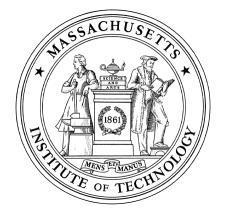# Massachusetts Institute of Technology
Department of Urban Studies and Planning

11.204: Planning, Communications & Digital Media
Fall 2004

Recitation 5: Using ArcGIS to Visualize Population Density

I. Introducing GIS

- Geographic Features: Point, Line, and Polygon
- Feature Attributes
- GIS software vendors and products

VENDORS	PRODUCTS
ESRI (Environmental Systems Research Institute, Inc.)	ArcView; ArcInfo; ArcGIS; ArcIMS
Intergraph	GeoMedia; GeoMedia Web Map
MapInfo Corporation	MapInfo; MapXtreme
Microsoft	MapPoint

II. ArcGIS 8 Interface and Elements

- Launch ArcMAP 8 and open an Existing Project File
- Data frame / Data layer /Attribute Table
- Existence, Visibility, and Activeness
- Overlay of Layers / Display sequence
- Panning and Zooming; Information Tool
- Help

1. Launch **ArcMap** and examine the interface.
2. Open an **ArcMap file** "Recitation5.mxd" at The MIT Server\Data\Recitation5\Recitation5.mxd.
3. Examine the **data frame** "Pittsburgh."
4. Open and examine the **attribute table** for the layer "Census Tracts."
5. Exit ArcMap.

III. Creating a New Project

- Launch ArcMAP and create a new document
- Add Layers
- Data Frame Property
  - Map unit / Display unit
- Data Layer Property

1. Restart ArcMap and Create a new document.
2. Add a data layer The MIT Server\Data\Recitation5\Newton_townboundary.shp (Newton Boundary) into the data frame.
3. Add three more data layers. The first is a **Point Feature**, the second is a **Line Feature**, and the third is a **Polygon Feature**.
   - The MIT Server\Data\Recitation5\Stops.shp (Newton MBTA Stop)
   - The MIT Server\Data\Recitation5\MBTALines.shp (Newton MBTA Line)
   - The MIT Server\Data\Recitation5\Newton_censustracts.shp (Newton Census Tract)
4. Turn all the layers on, make sure they are displayed in a sequence from top to bottom in this order: Stops, MBTALines, Newton_censustracts and Newton_townboundary. Make the Stops layer active. Consider the difference between **Existence, Visibility** and **Activeness**.
5. Play with **Pan/Zoom** In/Out/Full Extent/Layer/Selected/Previous.
6. Use the **"i" tool** (linking information to location) to find out and examine the area of a census tract where a MBTA stop is located.
7. Now, we need to setup the properties for the data frame. Change the data frame properties as follows,
   - Name: Type in "Newton Overview"

- Display Units: Choose "Miles"
8. Next, set up the layer properties. Change the name for each layer according to their contents.
9. Save the map document to "H:\private\11.204\Recitation5\janedoe.mxd." Replace "janedoe" with your username.
10. Great, we have built our first ArcGIS map document file! However, it needs improvement.

IV. Symbolization & Classification

- Symbolization:
  - Points: Style, Size, Color
  - Lines: Style, Width, Color
  - Polygons: Fill Pattern, Fill Color, Outline Width, Outline Color
- Classification
  - Classification Type: Quantile, Equal Interval, and Natural Breaks
  - Classification Field
  - Normalization
  - Unique Value, Graduated Colors, Graduated Symbols, and Proportional Symbols

1. Open the map document file "H:\private\11.204\Recitation5\janedoe.mxd" if you closed it. We want to refine the symbols for this map document.
2. Make the layer "Newton MBTA Stop" active and change the symbol for MBTA stops to the "Train Station" symbol with a size of 22 (Symbol Selector->More Symbols->Transportation).
3. Change the symbol for "Newton Boundary " layer as follows.
   - Fill pattern: Hollow
   - Outline width: 3
   - Outline Color: Black
4. Change the symbol for "Newton MBTA Line" layer by using the LINE field in determining the symbology.
   - Legend Type: Categories -> Unique Values
   - Style: Railroad line
   - Size: 2
   - Color: According to the line name (i.e. Green for G line, Purple for P Line)
5. Change "Newton Census Tract" layer to show the population density for each tract.
   - Legend Type: Quantities -> Graduated Color
   - Value: POPUDENSE (population density: total population per dry acre)
   - Classification Type: **Quantile**
   - Number of classes: 5
   - Color Ramps:
6. The map looks better. Save your map document.

V. Layout, Print and Export

- Data View vs. Layout View
- Layout Template
- Add Title, Author's Name, Date Source
- Map Elements (North Arrow, Legend, Scale, and Title)
- Map Export

1. Change to **Layout** view (View->Layout View).
2. Give the map a meaningful title
3. Add the author's name and the date
4. Add the data source as
   Data Sources: US Bureau of the Census, 2000; MBTA
5. Add north arrow, legend, and scale
6. Arrange map elements (north arrow, legend, scale, and title) on the page, creating a logical presentation.
7. Export the final map into "H:\private\11.204\Recitation5\janedoe_recitation5.jpg", replace "janedoe" with your username. Save the map document file.

Lab 4 is due Recitation 6.

Created October 2003 by Jinhua Zhao. Edited October 2004 by Shannon McKay.