Jonathan Engelbert

1/25/2017

Types of Spatial Data

Vector Data

Vector data is represented by points, lines and polygons. **Polygons** are used to represent spatial entities such as lakes and parcels. **Lines** often represent features such as rivers and roads, or borders of countries and states. **Points** are often used to represent discrete data when dimensions are not relevant – when representing water wells for examples - or can't be represented because of cluttering; the use of points is mainly governed by the scale of the map. If one looks at a map of a city, that city will be represented by a polygon. When looking at a world map, cities will be represented by points instead.

Vector data is excellent to represent locations and distributions of points of interests across a large area, such as hospitals across a state (map 1). Points can represent hospitals, since the dimensions of these buildings is not important for this observation and couldn't be efficiently portrayed at this scale. The state is and smaller administrative areas inside it are represented by polygons. Finally, bike trails area represented by lines.

Vector data is aesthetically pleasing, has great geographic accuracy and is efficient for topology encoding. Vector data disadvantages are that continuous data is not well represented, – temperature, elevation - topology can be processing intensive, spatial analysis is not as rich as in raster and vector data often represents abstractions; there is less precision regarding features.

Raster data

Raster data is made up of a grid of square/rectangular cells, each holding a value. It is used to store data that varies continuously, such as elevations, temperature or impervious surface area (map 2). It is also used to represent geographical information in imagery, such as satellite photos.

Raster data is excellent for data analysis, as its cells might carry a great degree of information, depending on the resolution and the grid nature of the data allows for map algebra and other quantitative analysis. However, raster datasets are much larger than vector, and the smaller the pixels – which entails more detailed data and better resolution – the more space it takes, making data processing and storing cumbersome.

Orthophoto

Orthophotographs are aerial photos that have undergone a process to remove horizontal distortions, which cause image displacements. This process is called *orthorectification*, and involves the production of a digital elevation model (DEM) in order to generate an accurate and reliable aerial photograph, that maintains geographical features by equilibrating topographical variations and generating real life distances and angles.

Orthophotos provide unparalleled visual detail of ground features, and are very important in the process of establishing areas of focus. Their rich visual content enables anyone to recognize ground features, such as buildings and streets in an aerial photo of an urban area, for example (map 3). On the other hand, it does not display boundaries very well, and it may be difficult to sort out what certain structures are without additional information or some kind of discrete data, such as cadastral.

Cadastral

Cadastral data defines the legal boundaries of parcels (map 4). They work best with orthophotos, delineating portions of land to identify extent, value and ownership of land. They are either lines or polygons that simply “fence in” the parcel, and generally contain data about the land. They are however, generalizations, and only delineate the land itself, not buildings and other structures.

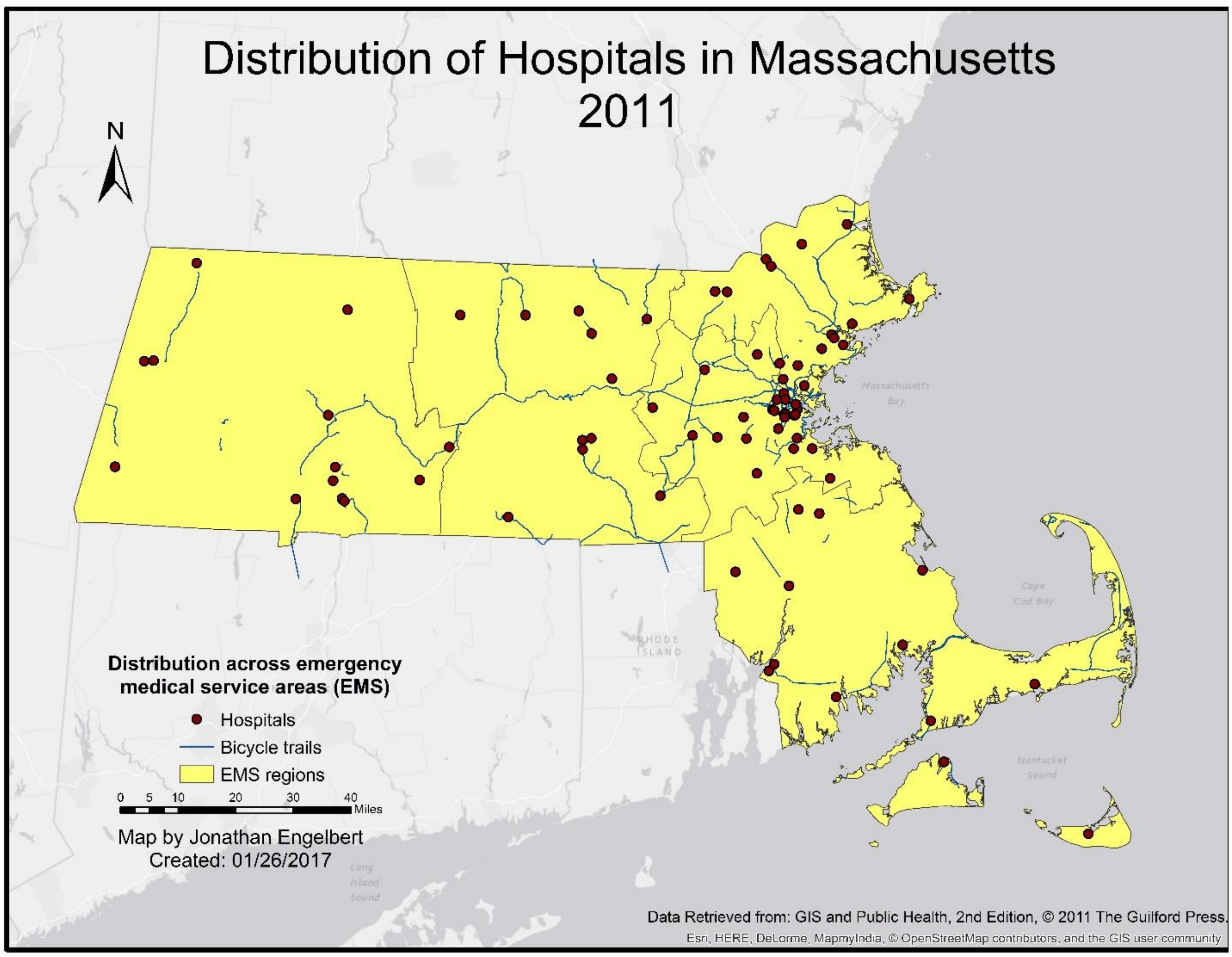
References

ESRI. *Cadastral GIS of Real Value*. Retrieved from http://www.esri.com/news/arcuser/1000/umbrella12.html. January 26, 2017.

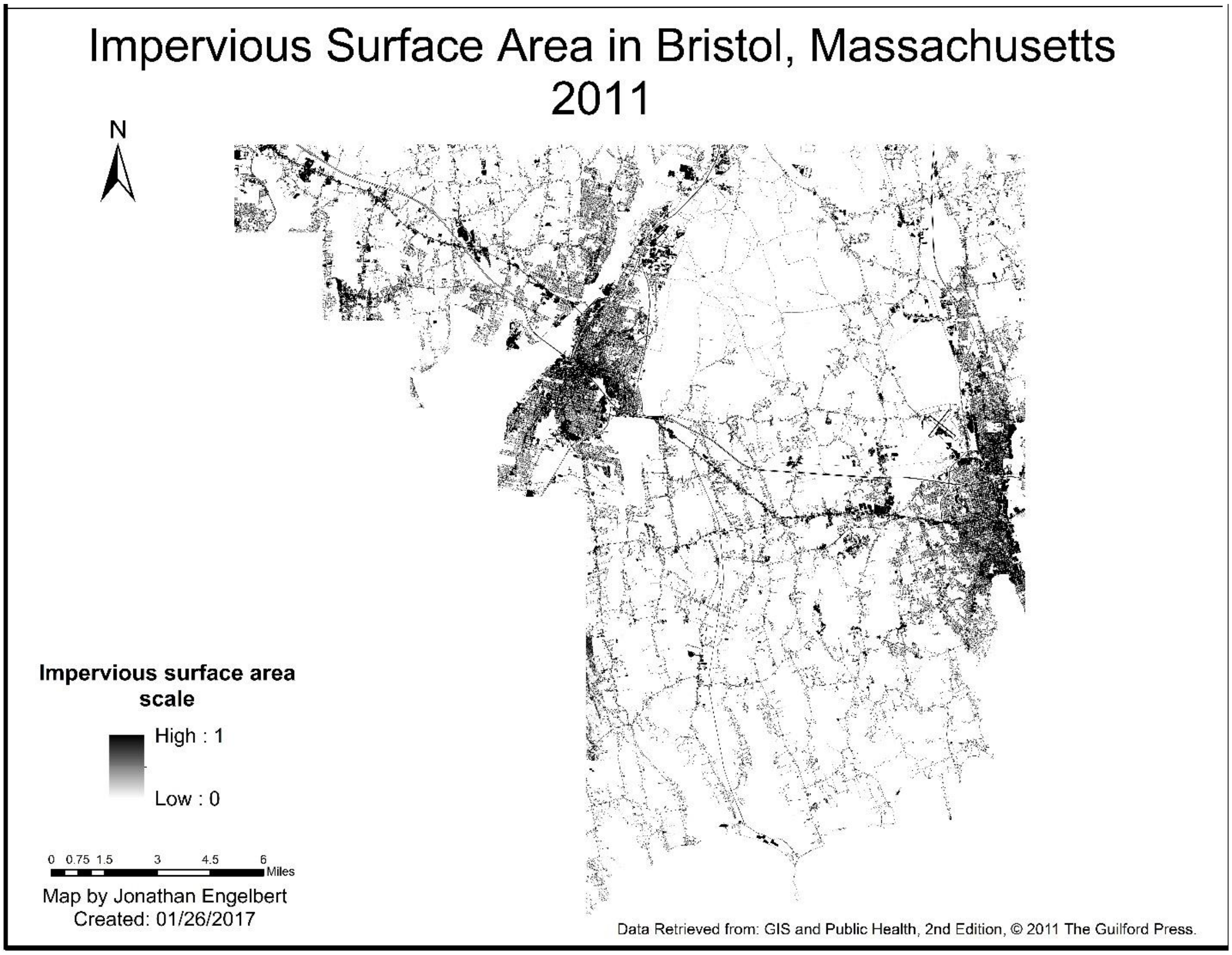
GIS Geography. *GIS Spatial Data Types: Vector vs Raster*. August 27. 2016. Retrieved from http://gisgeography.com/spatial-data-types-vector-raster/ January 26, 2017.

Maps

Map 1



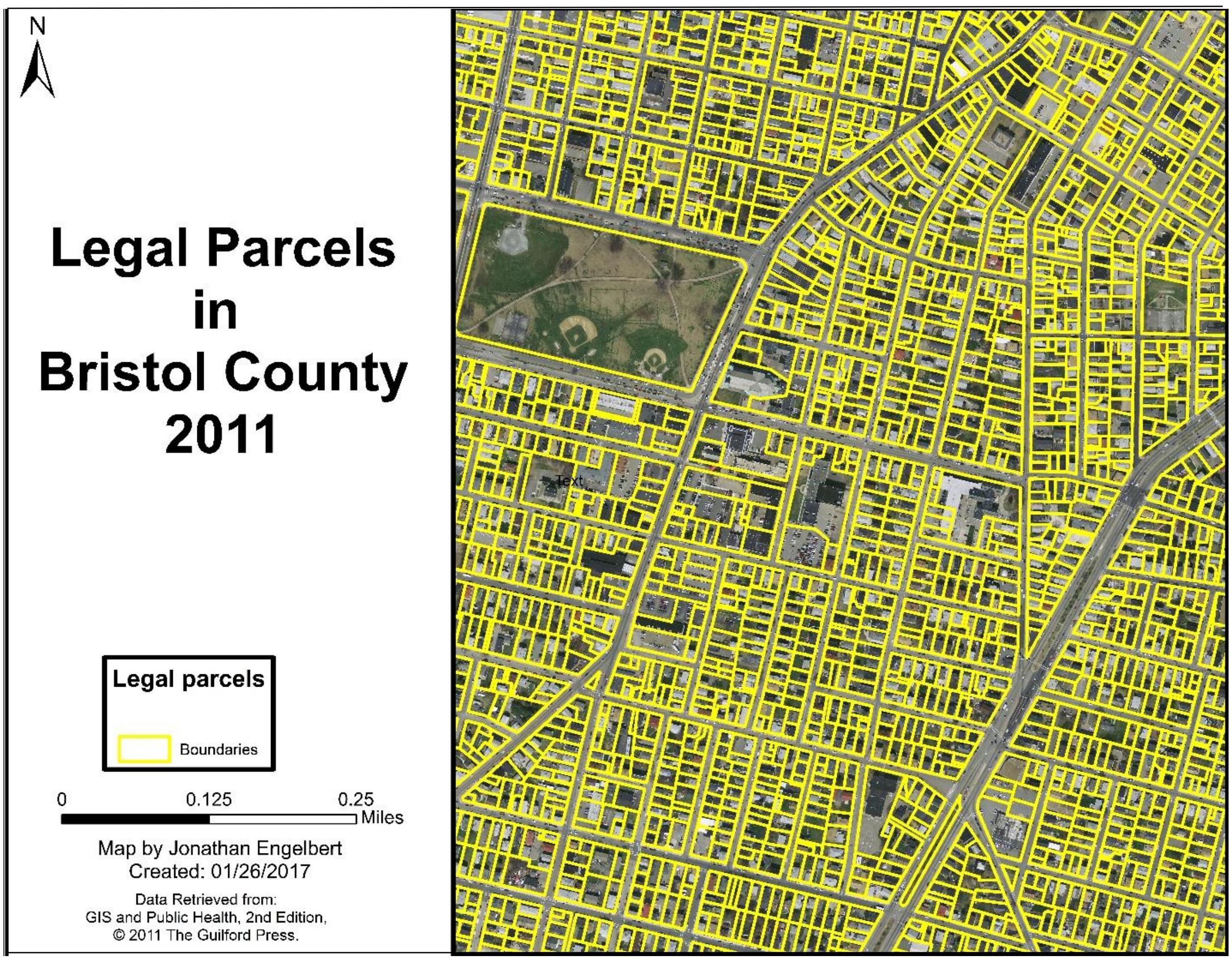
Map 2


Impervious Surface Area in Bristol, Massachusetts
2011
N
Impervious surface area
scale
High : 1
Low : 0
0 0.75 1.5 3 4.5 6
Miles
Map by Jonathan Engelbert
Created: 01/26/2017
Data Retrieved from: GIS and Public Health, 2nd Edition, © 2011 The Guilford Press.

Map 3


N
Emergency Facilities in Bristol County 2011
Text
Emergency Facilities
Fire Stations
Hospitals
0
0.125
0.25
Miles
Map by Jonathan Engelbert
Created: 01/26/2017
Data Retrieved from:
GIS and Public Health, 2nd Edition,
© 2011 The Guilford Press.
MassGIS, MEMA

Map 4


N
Legal Parcels
in
Bristol County
2011
Legal parcels
Boundaries
0
0.125
0.25
Miles
Map by Jonathan Engelbert
Created: 01/26/2017
Data Retrieved from:
GIS and Public Health, 2nd Edition,
© 2011 The Guilford Press.