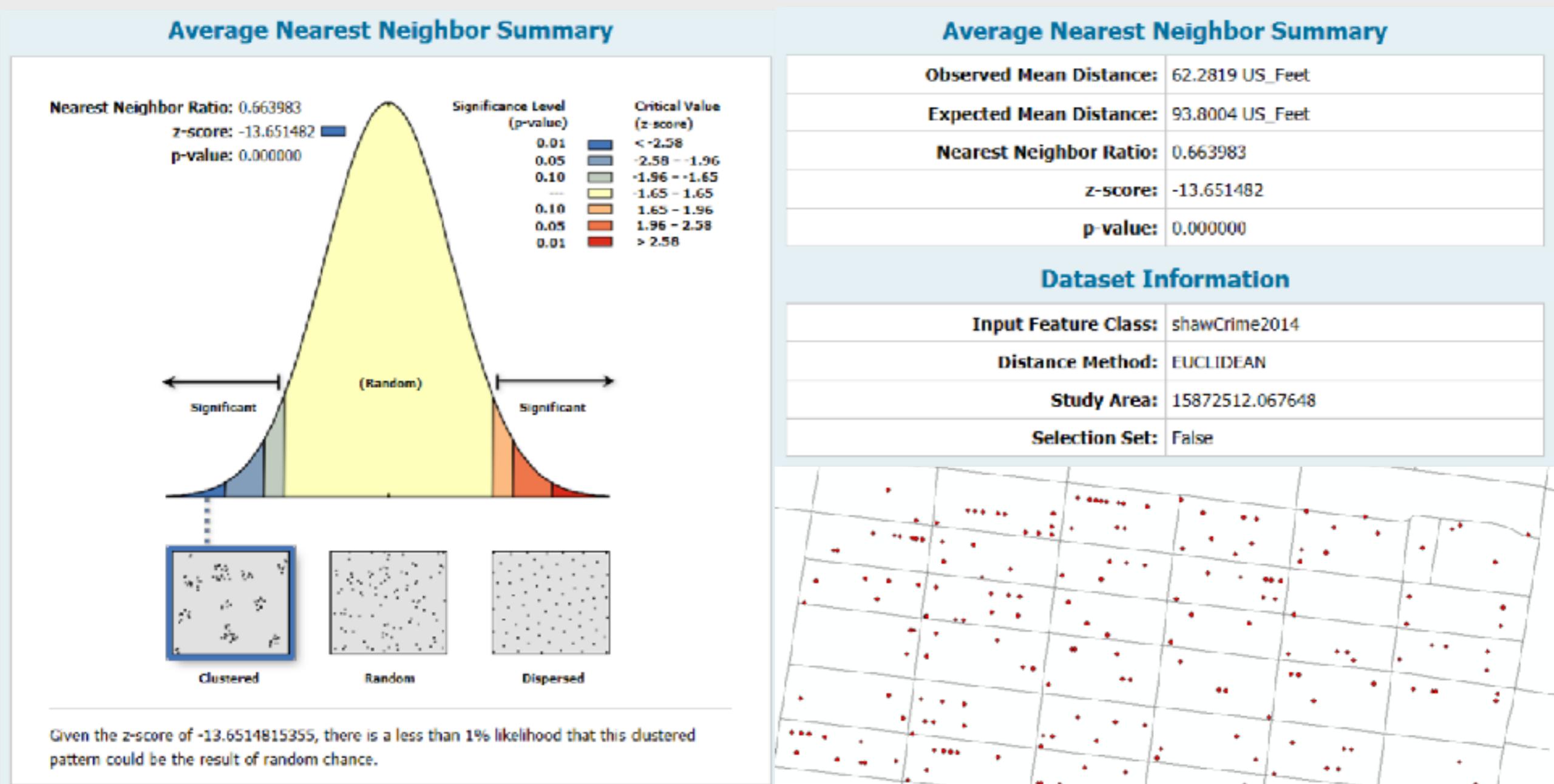


new york / new york rangé



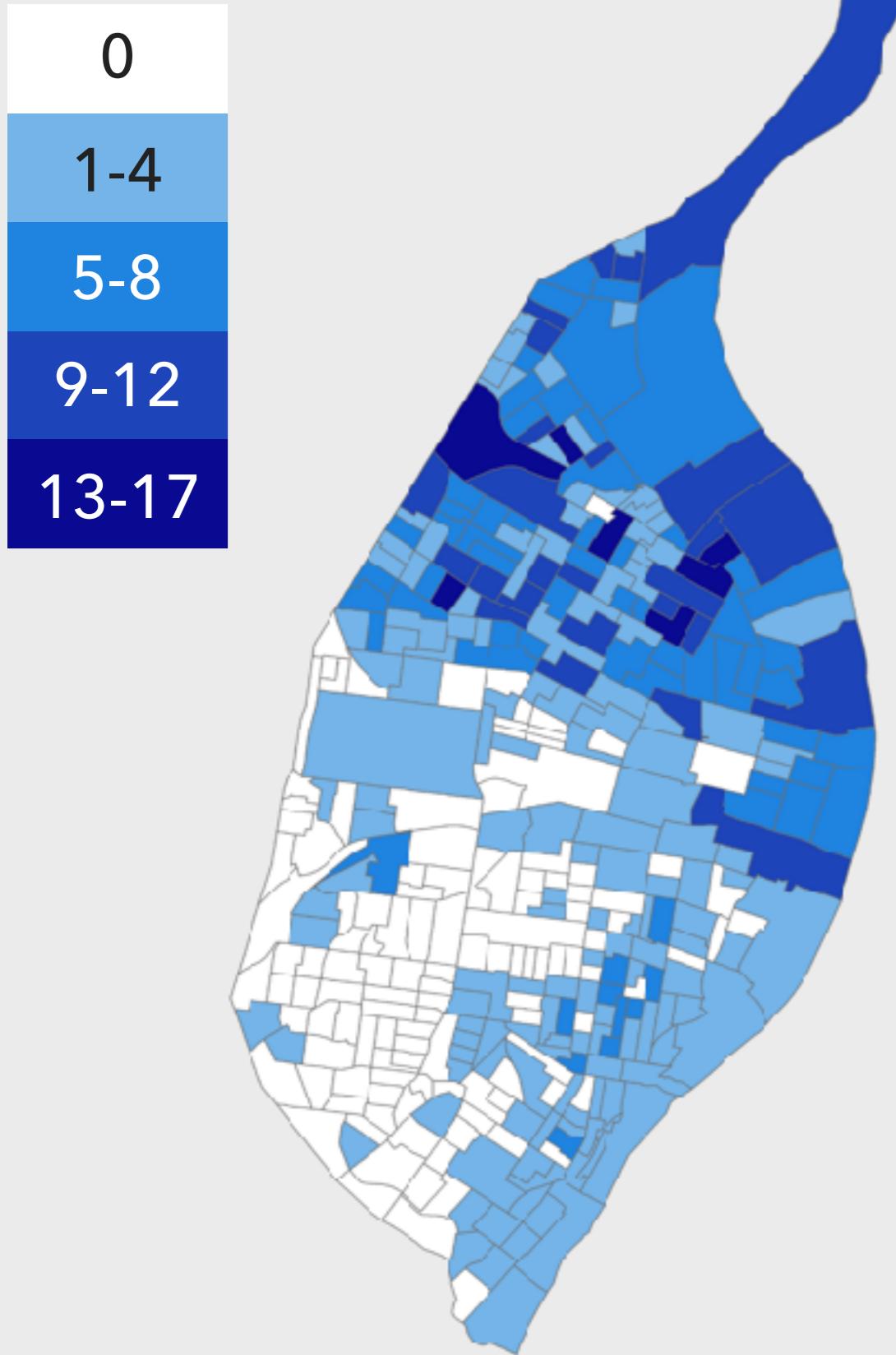
4. WHAT ARE GIS & GISc

INFERENTIAL ANALYSIS

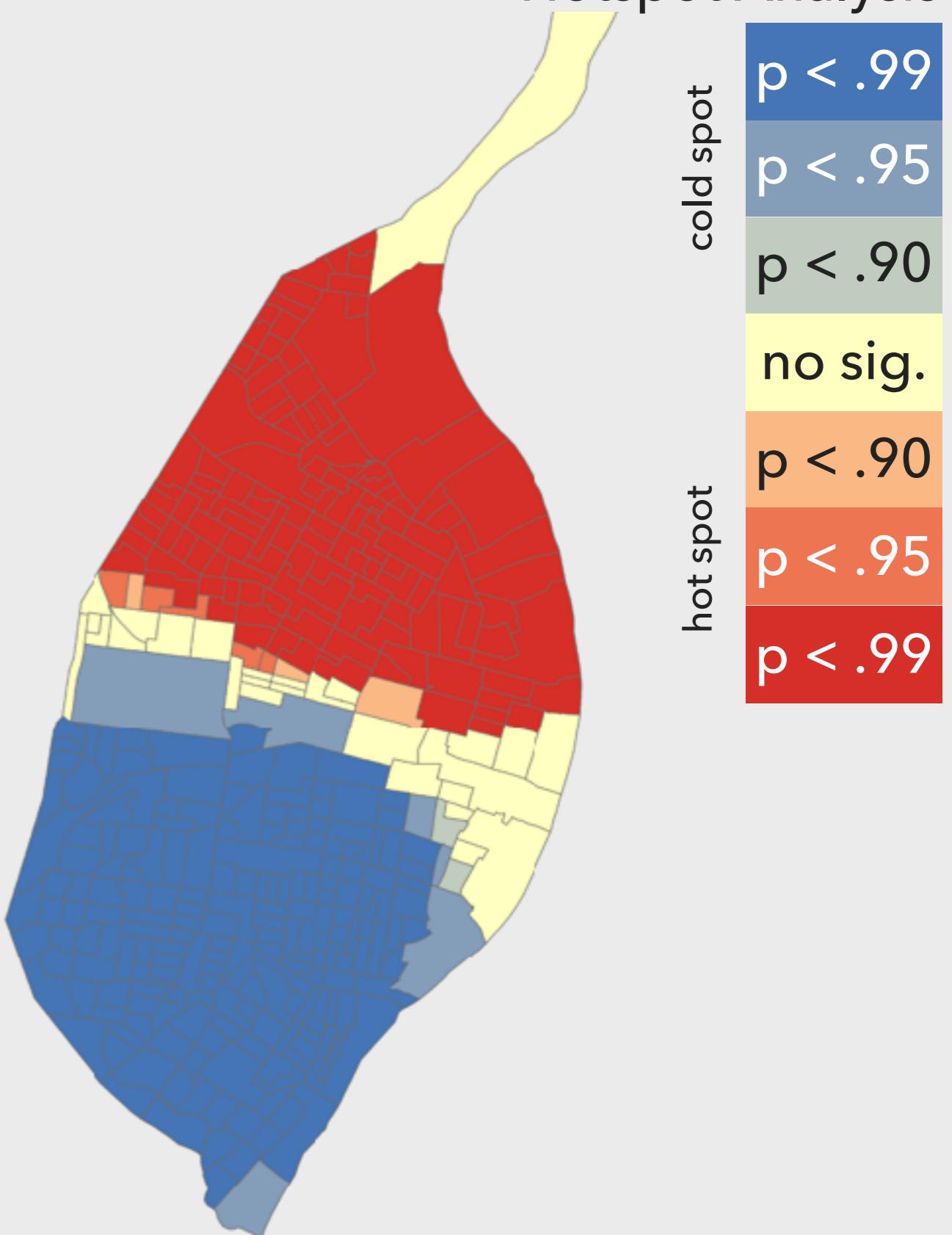


INFERENTIAL ANALYSIS

Murders in St. Louis, 2008-2015



Hotspot Analysis



5 INTRODUCING THE COURSE SOFTWARE

REFERENCES

- ▶ Slide 6 - Daily Mail - <https://goo.gl/3ySVPt>
- ▶ Slide 7 - MSNBC - <https://goo.gl/JLHpcu>
- ▶ Slide 8 - KWMU - <https://goo.gl/Y3nMmO>
- ▶ Slide 9 - Riverfront Times - <https://goo.gl/Z3Zze9>
- ▶ Slide 10 - Explore St. Louis - <https://goo.gl/2PgncD>