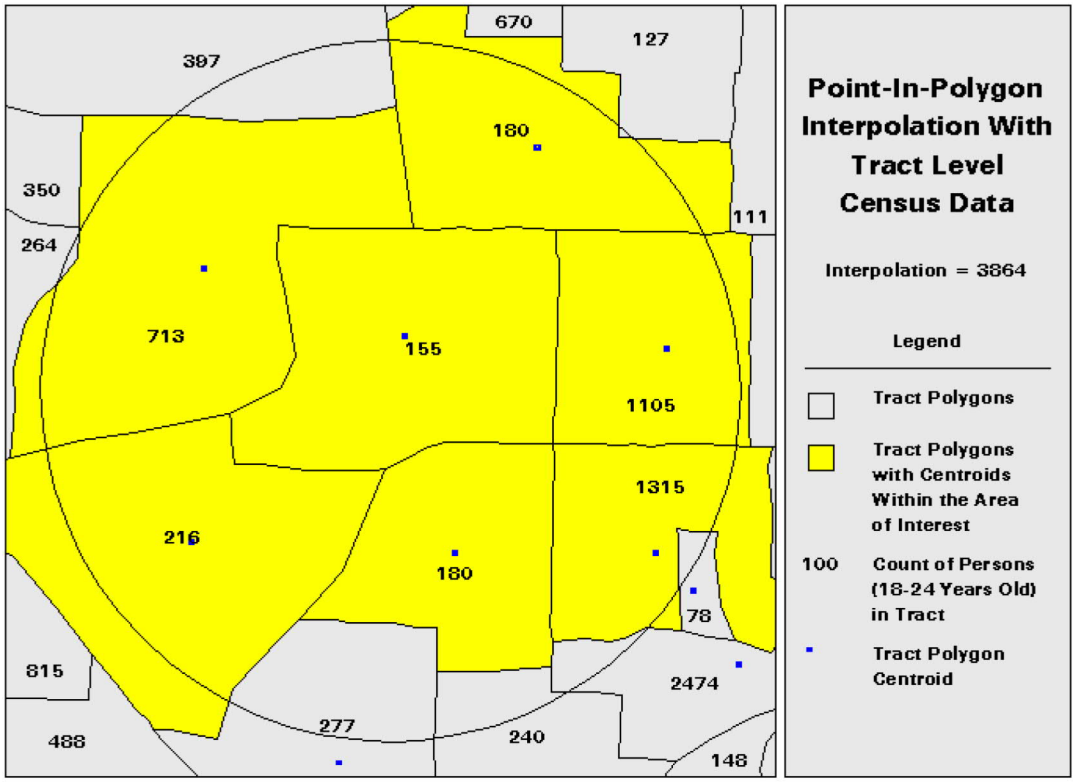
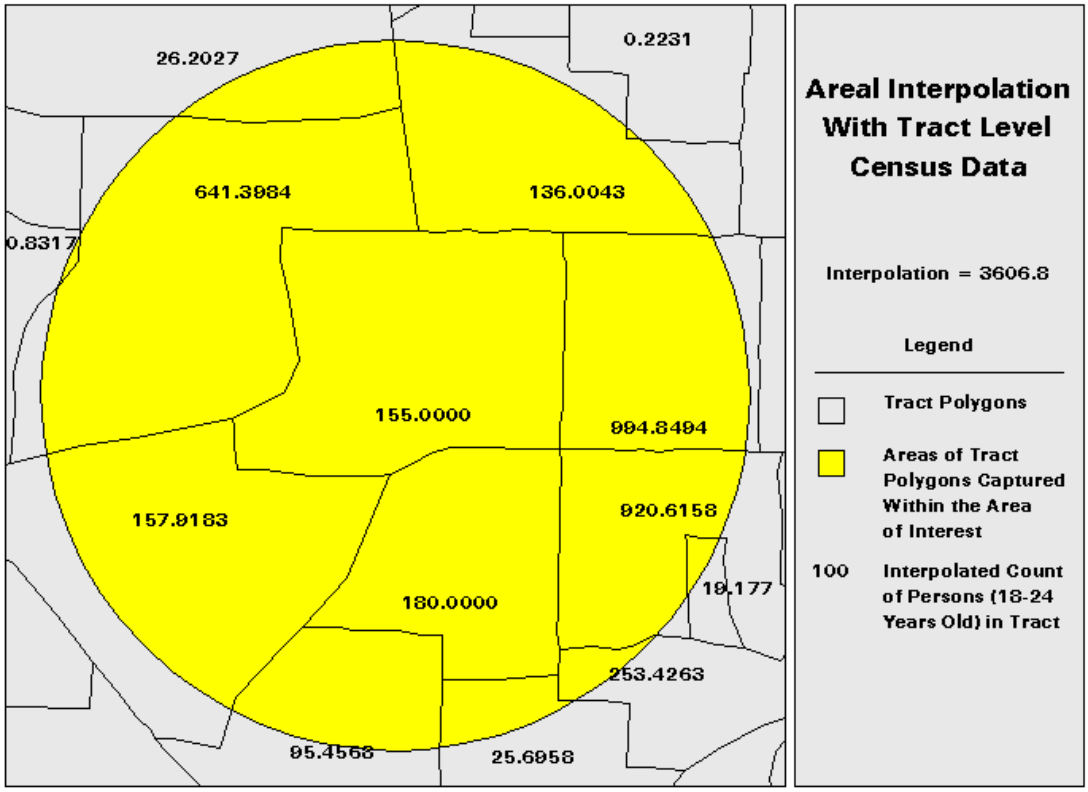
In this exercise, we are going to build a program to calculate the value of a given circle from underlying census polygons.

Mathematically, it is called areal interpolation.

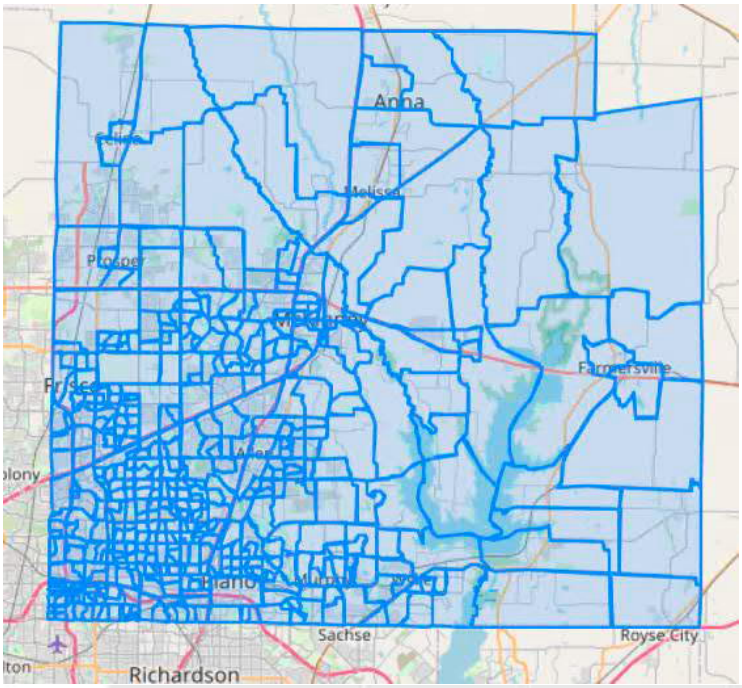
From an application perspective, it is called demographic harvesting.



Centroid based method



Areal proportion method



Key character varying (32)	income integer	population integer	SpatialObj geometry
480850301001	97431	2678	0103000020E610...
480850301002	99209	1973	0103000020E610...
480850301003	90131	3622	0103000020E610...
480850302011	115649	2839	0103000020E610...
480850302012	124932	3411	0103000020E610...
480850302021	137726	2618	0103000020E610...
480850302022	149617	3078	0103000020E610...
480850302031	102273	9595	0103000020E610...
480850302032	140089	8125	0103000020E610...
480850304033	157552	1638	0103000020E610...
480850302033	98347	2112	0103000020E610...
480850302034	92696	9487	0103000020E610...
480850302035	111829	4685	0103000020E610...
480850303011	153584	1298	0103000020E610

The dataset is in the Postgres database.

Here is the information to access this table

- Host Name: [redacted]
- Database name: [redacted]
- Port number: [redacted]
- Username: [redacted]
- Password: [redacted]
- Table name: [redacted]

The table has both population and income columns.

Please calculate the total population and average income of given distance buffer from any given points.

Here is what you need to know about PostGIS, we installed PostGIS as an extension to Postgres. This is a popular extension to manage spatial data and operations.

https://postgis.net/

Some functions that you may use in the application:

https://postgis.net/docs/ST_Centroid.html

https://postgis.net/docs/ST_Intersects.html

https://postgis.net/docs/ST_Area.html

https://postgis.net/docs/ST_Within.html

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- For the frontend implementation, here are some tips:
    - The map in the frontend can use Google Map, Leaflet, Mapbox or any mapping platform you are comfortable with. Leaflet is an opensource library. Here is a quick guide https://leafletjs.com/examples/quick-start/
    - Mapbox is free, you just need to register an account to get the API token
- Java/Springboot (or others) for backend and React (or others) for frontend.
- You should host your service on AWS or Heroku, free tier.
- Please send the link to your Github repository in your final submission