data

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outline

regular (not gis) data: xls, csv, etc

gis data (has shapes, can make a map from it): shp, kml, etc

the 'join'

Example: New Jersey Home Values

census data [probably do one week later]

old ps comments

data management takes time! value your time!

- producing maps is fast; data management is 50-95% of time
  - figuring out, cleaning, documenting, combining, etc
- so we start with data management: only 2 classes
  - but critically important and time consuming for you
- spend it on data you care about and will use in your career!
- think hard about data you'll use in your career
- otherwhise you'll waste 100+ hours !!!

gis data

- camden county https://camdencountynj-ccdpw.opendata.arcgis.com/search?collection=Dataset eg camden zoning :)
  https://camdencountynj-ccdpw.opendata.arcgis.com/datasets/camden-city-zoning
- NJ https://gisdata-njdep.opendata.arcgis.com
- Philly https://www.opendataphilly.org
- a lot:
  - http://geocommons.com/search.html
  - just search for what you are interested in, say 'road'
- https://www.policymap.com/maps
  - they make you pay to downlad data, but can see source and download by hand
- open gov, especially city data, just few examples
- http://phlapi.com/ , https://data.cityofchicago.org/ , http://opencityapps.org/ , http://www.opendataphilly.org/ , http://www.phila.gov/data/Pages/data.aspx

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what are data?

- u/a: unit of analysis: what do you study?
- u/a=# of obs=# of rows=sample size
  - dataset has variables, which are the *attributes* of u/as
- say students: age; counties: water area
- if several layers: may have several u/as
- eg counties: #18; hospitals:#700; ex of attr?
- dataset is a matrix/spreadsheet/2D object
- cols are vars, rows are obs
- vars are characteristics of obs
- eg: edu, age, inc are vars
  - and persons are obs–each row is a different person

storage type: numeric v string

- strings are safer; eg string "0821" made into a number results in "821", which is a mistake !
  - that's why many software packages, incl qgis often store numbers as strings
  - but then we often need to make them into numeric to do the math or mapping
- be careful about it, triple check, there are often problems and it's non-intuitive

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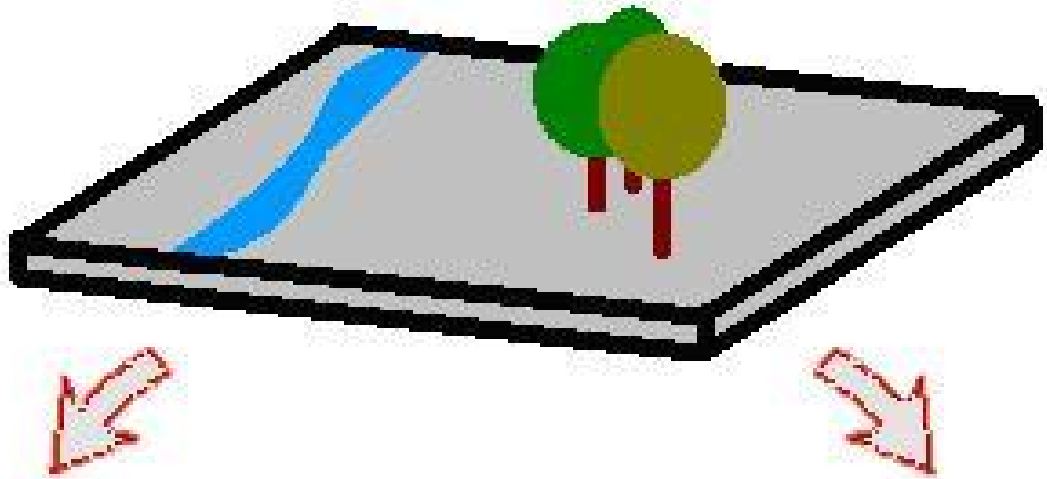
files

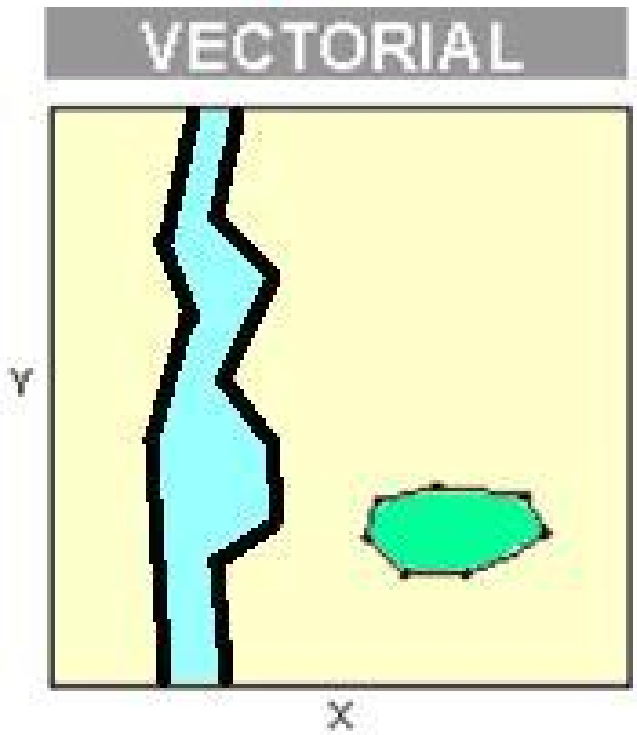
- .shp (along with buch of others)
- .kml
- and there's much more
- we'll cover them on "as is" basis
  - if you bump into something else–let me know–we'll cover it

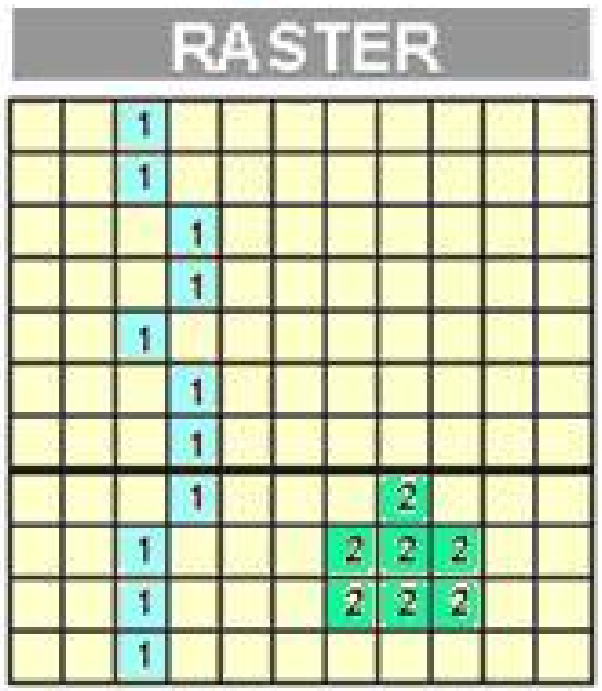
raster (picture) and vector (point, line, or polygon)

- raster (has resolution)
  - area covered by cells/pixels
  - each cell/pixel have values/colors
- vector (no resolution): all real world features:
  - points (dots/nodes): airports, cities, trees
  - lines (arcs): rivers, roads
  - polygons (areas): counties, cities

raster and vector







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gis data as layers of shapes with regular data

- data are organized by *layers*, eg roads, admin boundaries, etc; show example/draw a picture
- each layer: location info (shapes)+usually some regular data
  - ie a data table with location info (shapes) must underlie a map
  - (and the data table usually contains some regular data, too)
- often you want to produce thematic (choropleth) maps
  - thematic maps use different symbols/colors to show variation in regular data

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old ps comments

some real skills

- this is where the real value come from:
  - to bring different vars together to produce new insight
- if you just map vars from same or similar data:
  - it has probably already been done!
  - just goog: "what you study, map" and see images
- but combining creatively variety of vars:
  - there is no such map in the world!
- eg `https://sites.google.com/site/adamokuliczkozaryn/pubs/rel_inn.pdf`

howto map regular (eg xls) data?

- it would likely have geo id:
  - ISD name/code, county name/id, etc
  - codes/ids are great: unique! (as opposed to names)
  - then google a shapefile that you can join with your data
- google "geo in you data, shapefile"
  - eg "NJ counties, shapefile"
- and then join the two to produce a map
- beware of representativeness of your data for areas
  - i spent months mapping provinces from WVS
  - then emailed WVS and was told they're not representative

"the join problems": some examples

- "Camden county" $\neq$ "Camden"
- "Congo" $\neq$ "Congo, Republic of"
- "Great Britain" $\neq$ "United Kingdom"
- "Camden" $\neq$ "CAMDEN"
- "Camden " $\neq$ "Camden" (space is a character !)
- "08012" $\neq$ "8012"
- be very careful; check the tables to see if it merged right
- does it make sense? eg Camden richer than Cherry Hill?

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figuring things out

- so say you've got housing prices for NJ counties
- then need to google matching gis data (shapefile)
  - google: "NJ counties shapefile"
- both have county variable so you can join
- but both keys/ids need to be coded in exactly the same way
  - characters and storage!
- and **you** need to figure this out

http://www.zillow.com/research/data

- subset reposted on my website `https://sites.google.com/site/adamokuliczkozaryn/gis_int/NJ-counties-Zillow-Home-Value-Index-TimeSeries.xls`
- adjust ID: make counties uppercase
  - (or could drop 'County' from COUNTY LABEL variable)
  - make col (var) names short: eg <5 alphanumeric chars
- and clean up: dropped first row, excessive columns,$ (%,#, etc) and ","; cnty names upcase, saved as csv (first sheet)
- `https://sites.google.com/site/adamokuliczkozaryn/gis_int/all_homes.csv`
  - note missing val for Morris; think abt missing data!
- nj counties data (same as alaways) `https://docs.google.com/uc?id=1xJDhcRCkgv7k4tNCa72Oog5bohV6dTB2&export=download`

excel fix! [do this if trouble reading csv into qgis]

- excel is clunky, and often adds special/weird characters!
- when save as csv, go to:
- tools-web options-encoding and select 'us ascii'
  - other ideas: `https://www.webtoffee.com/how-to-save-csv-excel-file-as-utf-8-encoded`

install MMQGIS (just once) if not there already

- Plugins-Manage and Install Plugins:
  - Search: MMQGIS
  - and install
- now we can use MMQGIS to join and fix the data!
  - [another way to do joins:

    `http://www.qgistutorials.com/en/docs/performing_table_joins.html`]

MMQGIS: join; and text to float

- MMQGIS-Combine-Attributes Join From CSV File
- Input CSV: all_homes.csv
- CSV File Field: UPPER
- Join Layer: nj_counties
- Join Layer Attribute: COUNTY
- make sure joined output shapefile is where you can write!
  - check the tables to see if it joined right; be very careful!
- MMQGIS-Modify-Text to Float (almost always need this!)
- highlight "Dec 2012" only (others are not clean:"$","","")

missing value

- right click layer-Open Attribute Table
- note that now MORRIS has 0 for "Dec 2012"
- this is incorrect!
- hit pen icon at top left: "Toggle Editing Mode"
  - and remove zero from that cell
- hit "Toggle Editing Mode" again and Save

and the thematic map

- nj_counties-Properties-Style and from drop-down: "Graduated"
- Column: "Dec 2012"
- Color ramp: i like Blues!
- many ways to classify [if time, discuss later]
- usually good: 'natural breaks/jenks' say 3-7
- and hit "Classify" button
- and hit "OK" to see the map–viola!
- zoom in as much as needed

printing to file: Project-New Print Layout

- left: blank icon "Add New Map" and draw a rectangle
- NJ is tall: on the right "Layout" and do "Resize layout"
- left: icon with arrows "Move Item Content" to adjust view
- right: "Item properties" change scale to adjust zoom and/or use mouse's wheel
- left: legend button "Add new legend" (legend needs fixing)
  - right: **uncheck** auto-update and beautify it:
  - drop items with minus sign; and edit by double clicking it
- top: on the left: Layout-Export as Image
  - probably png is fine, just increase resolution to say 600dpi
  - `http://www.qgistutorials.com/en/docs/making_a_map.html` and

print layout

- people always have toroubles
- so let's do it again!

don't trust anybody!

- remember, always be critical
- triangulate your results: compare with other source
  - just goog picture, eg 'nj counties property values map'
- looks about right
  - (other definition of the prices, but correlation is important)
- show to others, ask for comments
  - present locally or at a conference
- i mistakengly thought a lot of alcohol problems in Cape May
  - but it is just tourists!

tip1

- merging (joining) data is tedious and tricky
- be careful, double, triple check
- easy to make mistake

tip2: missing vals

- tricky! pay extra attention to it!
- sometimes qgis makes ' ' to 0! esp MMQGIS: str to float
- sometimes qgis colors it yellow sometimes transparent:
  - (i guess: ' '=transparent, 'NULL'=yellow)
- to make it stand out can change color ramp
  - eg if NULL is white, make even number of classes say 2
  - and say make color ramp GnRd

tip3: what if traditional data is in weird format

- same as with gis data
  - if you see something else than .shp or .kml, email us!
  - there are many data formats, and we cannot cover them all
  - we'll do them if we bump into them–do let us know what you've found!

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old ps comments

census data: 5-yr ACS

- census is a good source of data, even at neighborhood level!
- for city/neighb lev probably want 5-yr ACS
- `https://geomap.ffiec.gov/FFIECGeocMap/GeocodeMap1.aspx`
- `https://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t`
- can search in top box but probably best select on the left from "Topics" eg: people-poverty-poverty
- then select "Geographies": eg census tracts (ie neighborhoods)
  - go down to "All Census Tracts in Camden County" and hit "ADD TO YOUR SELECTIONS" and hit "CLOSE"
- and from "Show results from" pick "2015"

cont

- take note of margins of errors!!
  - most precise is decennial census, but much fewer variables
- "Modify Table" and keep selected only the stuff you need
- ok, at top hit Download
  - and check "Use" not "View"
  - keep both checked: "Merge the annotations..." and "Include descriptive...", hit OK
  - csv reposted `https://docs.google.com/uc?id=1MD-P2IuOXWWkYAsInOWCYfqZ15cJya8n&export=download`

again, always clean it up before getting into qgis

- open csv file, keep GEO ids (will use them for join)
  - and just keep only needed vars and rename them:
  - HC01_EST_VC01, Total; Estimate; Population for whom poverty status is determined: "tot"
  - HC01_EST_VC53 Total; Estimate; ALL INDIVIDUALS WITH INCOME BELOW THE FOLLOWING POVERTY RATIOS - 125 percent of poverty level: "pov125"
- then calculate ratio of pov to tot: "prop"
- and drop row 2, the long name
  - and save as csv
  - clean csv reposted: `https://docs.google.com/uc?id=1Hw-8nuGf1b5Vvvai7Jv-lwA2IsRA0Pz0&export=download`

get geo data

- census has geo data for any US geog!: `https://www.census.gov/geo/maps-data/data/tiger-line.html`
- tracts: `https://www.census.gov/geo/maps-data/data/cbf/cbf_tracts.html`
  - doing 2015 because we have 2011-2015 data
- then note there are 2 similar IDs that would match census csv
  - shp: `https://docs.google.com/uc?id=1KNe_DSJQxiUiMVzKdVfHzYjUZSke2OnY&export=download`

join!

- load shp and then
- MMQGIS-Combine-Attributes join from CSV file
- MMQGIS: csv GEOid, shp: AFFGEOID
- and check notfound.csv–should be none
- MMQGIS: modify: text to float: tot pov125 prop
  - (Ctrl and left click all three)
- right click layer-Properties-Style: "Graduated" map prop with say Blues 5 jenks
- move around and say zoom in on Camden

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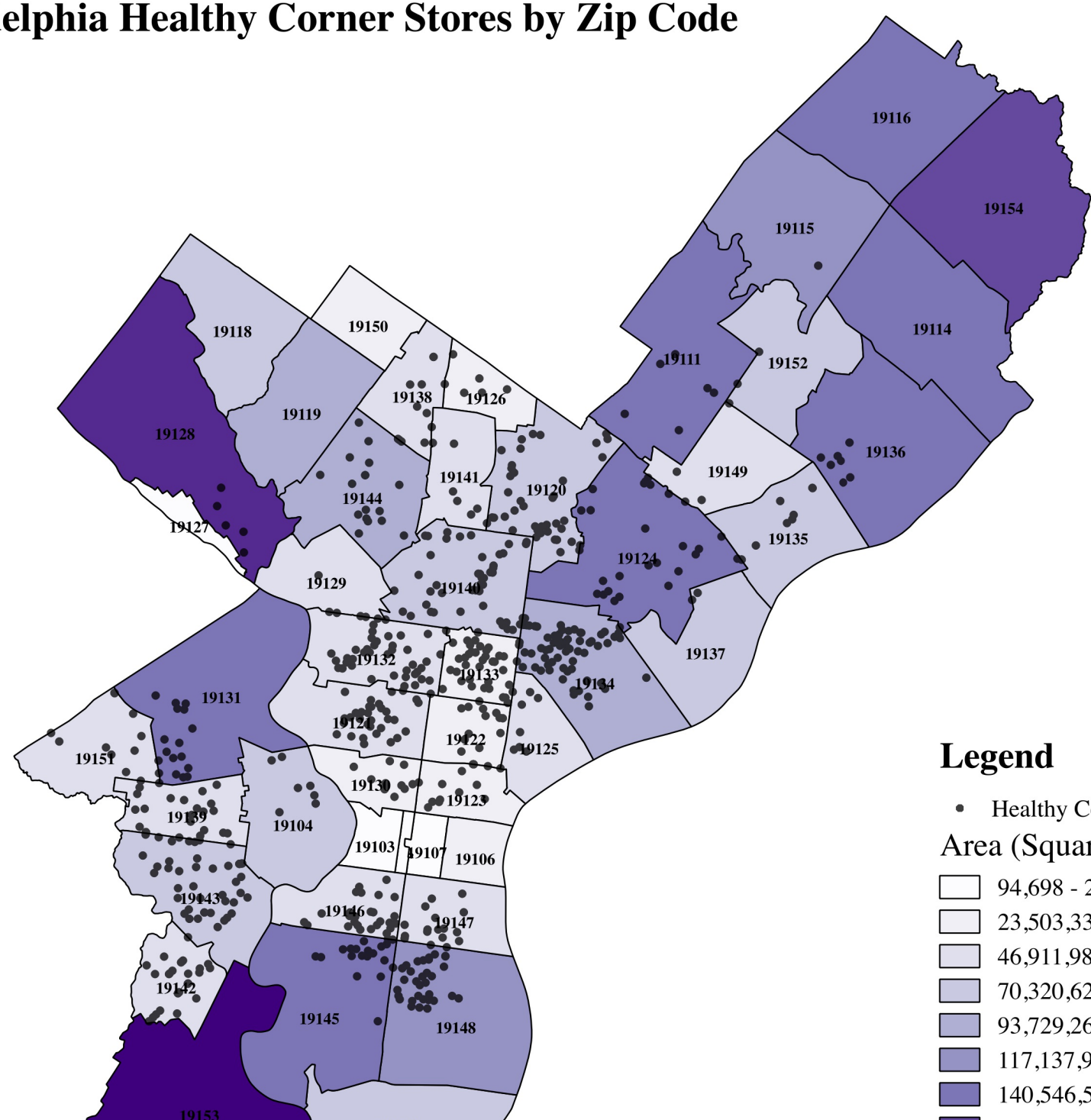
general comments

- please no ms word! txt or pdf
- remember to specify u/a and num of obs
- need to email me *all* data you've used
  - (incl data you used for joining (toady's class))
  - eg do not assume i have NJ counties
- send the whole thing! can just zip the whole project folder
  - or share good drive, dropbox.com etc
  - .shp file won't work! (need .dbf .prj, etc)
- again, in journal you can ask me questions!

Philadelphia Healthy Corner Stores by Zip Code



Legend

- Healthy Corner Stores

Area (Square Miles)

- 94,698 - 23,503,339
- 23,503,339 - 46,911,980
- 46,911,980 - 70,320,621
- 70,320,621 - 93,729,262
- 93,729,262 - 117,137,903
- 117,137,903 - 140,546,54
- 140,546,544 - 163,955,18

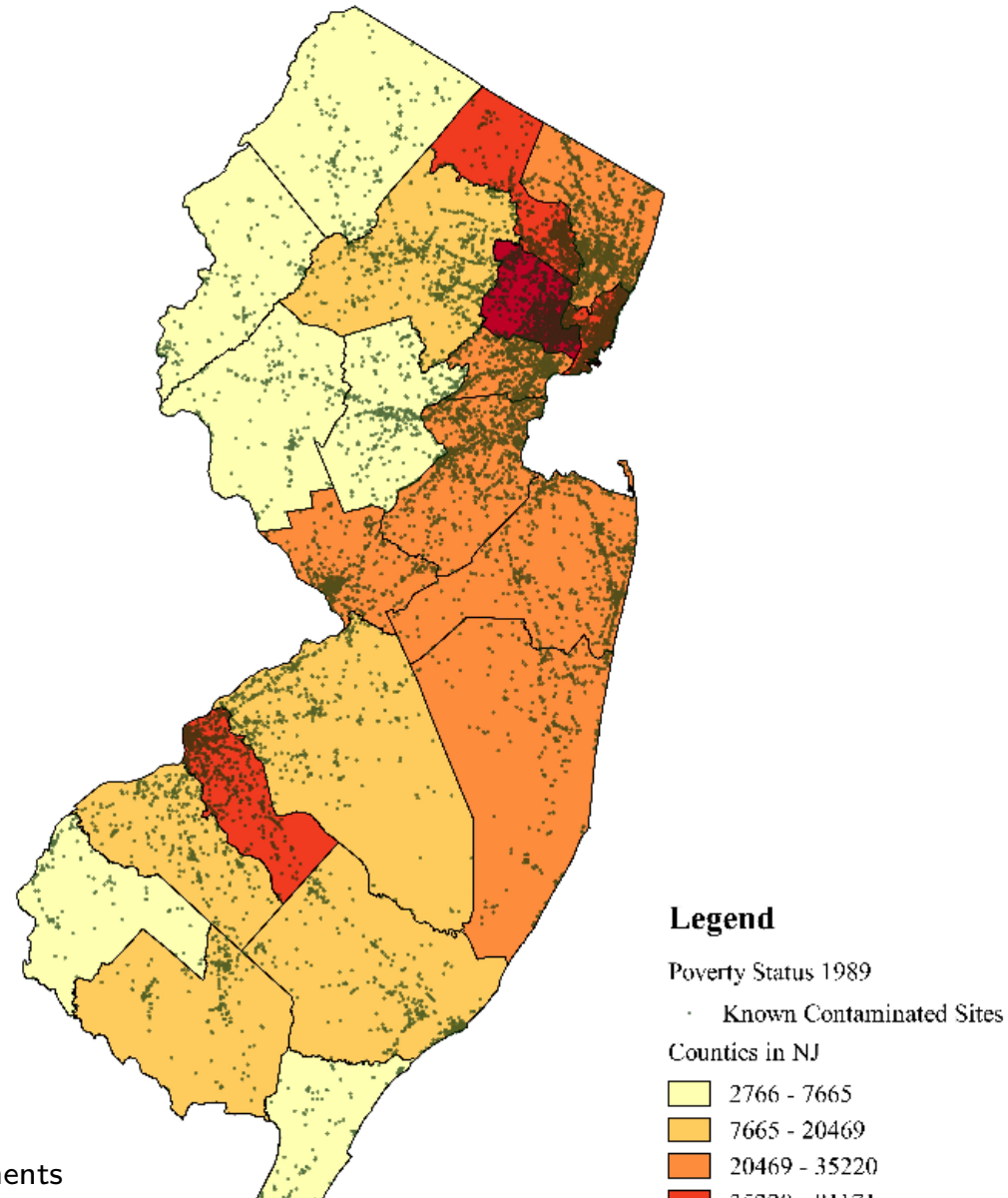
old ps comments

healthy corner stores

- makes sense to label zipcodes; right proportions
- these aren't sq miles! sq ft or meters!
  - colors denote polygon sizes–so same info twice
  - better could map educ, inc, age, bmi, etc
  - dots could be little smaller or hollow so they overlap less
- make goog map and zoom in: show more detail

  see environ: other businesses, pub transpo, sch, etc
- wonder about big healthy stores like wholefoods
  - could dentote big ones with big dots
- usually may want to put year on a map
  - (at very least in metadata/journal)

Contaminations Sites in New Jersey 1992



contaminations

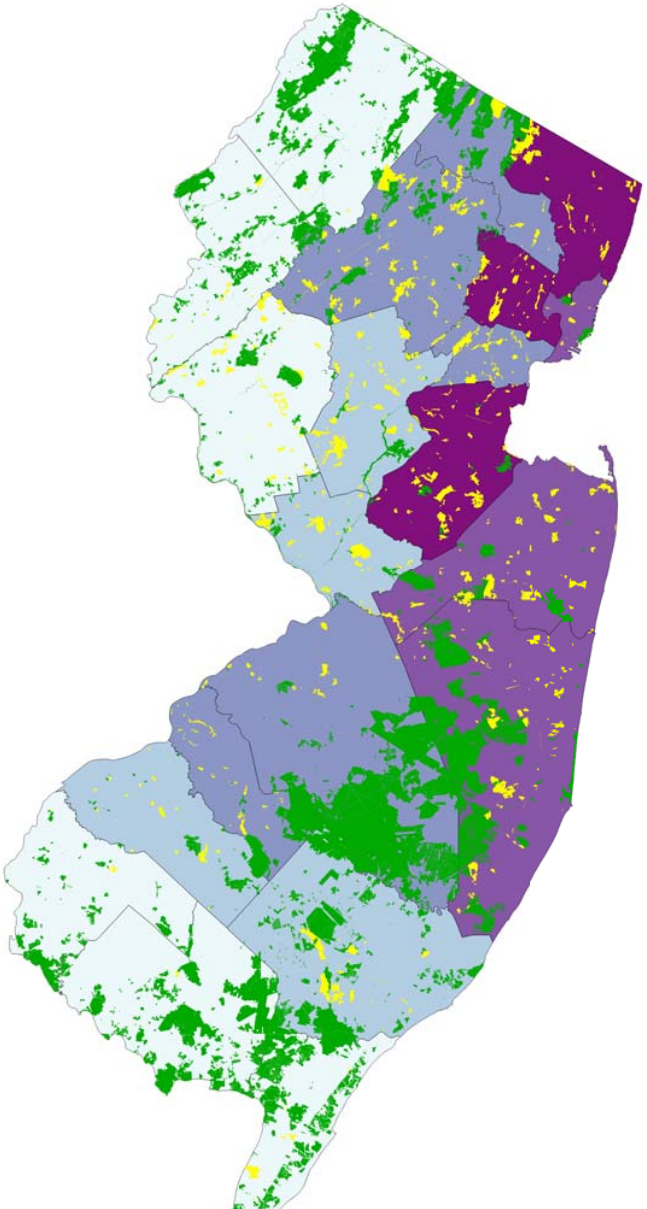
- perfect size and color for contaminated sites!
  - doesn't overlap much but big enough to see
  - and grayish good for contamination
- informative– NYC and Philly the worst
- excellent idea to relate poverty to contamination
  - there is lit linking them! so nice test! [also can do race]
  - could do poverty at municipal or census tract levels
- use space better! NJ should be bigger like Philly stores map
- thousands must be set off by commas in legend
- very good to match contaminations and poverty by year!
- "poverty status"–guess counts; better %
- as in Philly map: zoom to Camden, have goog map in

contaminations

- `http://www.nytimes.com/interactive/2015/07/08/us/census-race-map.html?_r=0`
- in couple classes we'll be making online maps like this
- but already now you can do sth similar
  - see footnote: census and socialexplorer.com: download data
- map in qgis and bring in background from googmaps
  - with openlayers plugin

open space

◇


New Jersey Preserved Open Spa
Legend
County Owned Open Sp
State Owned Open Spac
New Jersey Population
66083- 233890
233890 - 401696
401696 - 569503
569503 - 737309
737309 - 905116

open space

- excellent idea for map–open space related to population
- great use of multiple layers
- great non-cluttered borders
- can use space better-portrait orientation, bigger NJ
- use commas for population
- say for which year it is
- pop den probably more meaningful
  - on the other hand, we already see size from map
  - and so we can sort out density