Spatial Approaches

Methods of Sociological Research
Soc 362/CJC483

November 27, 2007

Spatial Approaches

Outline:

- Introduce spatial approaches in the social sciences
- Illustrate an example of spatial analysis (identifying ethnic neighborhoods)

Objective:

- Be able to understand the importance of spatial approaches in the social scientific research

Space matters

- In life
- In all sciences → Multidisciplinary
- A map is worth a thousand words

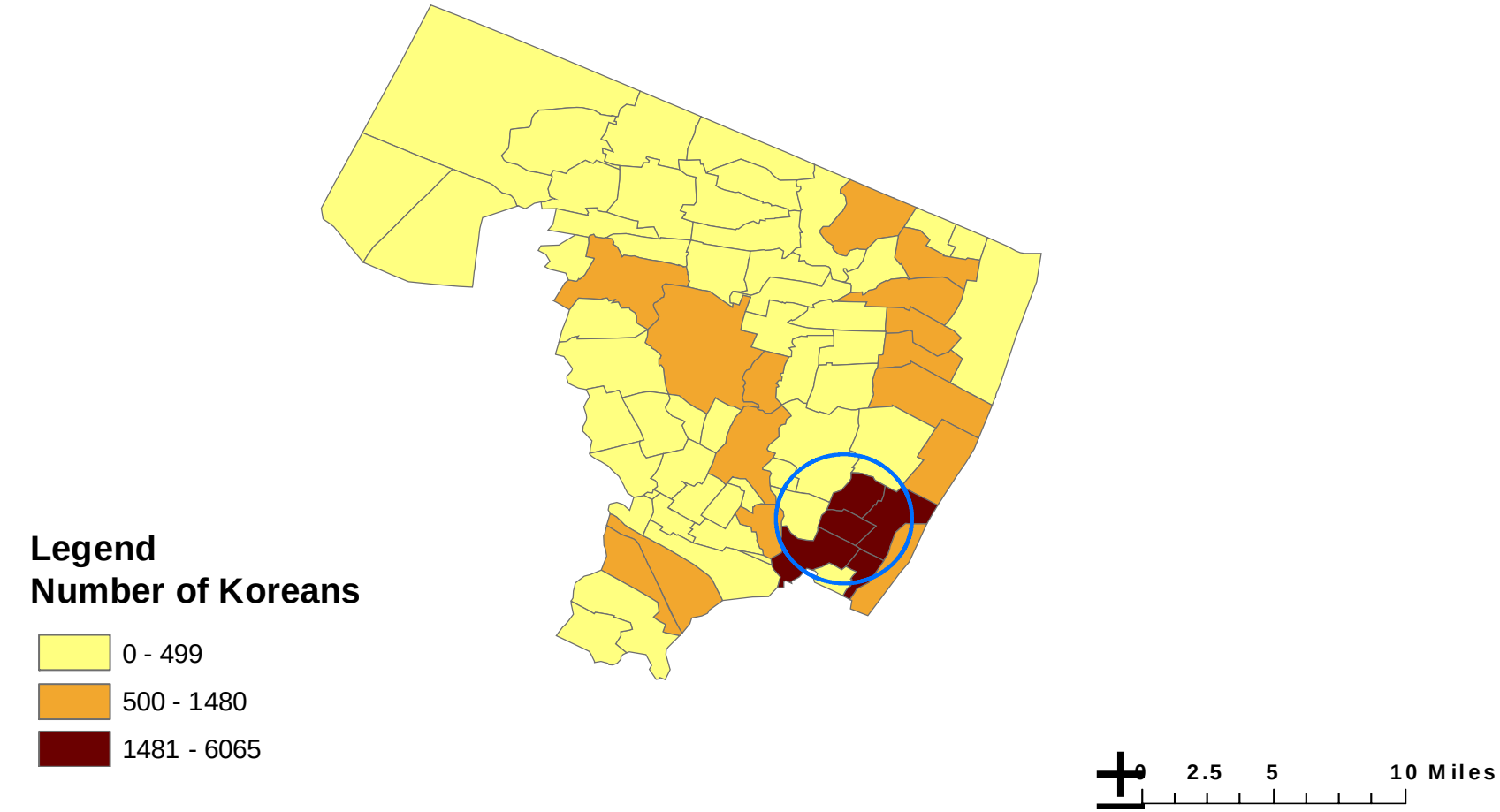
* Source: Goodchild 2004

Tables vs. Maps

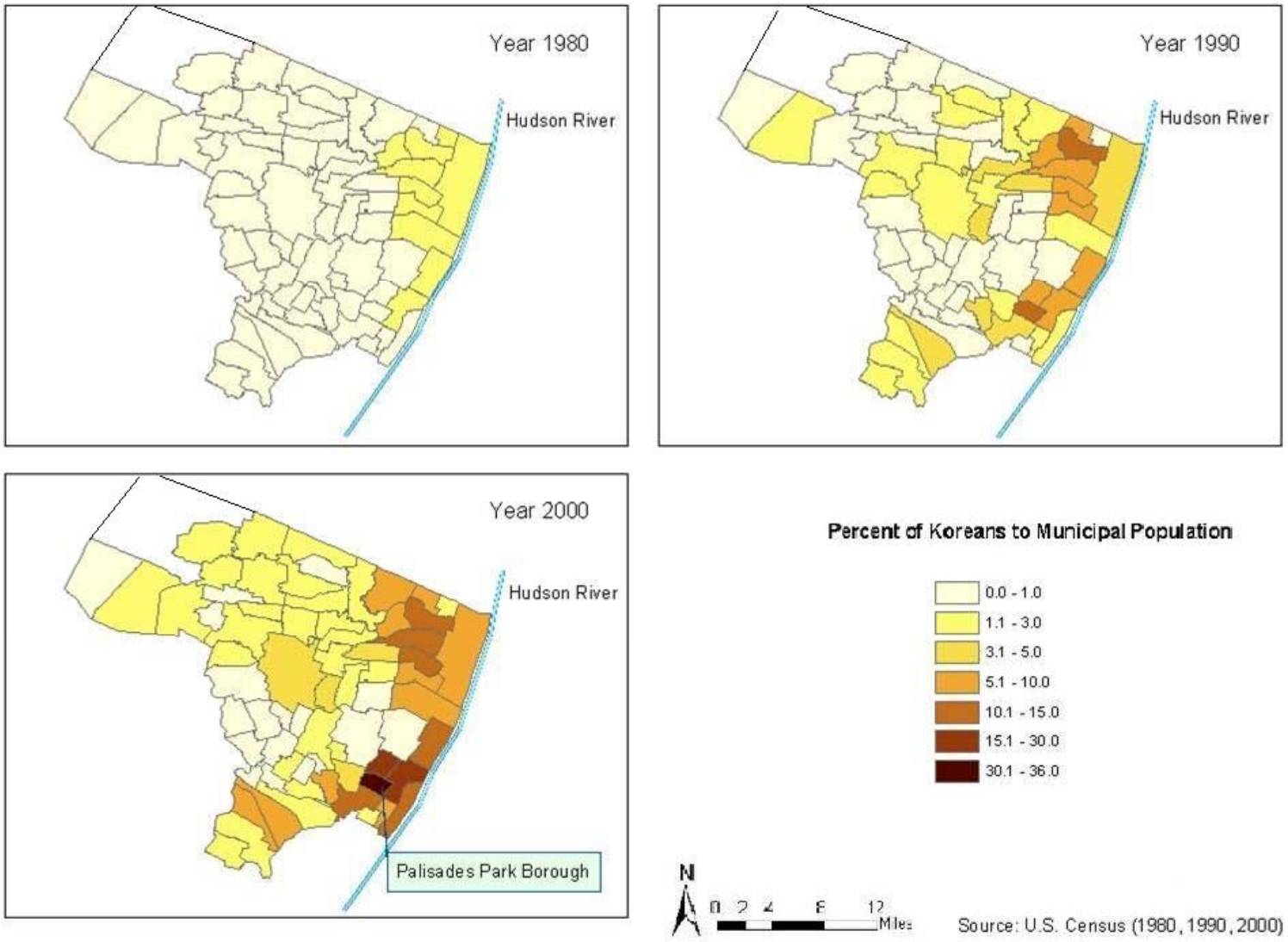
Municipalities (n=70)	Total population	# Korean	% Korean
Palisades Park borough	17,073	6,065	35.52
Fort Lee borough	35,461	5,978	16.86
Leonia borough	8,914	1,485	16.66
Ridgefield borough	10,830	1,519	14.03
Cliffside Park borough	23,007	1,588	6.90
Norwood borough	5,751	717	12.47
Closter borough	8,383	1,041	12.42
Englewood Cliffs borough	5,322	622	11.69
Edgewater borough	7,677	889	11.58
Demarest borough	4,845	505	10.42
Old Tappan borough	5,482	545	9.94
Cresskill borough	7,746	761	9.82
Tenafly borough	13,806	1,294	9.37
Alpine borough	2,183	202	9.25

Tables vs. Maps

Number of Koreans in Bergen County, NJ (2000)



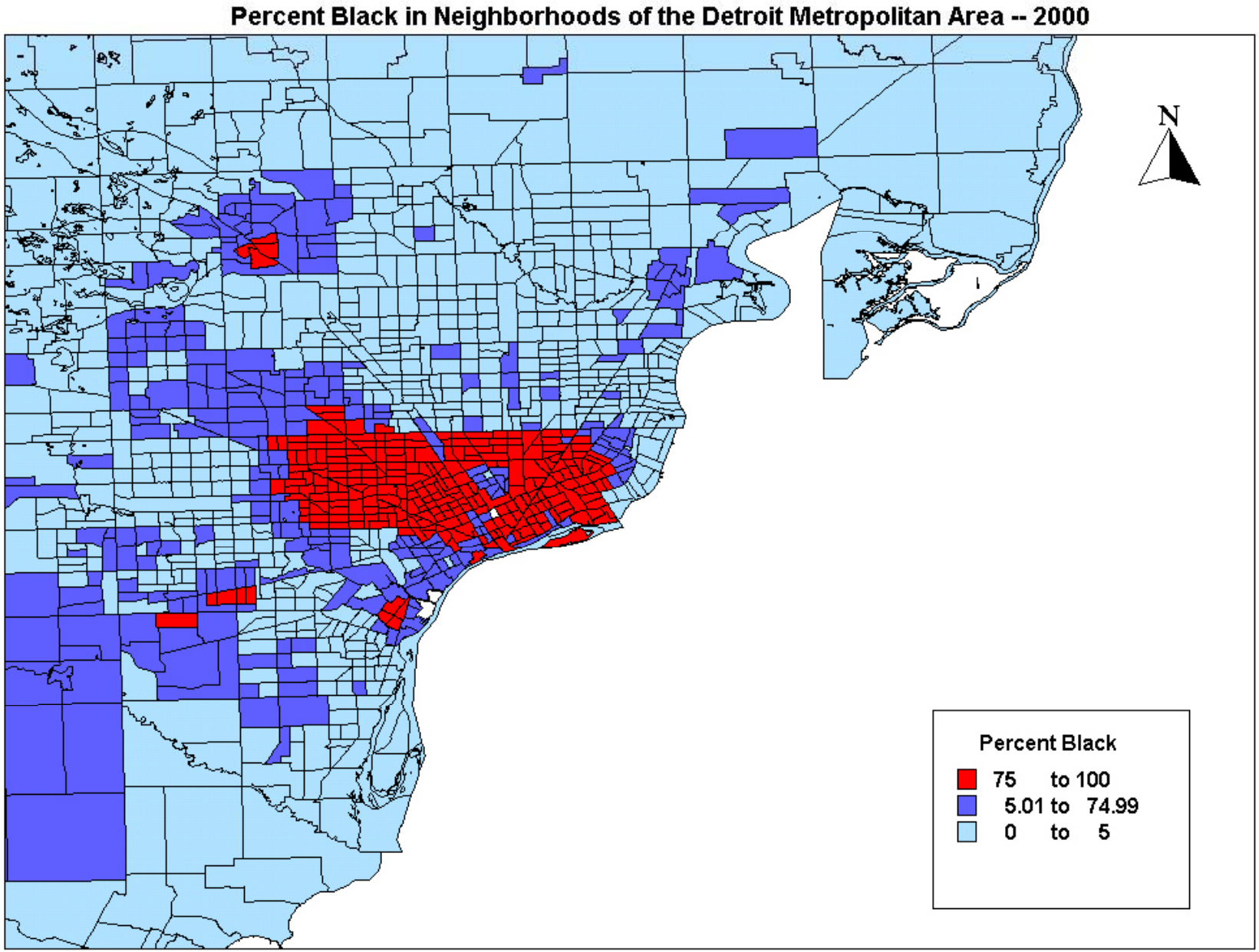
Residential distribution of Koreans in Bergen County, NJ (1980-2000)



Statistics vs. Maps

- *Detroit in 2000*
- *Index of Dissimilarity (D)*

  White with Black = 85



Source: Logan (2006)

Spatial questions

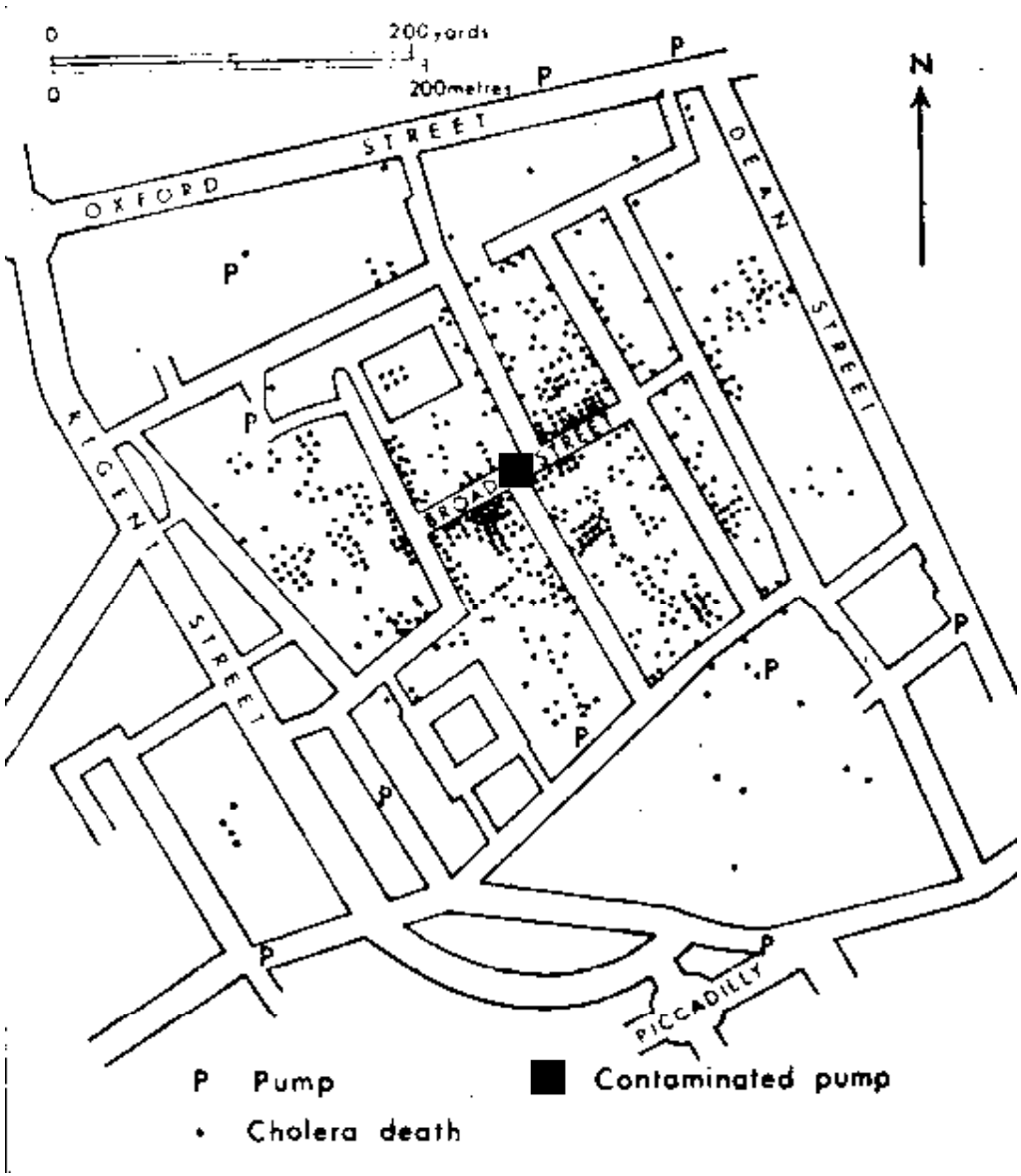
- Some spatial questions don't require spatial analysis

  Do some states have higher infant mortality than other states? If so, which?

- Other so

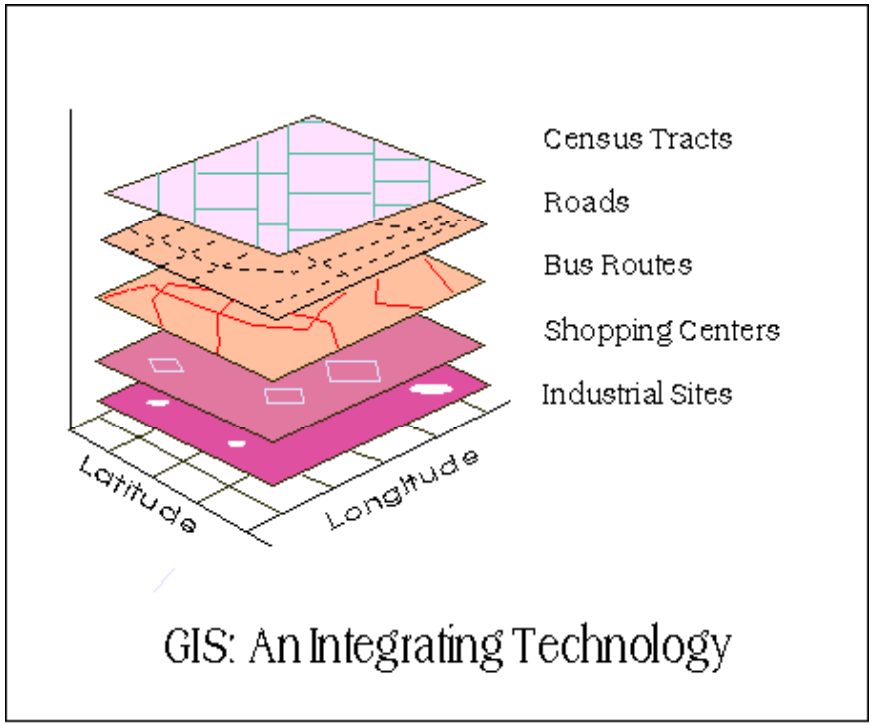
  Are states with higher infant mortality *clustered* together?

Spatial Analysis in the 19th century



Geographic Information Systems

- Formal structure for *dealing with* geographic information
- GIS as an application: hardware, data, software and people needed to solve a problem
- GIS as software: developer specific (e.g., ESRI)



Spatial Approaches in the social scientific research

- Context: Disentangle compositional and contextual effects
- Spatial relationships: Distance and gradients
- Spatial processes: Diffusion, interaction, exchange and transfer, and dispersal

Tobler's law

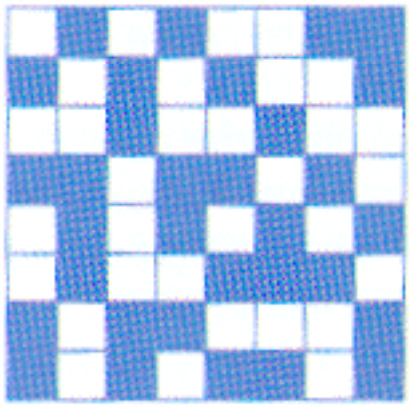
- The first law of geography: Everything is related to everything else but near things are more relate than distant things (Tobler 1970)
- "Independence of observations" assumption in traditional statistics
- Spatial Statistics operate on data that are assumed to be spatially dependent

Spatial Autocorrelation

- Deal simultaneously with similarities in the location (space) of objects and their (non-spatial) attributes. (Goodchild, et. al. 2001)
  - Similar location/Similar attribute = high spatial autocorrelation
  - Similar location/dissimilar attributes = low spatial autocorrelation
  - Attributes are independent of location = zero correlation

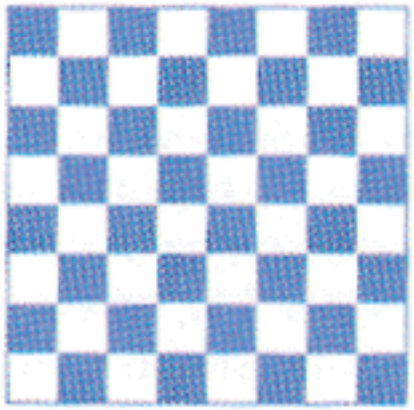
Spatial Autocorrelation

(B)



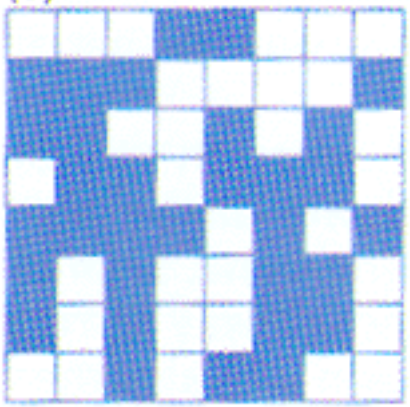
Correlation= -1.00

(A)



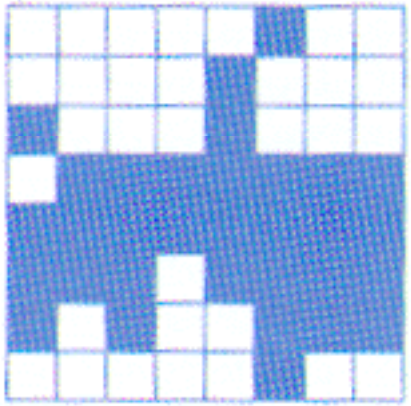
Correlation= -.393

(C)



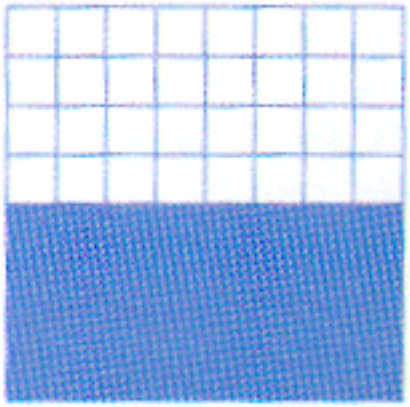
Correlation= 0

(D)



Correlation= +.393

(E)



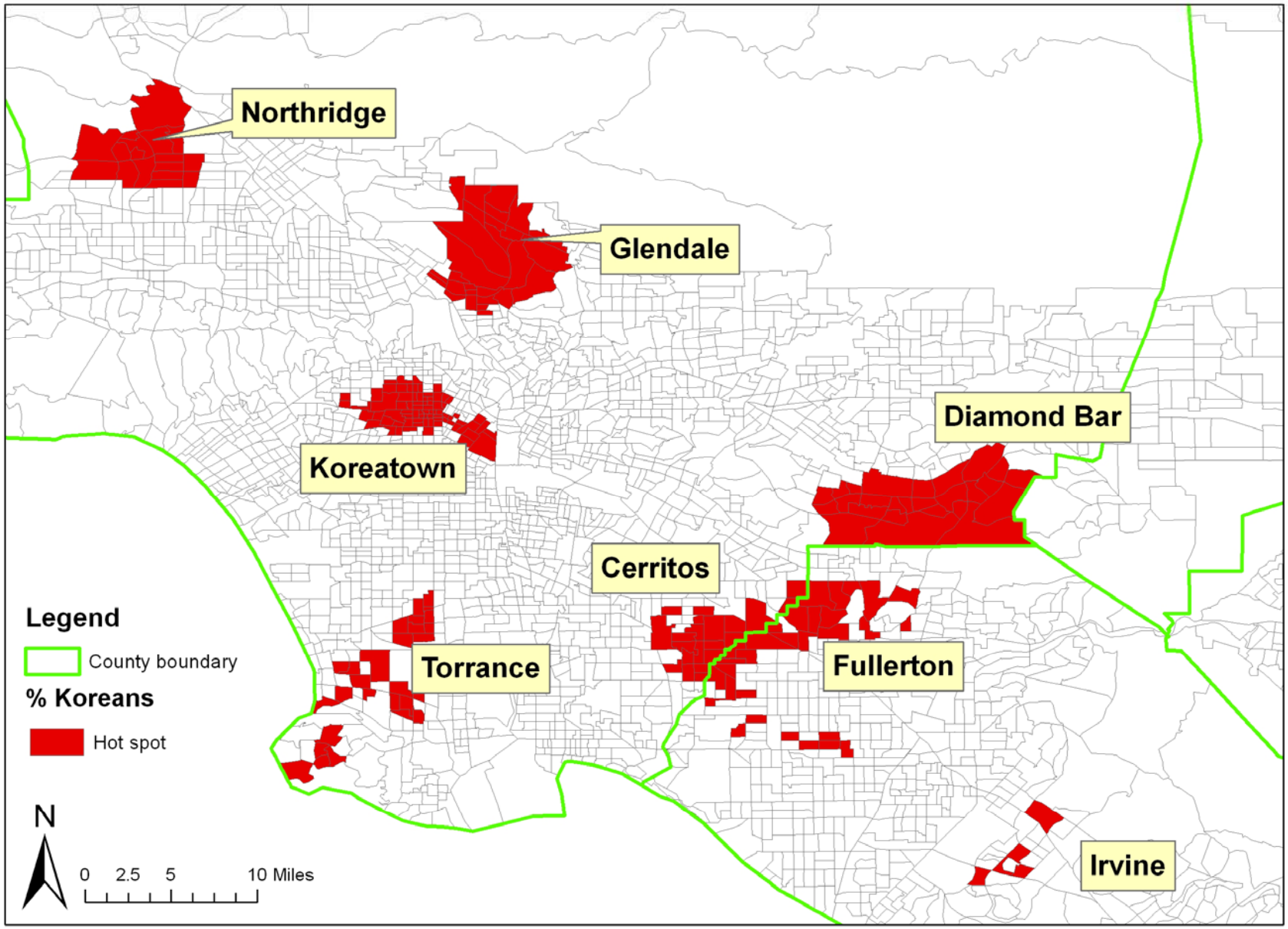
Correlation= +.857

Identifying ethnic communities

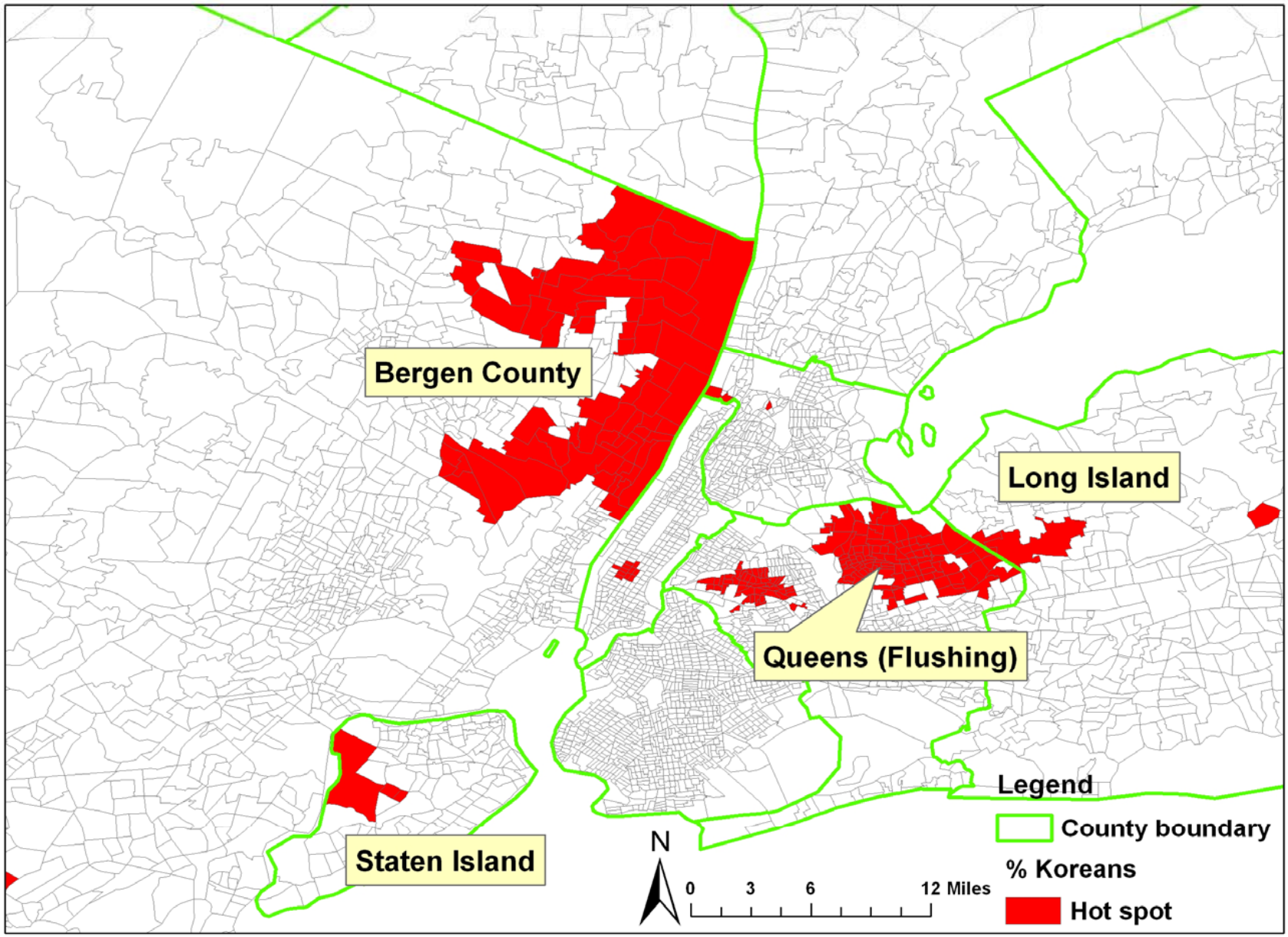
Multiple criteria:

1) Concentration (%)
2) Critical mass (N)
3) *Spatial clustering*
   (Local Indicators of Spatial Autocorrelation)
4) Ethnic businesses and institutions

Significant Spatial Clusters of Koreans in Los Angeles (2000)



Significant Spatial Clusters of Koreans in New York (2000)



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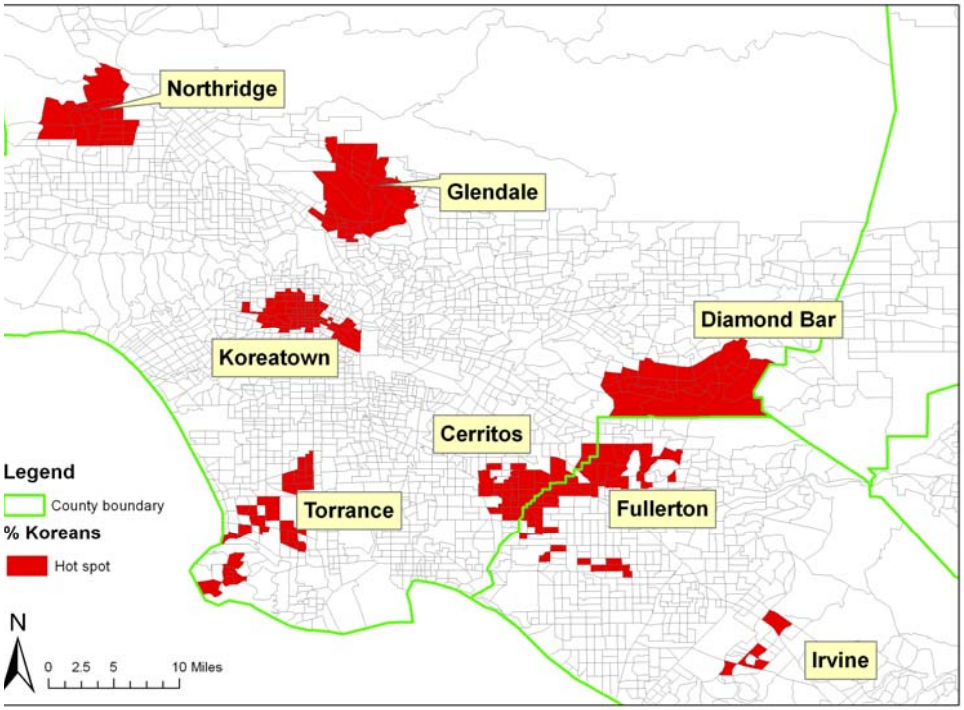
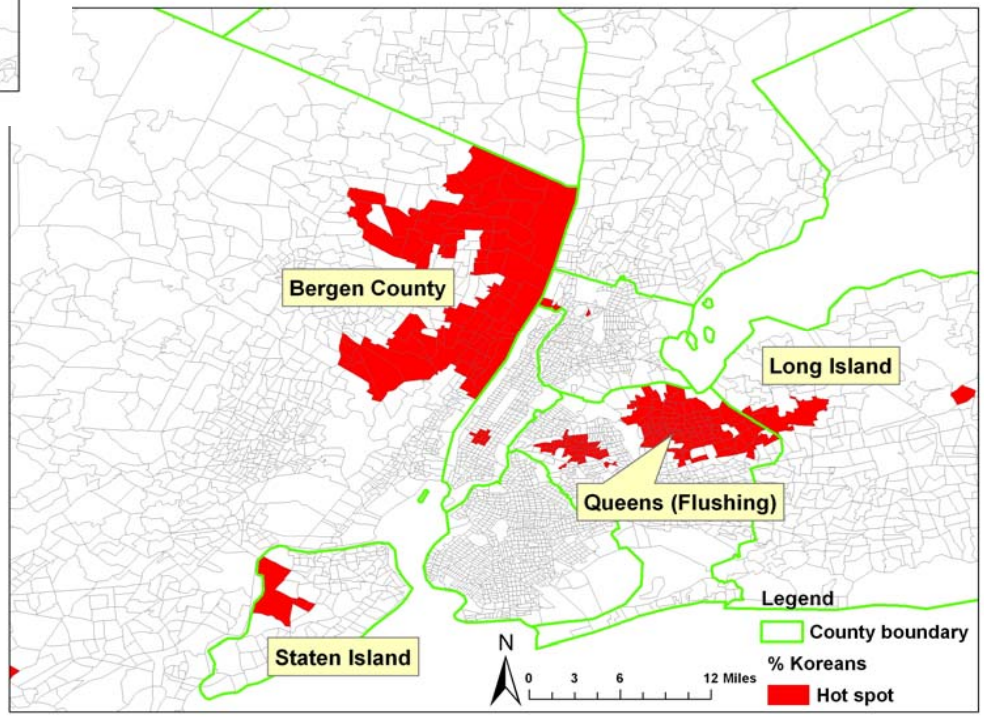


← Global Moran's I=0.61

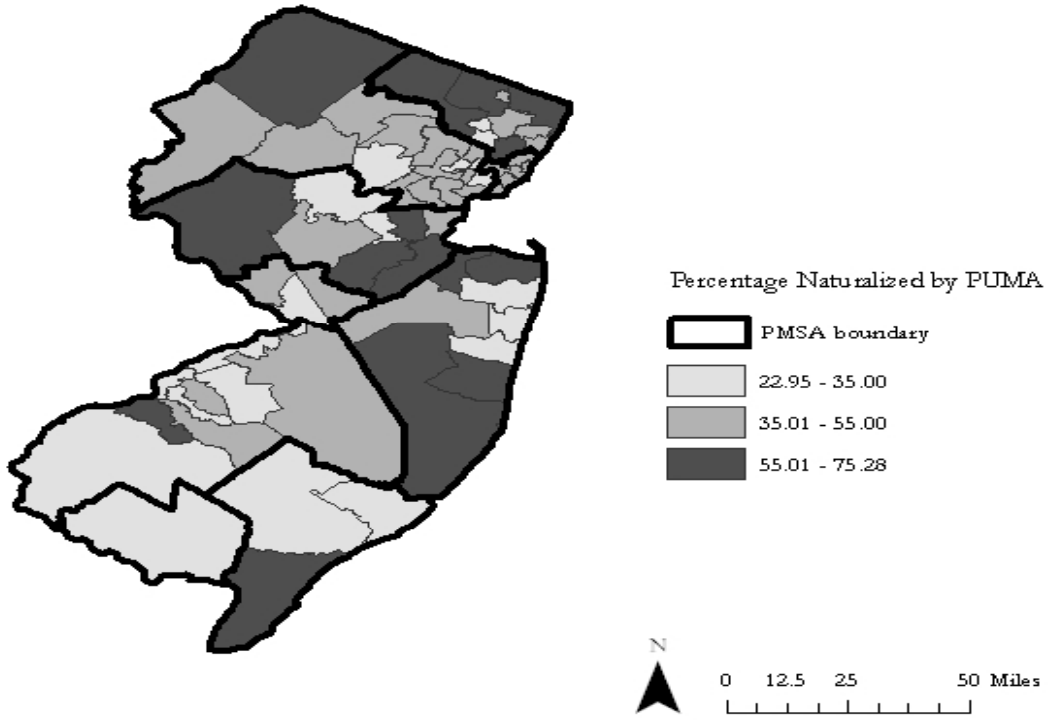
Significant Spatial Clusters of Koreans in New York (2000)



Global Moran's I=0.74 →

Modifiable Areal Unit Problem (MAUP)

Percentage Naturalized 18+ of Hispanic Immigrants by PUMA, New Jersey, 2000 (with PMSA boundaries shown in black)



Daily Reaction

How can spatial analysis play important roles in *inductive approach*?

Spatial analysis' exploratory technique reveals patterns and anomalies and suggests hypotheses and insights into theory.