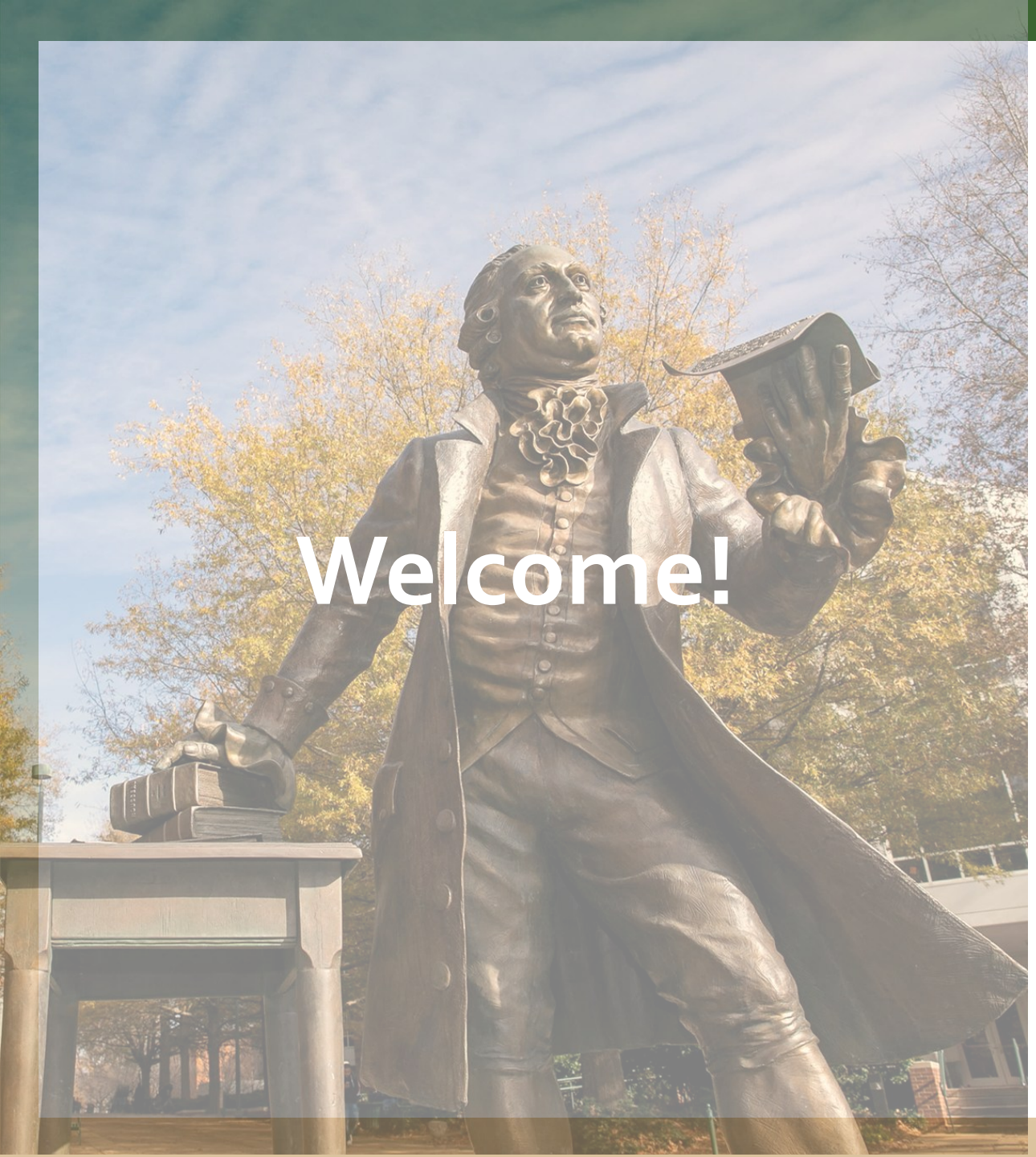
# EXPLORING AND MAPPING GEORGE MASON UNIVERSITY WITH GEOSPATIAL TECHNOLOGIES

Emma Von Hoene & Taylor Anderson

*Department of Geography and Geoinformation Science*

FOCUS – August 1st , 2023



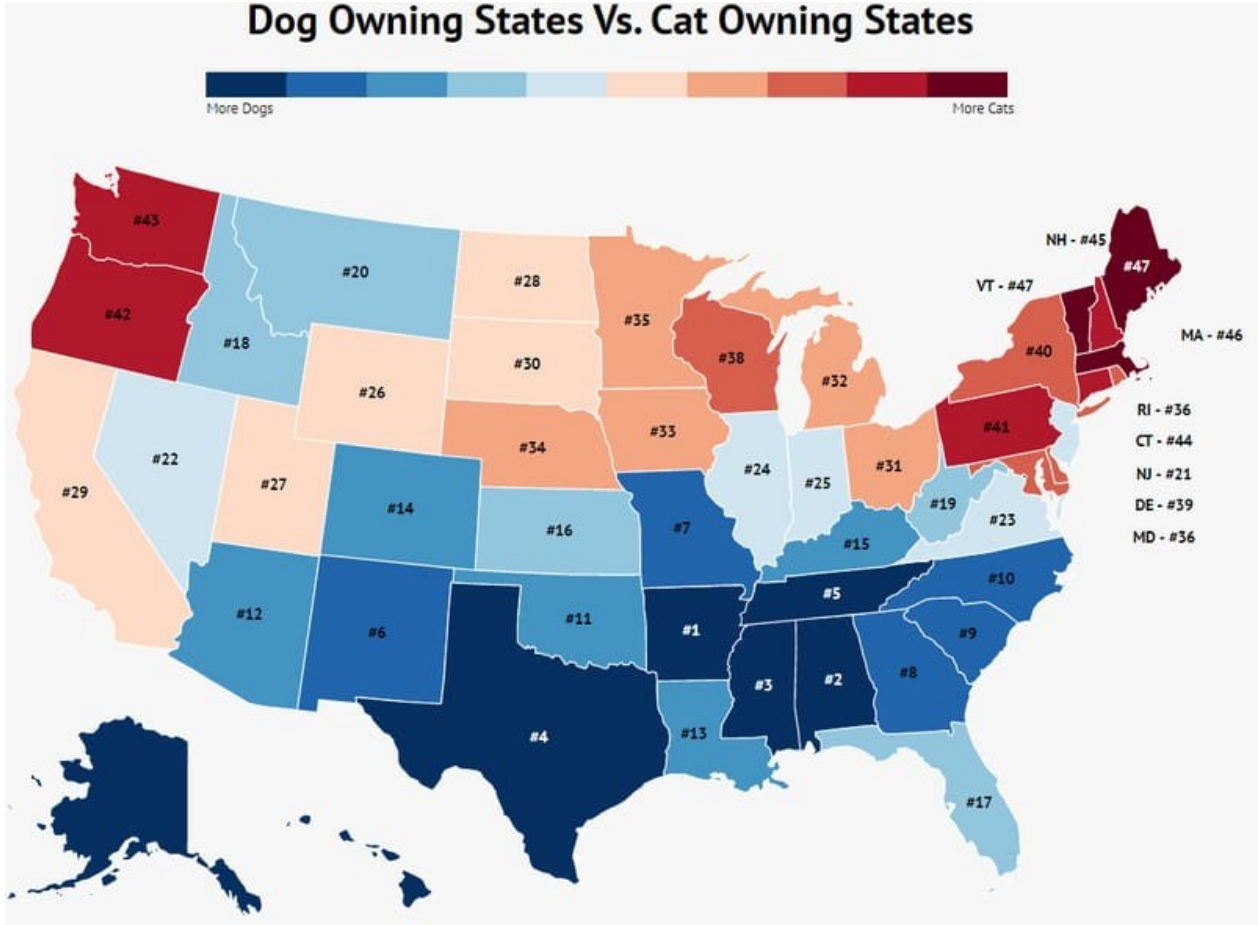

- **Today we will :**
  - Learn about GIS and spatial data
  - Explore George Mason University
  - Collect data for landmarks on campus (scavenger hunt!)
  - Create a map using GIS

# Spatial Data

- Foundation of geography
- **Where** is what?”
- Data that contains information for a specific location
- Includes *location* and *attributes*

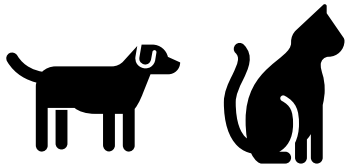
*Example* →

Are you a cat or dog person?






What is the **location**?

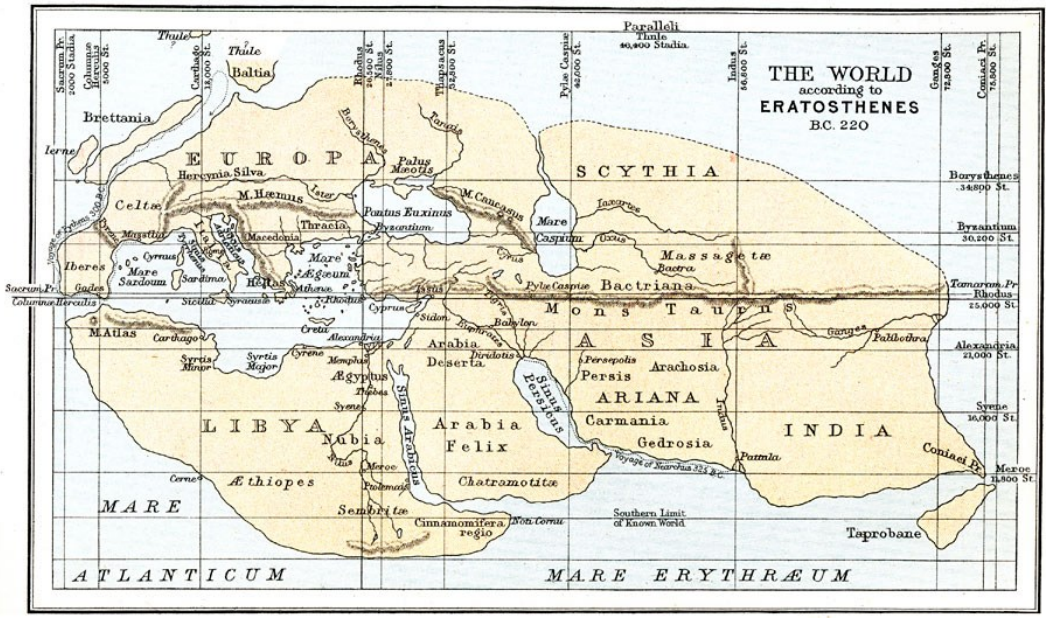


What is the **attribute**?

# Spatial Data

- Not limited to the digital format we commonly associate it with today
- Dates back thousands of years
- ***Where*** something is has always mattered!



# Can you think of any phenomena where location is not an important piece of information?

# Spatial Data

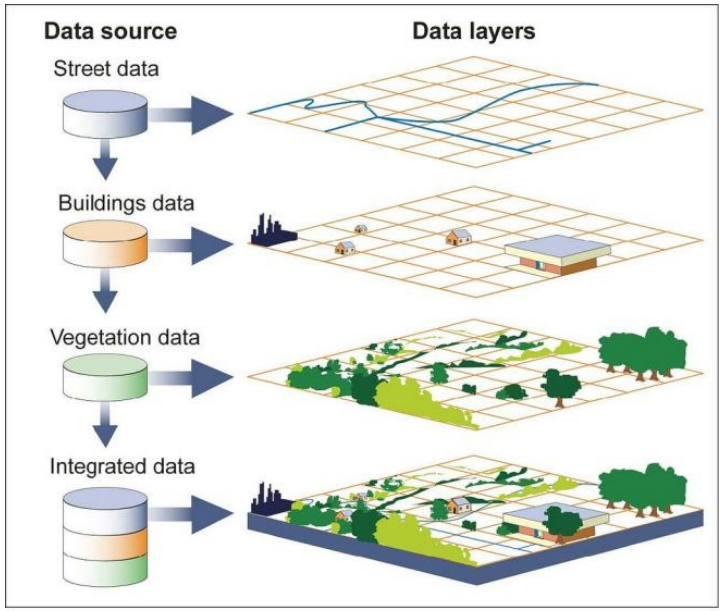
- The 20th century witnessed many geographic innovations
- Introduced a new era of digital collection and analysis of spatial data using GIS



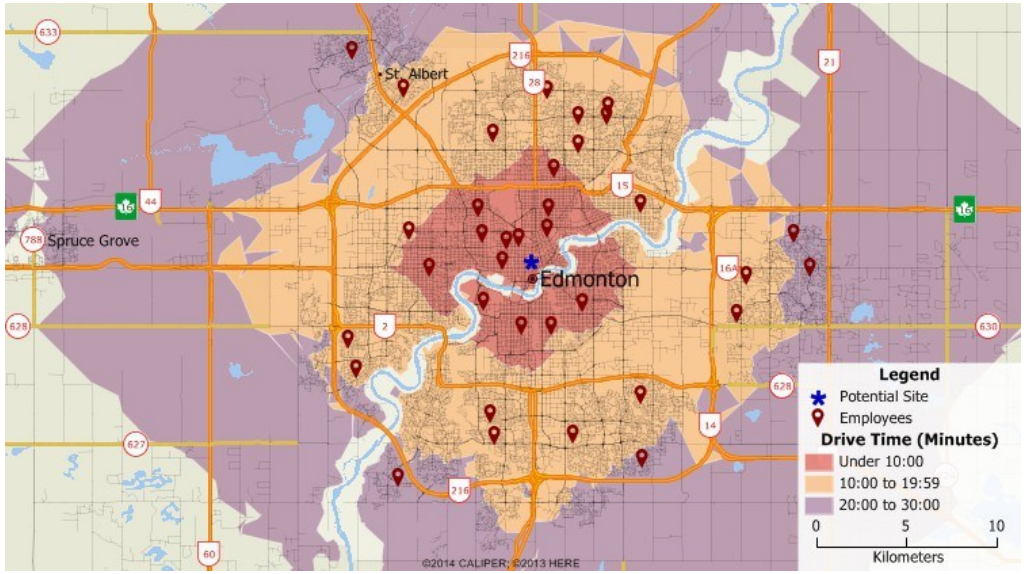



# Introduction to GIS

- **G**eographic **I**nformation **S**ystem
- A computer system that *creates*, *manages*, *analyzes*, and *maps* many types of **data**
- Helps users understand how things in the world are connected and how they work together

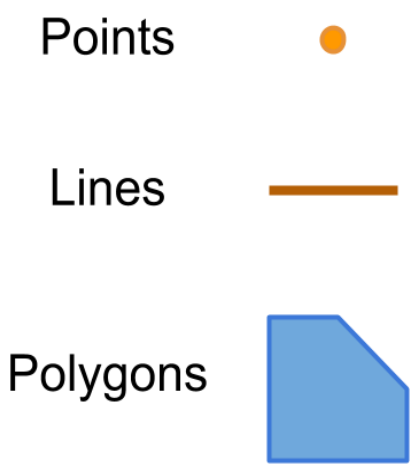


Source: GAO.



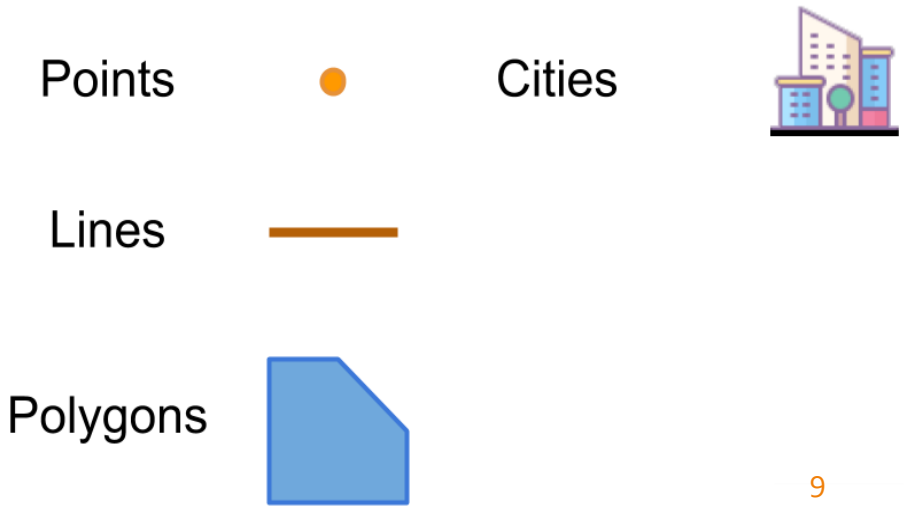
# Spatial Data Representation in GIS

- Discrete Object Representation
  - Known as Vector Data
- Represents the real-world as objects with well-defined boundaries
- Three types: *Points, Lines* & *Polygons*
- ***Point*** examples?



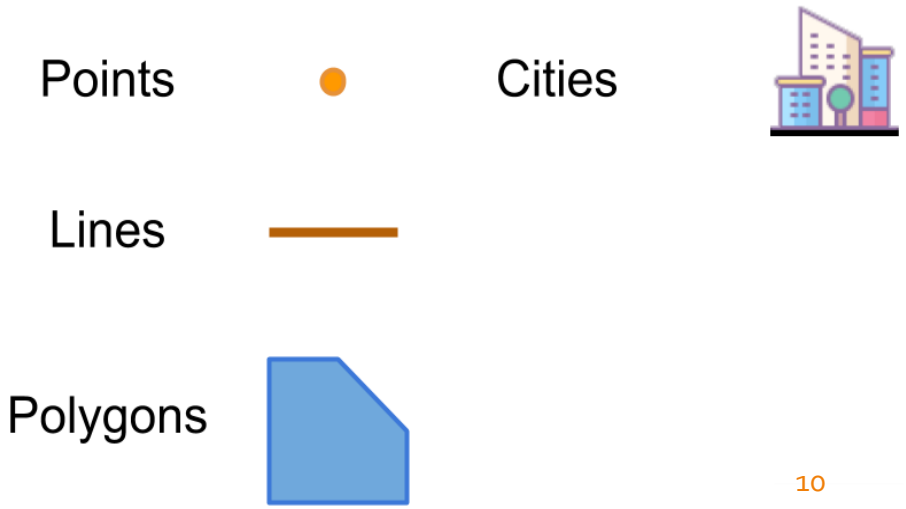
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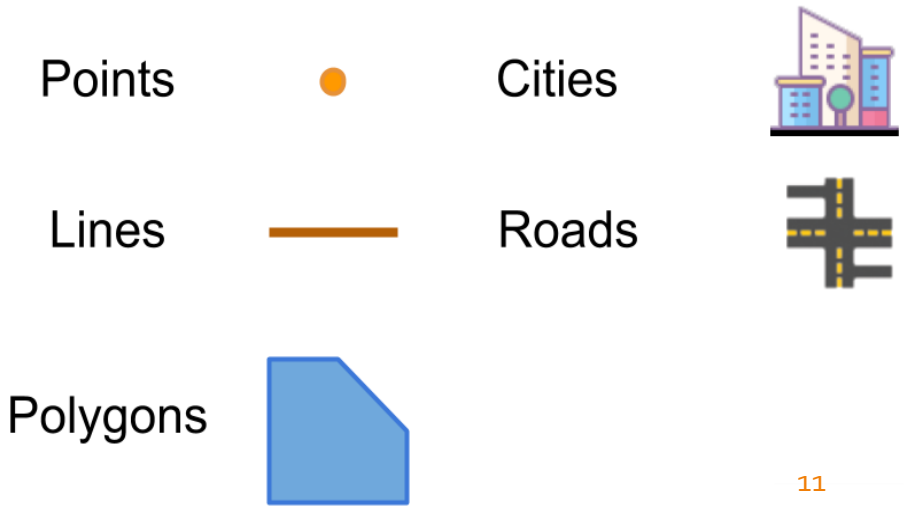
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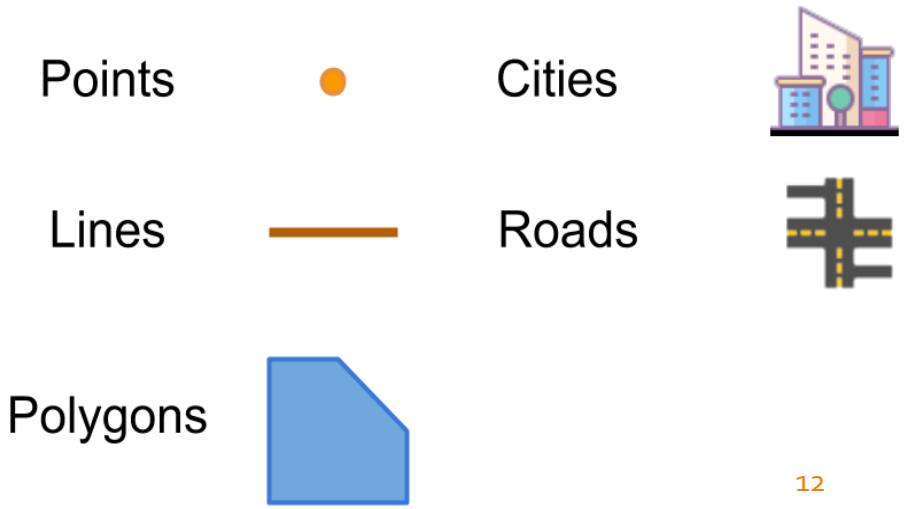
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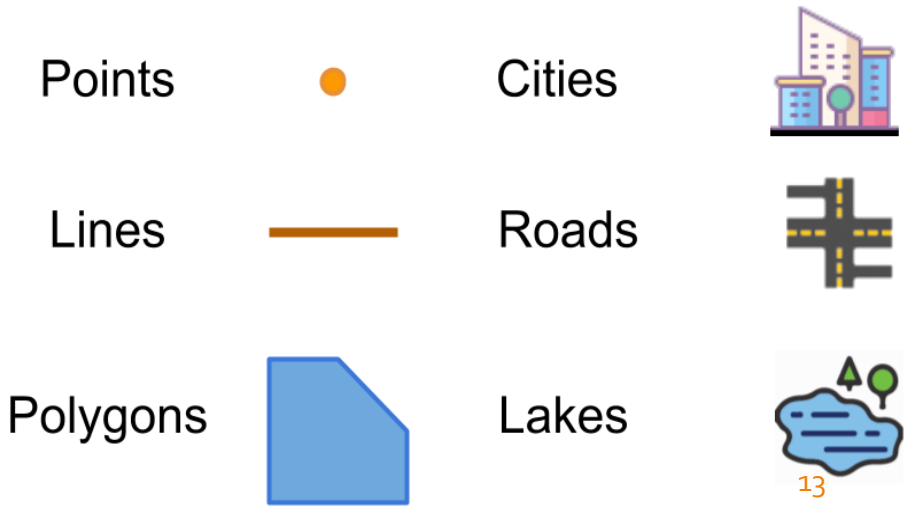
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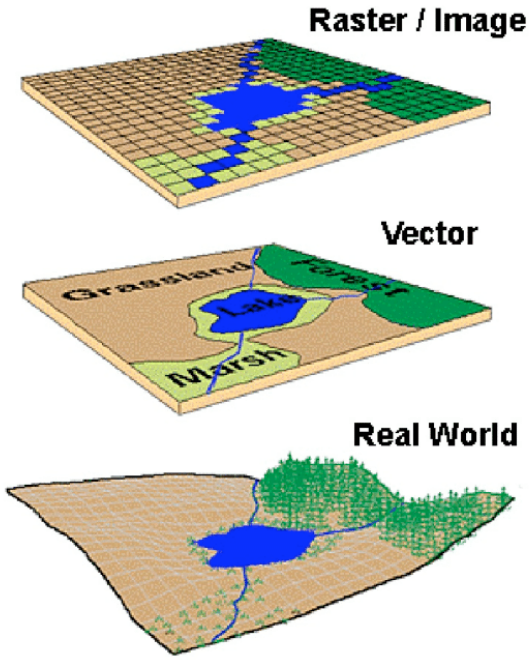


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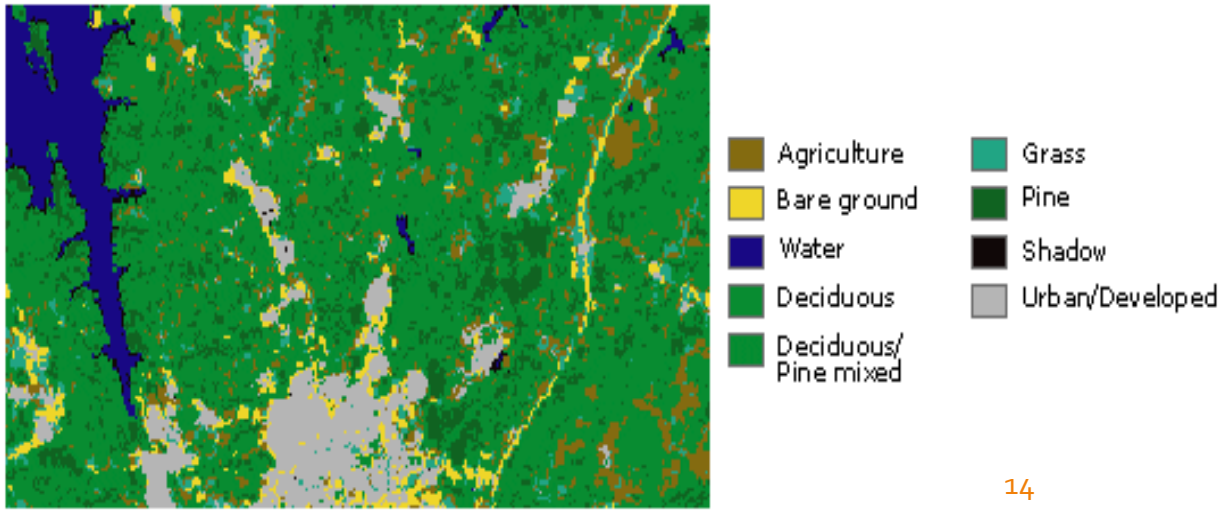
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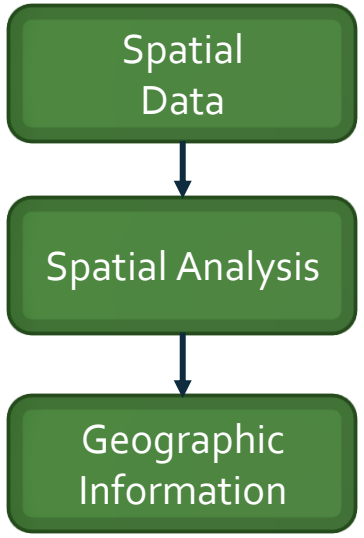



- Grid of cells (or pixels)
  - Known as **Raster Data**
- Each cell in the grid has a value representing information
- Used to represent continuous data
- Examples?



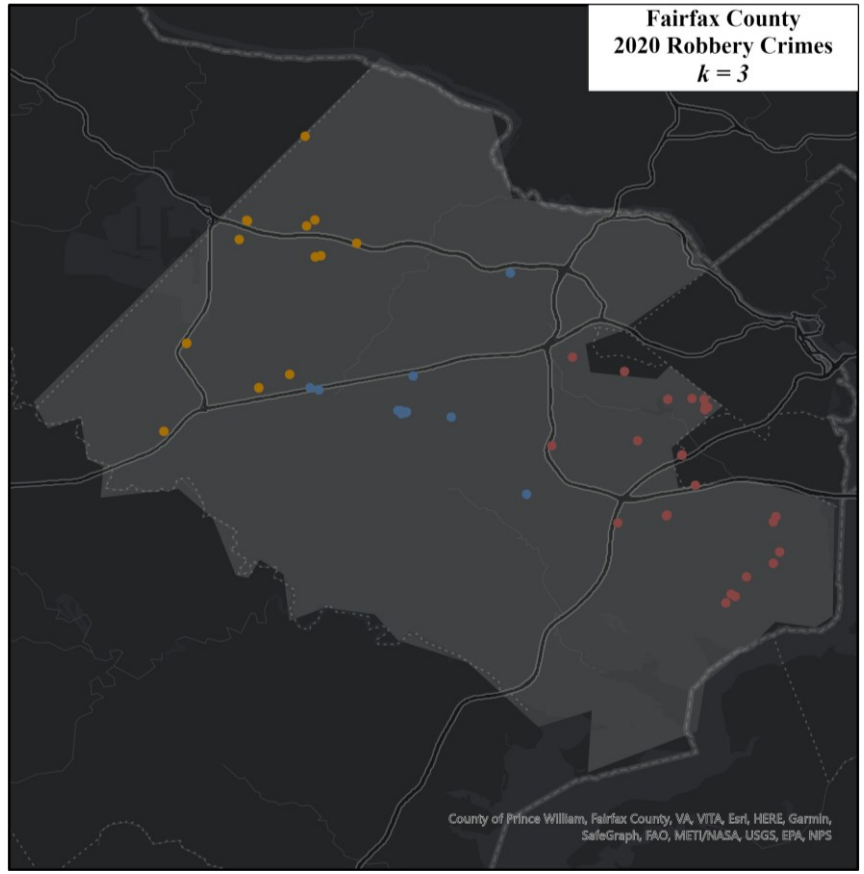
# What can we do with this data?

- **Spatial analysis!**
- The process of gaining **information** on spatial data with analytical techniques
- Allows users to:
  - *Solve complex location-oriented problems*
  - *Find patterns*
  - *Assess trends*
  - *Gain a new perspective to make decisions*



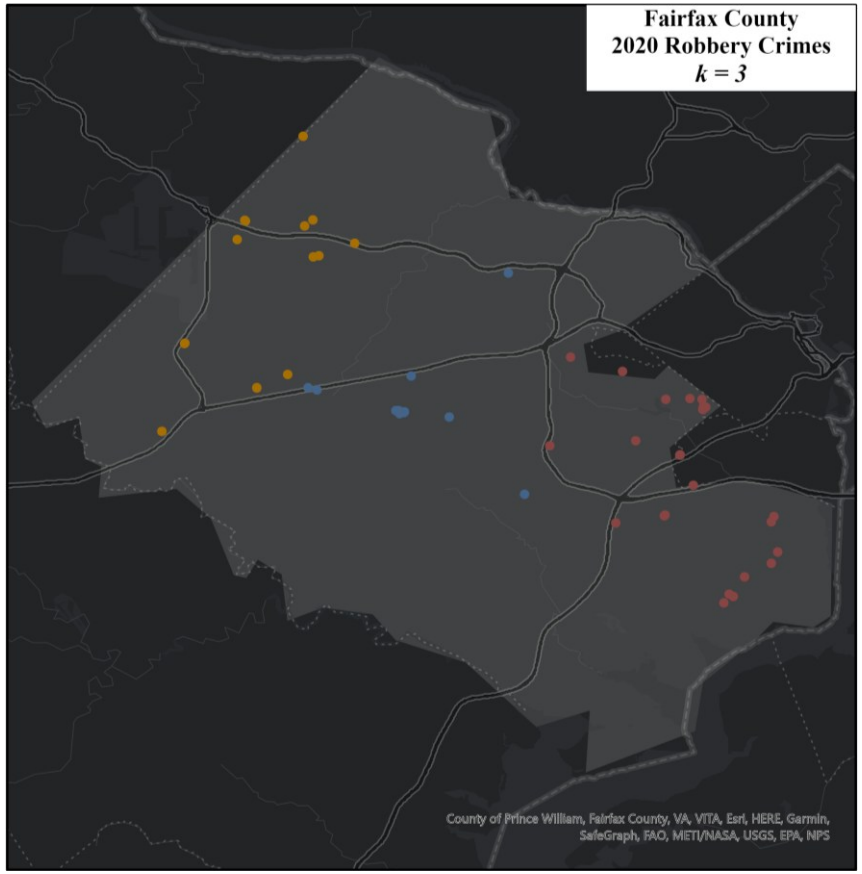
# What can we do with this data?

- **Spatial Data:**
  - **Location:**
  - **Attributes:**
- **Spatial Analysis:**
- **Geographic Information:**



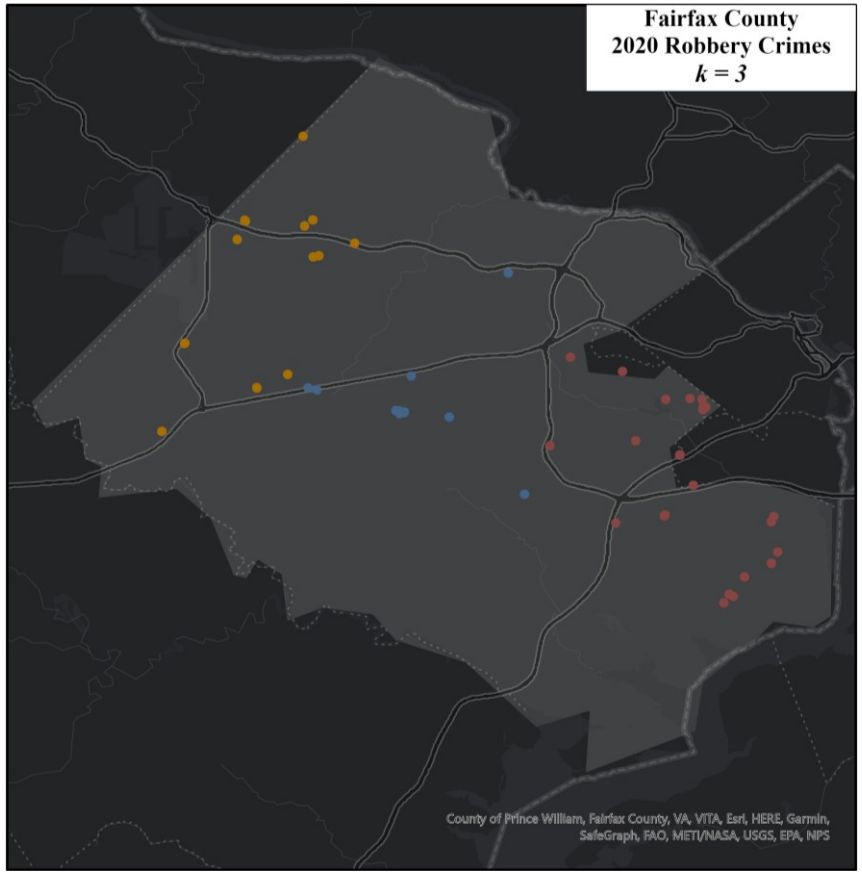
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- **Spatial Data:** Points of robbery crimes
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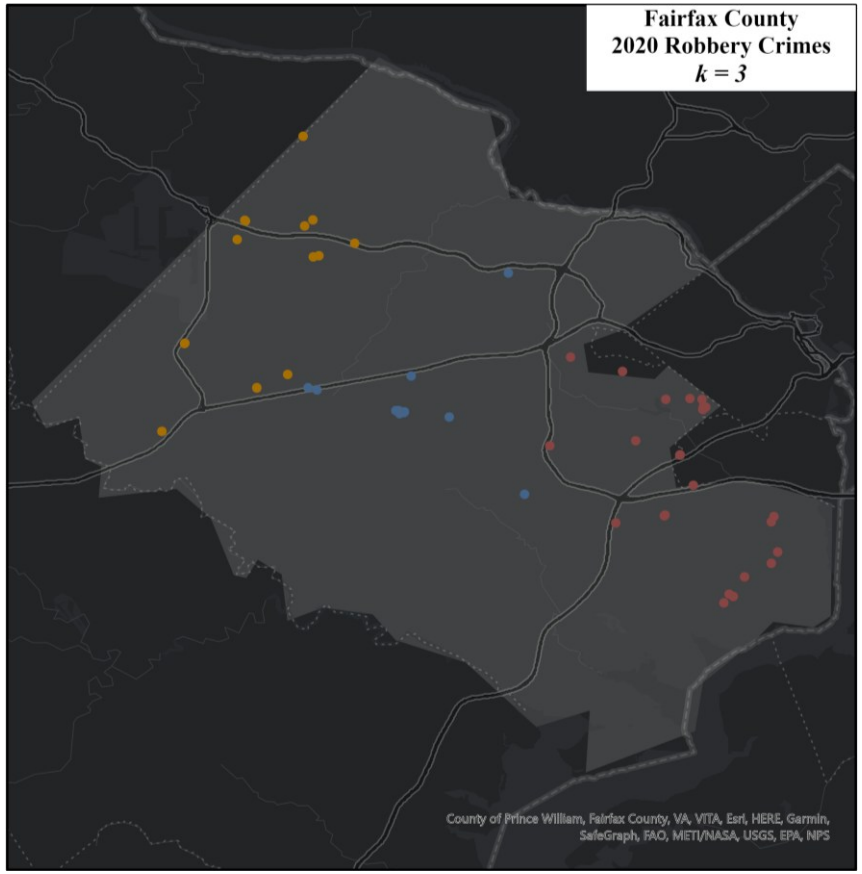
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- **Spatial Data:** Points of robbery crimes
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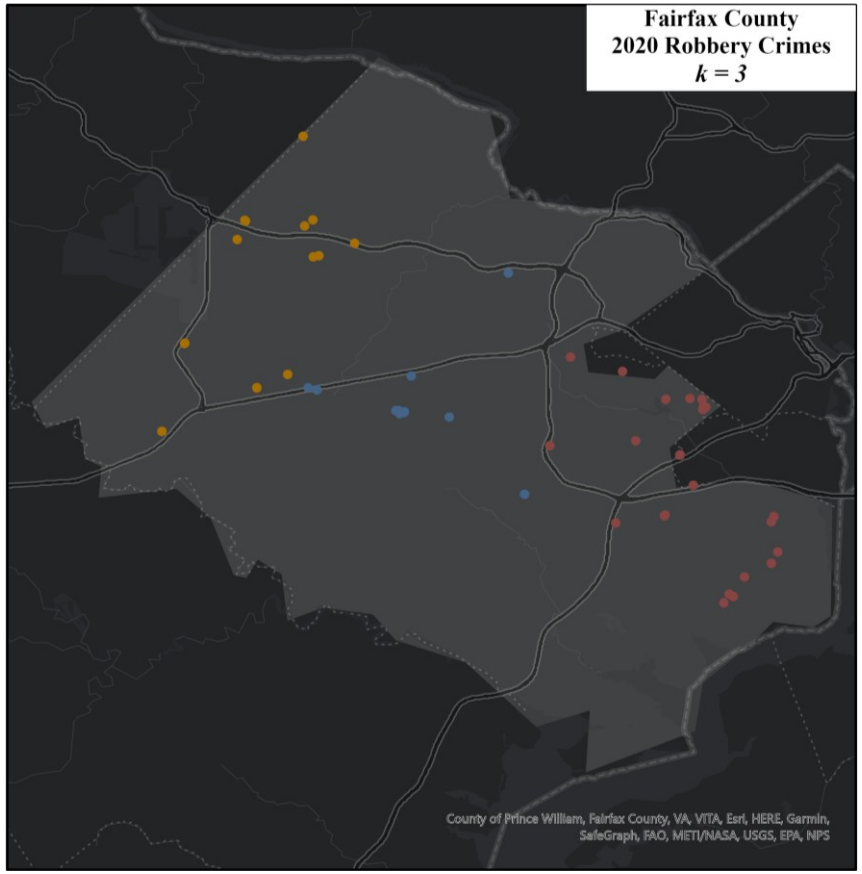
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- **Spatial Data:** Points of robbery crimes
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  - **Attributes:** Type of crime (robbery)
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- **Geographic Information:**



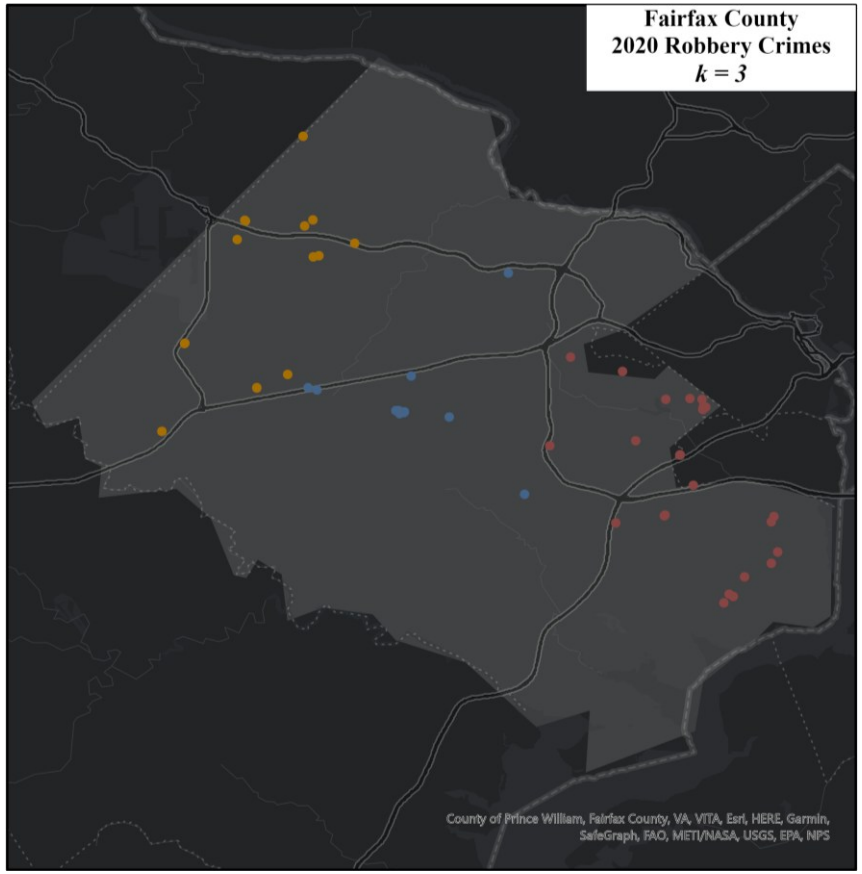
# What can we do with this data?

- **Spatial Data:** Points of robbery crimes
  - **Location**: *Where* the crime happened
  - **Attributes:** Type of crime (robbery)
- **Spatial Analysis:** Clustering
- **Geographic Information:**



# What can we do with this data?

- **Spatial Data:** Points of robbery crimes
  - **Location**: *Where* the crime happened
  - **Attributes:** Type of crime (robbery)
- **Spatial Analysis:** Clustering
- **Geographic Information:**
  - Shows us patterns on where robbery happens
    - Can be overlayed with other datasets to give context to location of crimes

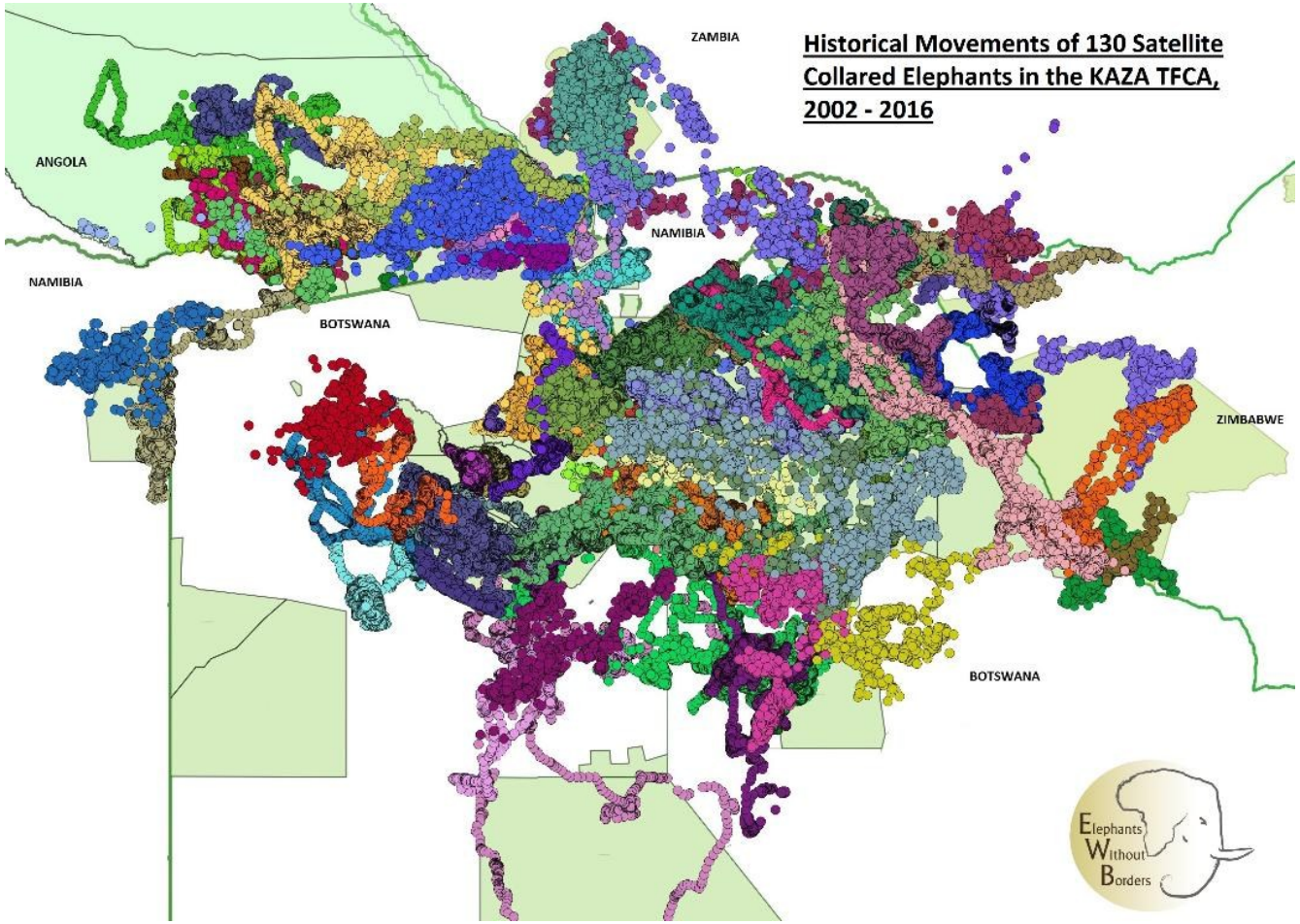


# GIS has many real-world applications!

# Any ideas?

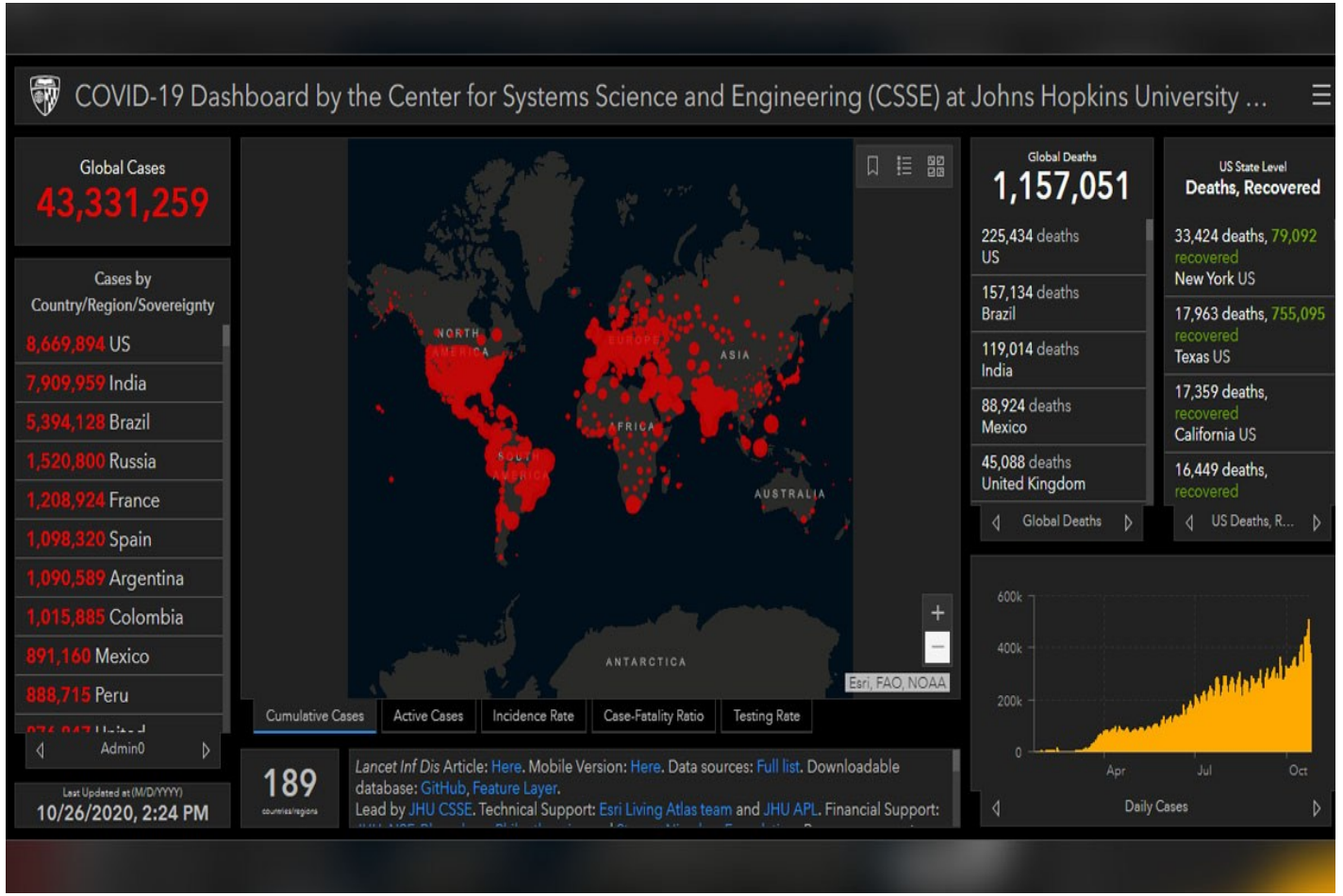
# Real-World Applications

- **Wildlife Tracking**
- *Case Study*: Elephant Tracking in Kenya



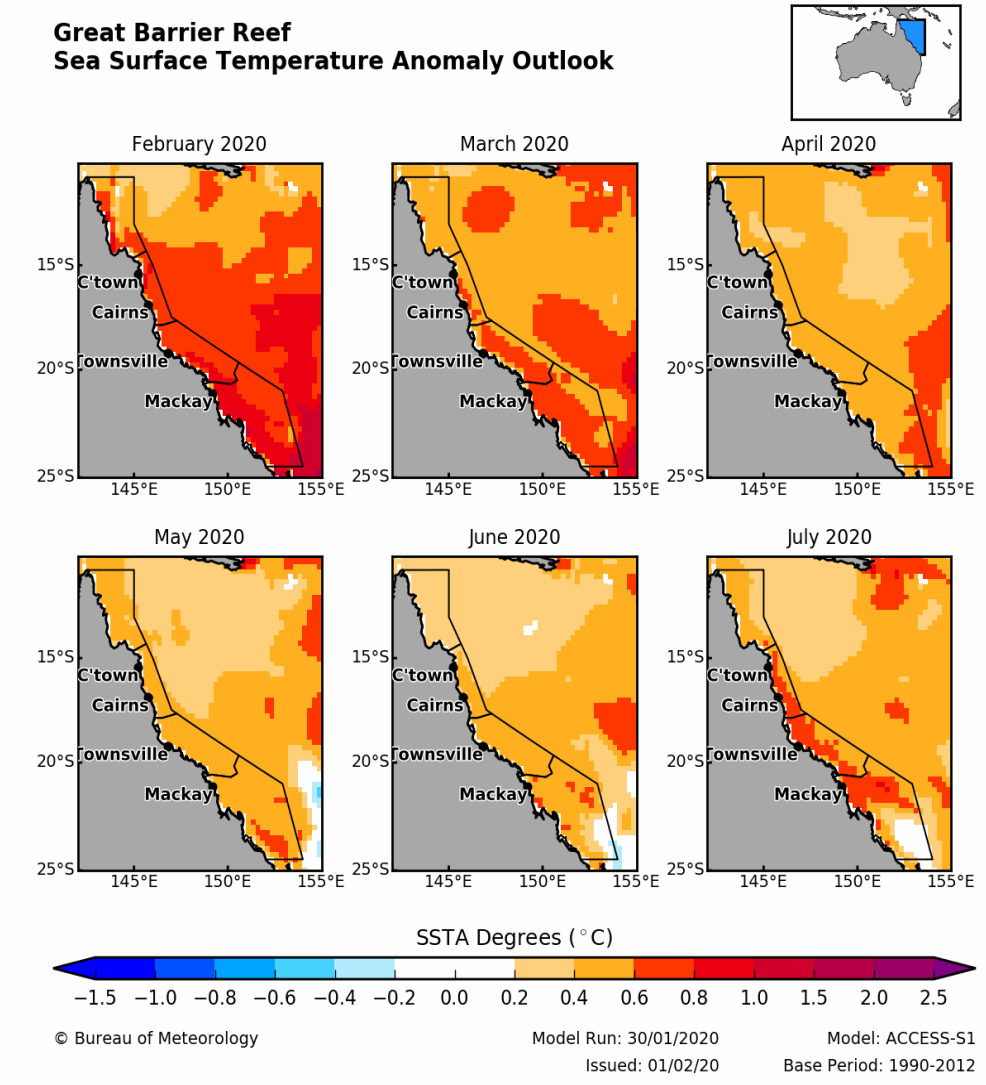
# Real-World Applications

- **Health Care**
- *Case Study*: COVID-19



# Real-World Applications

- **Climate**
- *Case Study*: Impact of climate change on the Great Barrier Reef



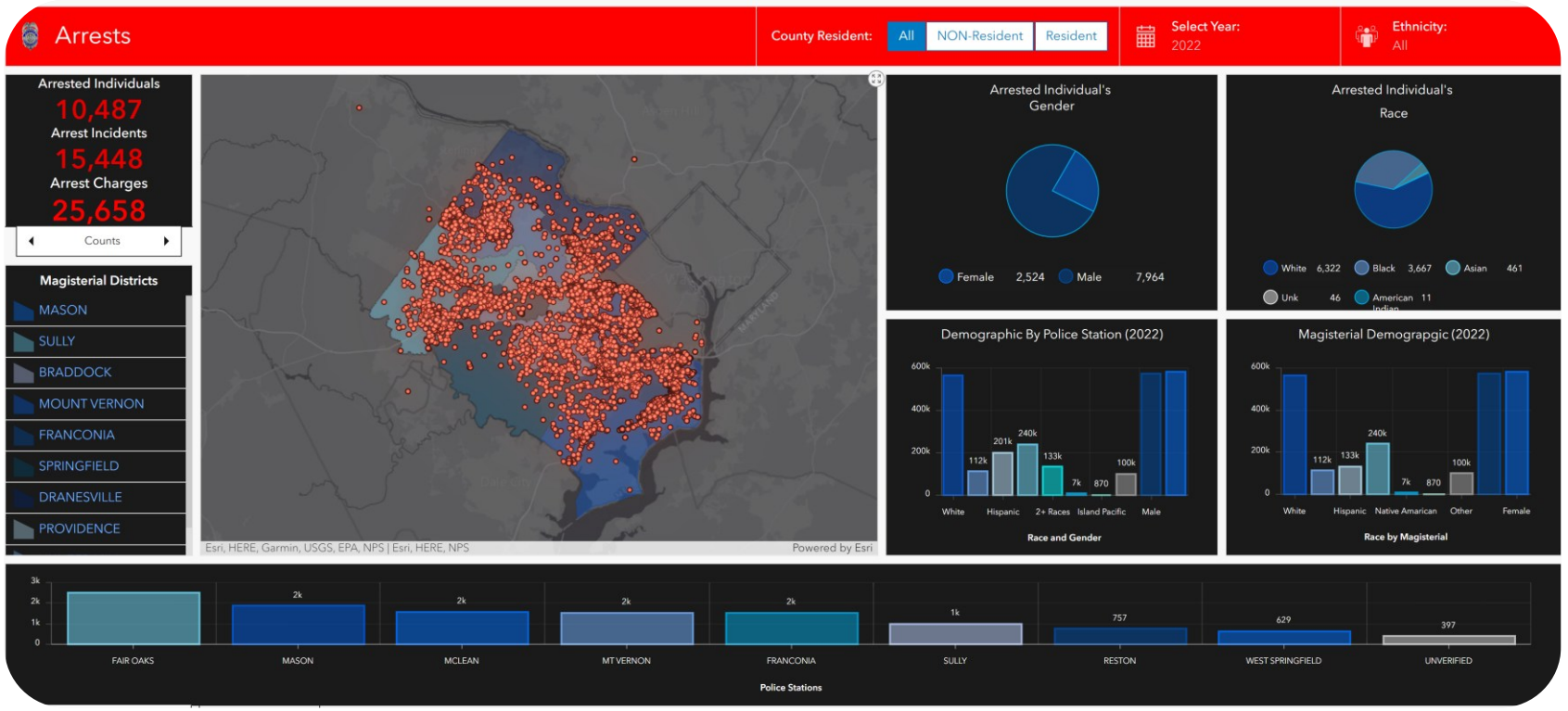
# Real-World Applications

- **Crime**
- *Case Study*:

  Fairfax County

  Police

  Department



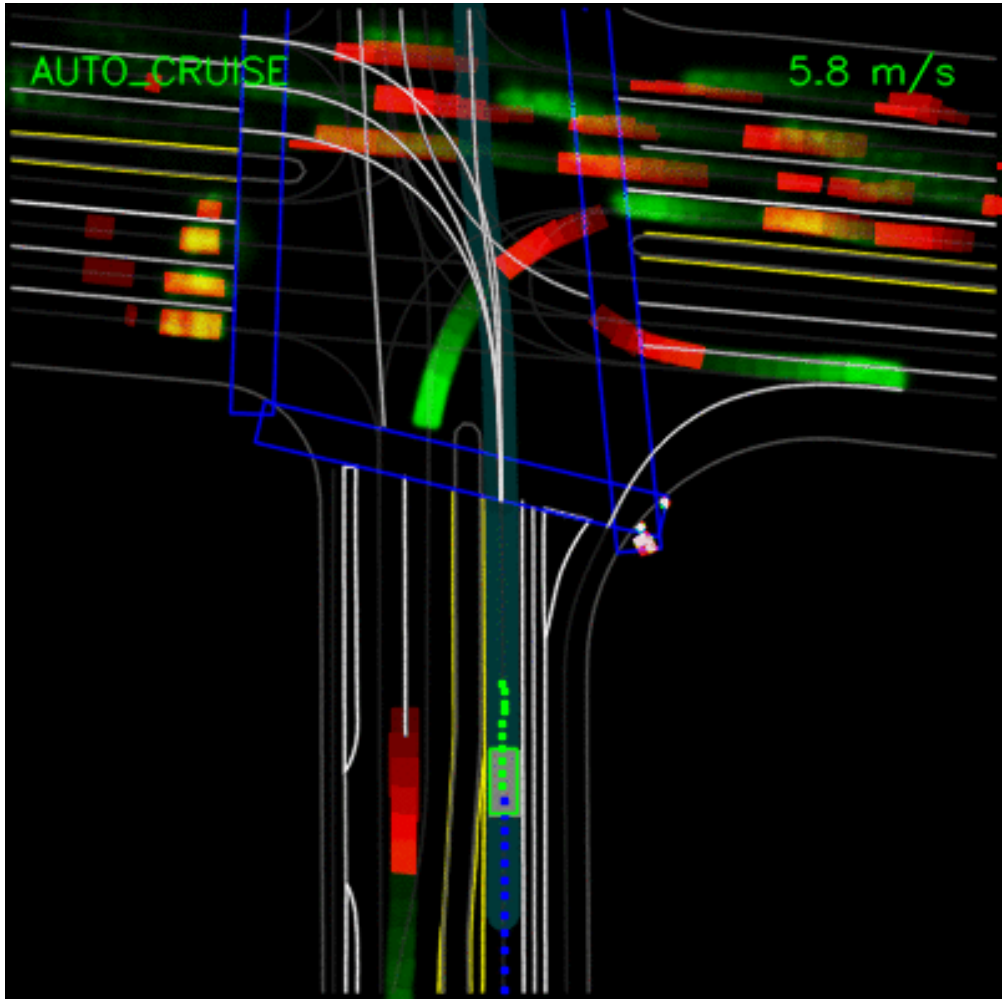
# Real-World Applications

- **Augmented Reality and Virtual Reality**
- *Case Study*: Pokémon Go



# Real-World Applications

- **Autonomous Vehicles**
- *Case Study*: Waymo



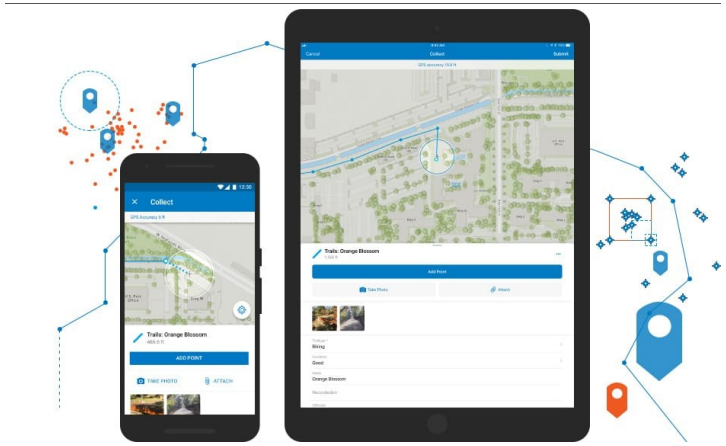
# Now it is your turn!!!

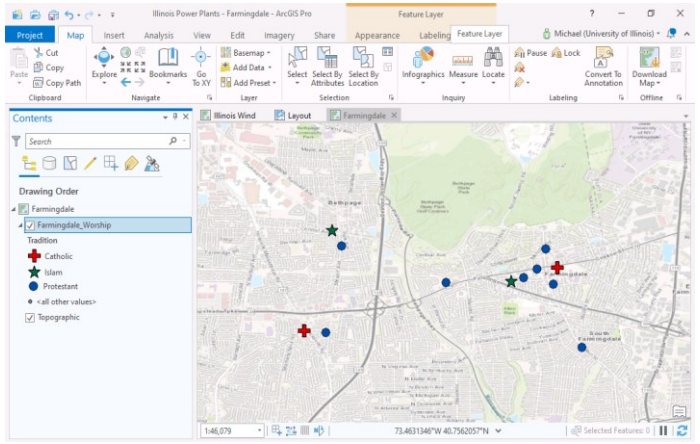
- **Goal → Create a map of landmarks located on campus**
  - We will do this by using two ArcGIS products
- **ArcGIS**: a family of software for handling geographic information



# ArcGIS Products We Will Use

1. Use **ArcGIS Field Maps** to gather **points** for each landmark
2. Synchronize the point data with **ArcGIS Pro** to produce your very own map





# Scavenger Hunt and Race!

- Work together as a team to explore the campus and find the landmarks
- 45 minutes for exploring and mapping
- There are **9** points, but map as many of them as possible!
- Make sure each person on your team has the chance to collect data
- The team that is *fastest* to map all (or most) wins!

# Time to Collect Data!

- Form teams of 4-5!
- Refer to your instruction sheet to get to know each of the landmarks
  - *There is no specific order*
- Someone will help guide you around campus to find them
- Use Collector to map the point and make sure you enter the name of the landmark and take a picture if you would like!
- Once finished or time is up, come back to this room to create your map
- **HAVE FUN!**