Introduction to Web Mapping Technologies

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What is GIS?

GIS definition

Store data geospatially
Query/analyze data
Visualize data to see the unseen

GIS main usage

Finding best location
Explaining data trend
Navigation
# What is GIS?

## GIS data models

<table>
<thead>
<tr>
<th>Data model name</th>
<th>Vector</th>
<th>Raster</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Definition</strong></td>
<td>Discrete objects with discrete boundaries and shapes → points, lines, or polygons</td>
<td>Continuous data → values in pixels</td>
</tr>
<tr>
<td><strong>Examples</strong></td>
<td>Restaurants → points</td>
<td>Temperature, and vegetation</td>
</tr>
<tr>
<td></td>
<td>Streets → lines</td>
<td></td>
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<tr>
<td></td>
<td>Buildings → polygons</td>
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</tbody>
</table>
What is GIS?

Layering → separating homogeneous objects into layers

- A layer is basically a table of attributes and each row is attached to a location explained in a separate column
- Each layer can be either points, lines, or polygons
- Layering is used mainly for analysis, and it is also used for better data management and organization
- All layers in one map should have the same \textit{coordinate system}, explained on next slide
- The bottom layer is referred to as the basemap
What is GIS?

Coordinate system → a reference to locations of objects on the map

- Coordinate systems are created through map projection
- Location can be presented in latitude and longitude, metric, or feet based
- For web mapping, the **Web Mercator** coordinate system is the most common and it uses latitude and longitude
What is Web Mapping?

It is simply using an interactive map in a website. The map can cover the whole HTML body or part of it.

It can be used only for visualization or for visualization and geospatial analysis.
Web Map Components

- JavaScript's Map Object
- Basemap
- Thematic Layers
- Interactive Objects
Proprietary Vs. Open Source
Data Formats

Geospatial Web services
1. WMS
2. WFS
3. WPS
4. WCS

Database tables
1. PostGIS/PostgreSQL
2. MongoDB geospatial collection
3. MySQL Spatial
4. SpatiaLite
5. Oracle Spatial
6. ArcGIS GeoDB

Programmable objects
1. GeoJSON
2. marker
3. polyline
4. polygon

File based
1. KML
2. GML
3. GeoJSON/TopoJSON
4. OSM
5. WKT
6. shapefiles
Mapbox

MapBox is a mapping platform.

They are very famous of their beautiful map tiles.

You can build web maps using MapBox either with programming or no-programming.

Exercise 1:

1. Go to MapBox and create your own account by clicking “Sign Up”
2. Navigate the website by following the instructor
3. Go to geojson.io to create sample geojson data and download it to desktop, also download kml
4. Create a new project in MapBox and select a basemap
CartoDB

CartoDB is another mapping platform.

They have both map and data views.

You can also build web maps either with programming or no-programming.

Exercise 1:

1. Go to CartoDB and create your own account by clicking “Sign Up”
2. Navigate the website by following the instructor
3. Drag the downloaded data from geojson.io to your browser
4. Follow with the instructor on how to visualize and manipulate the data
Conclusion

There are more web mapping technologies and packages out there.

Choosing one depends on the user’s needs and skills.

It is possible to mash up two or more technologies together.

Programming gives you the ability for further customization of a web map and its components.

Thank you for listening