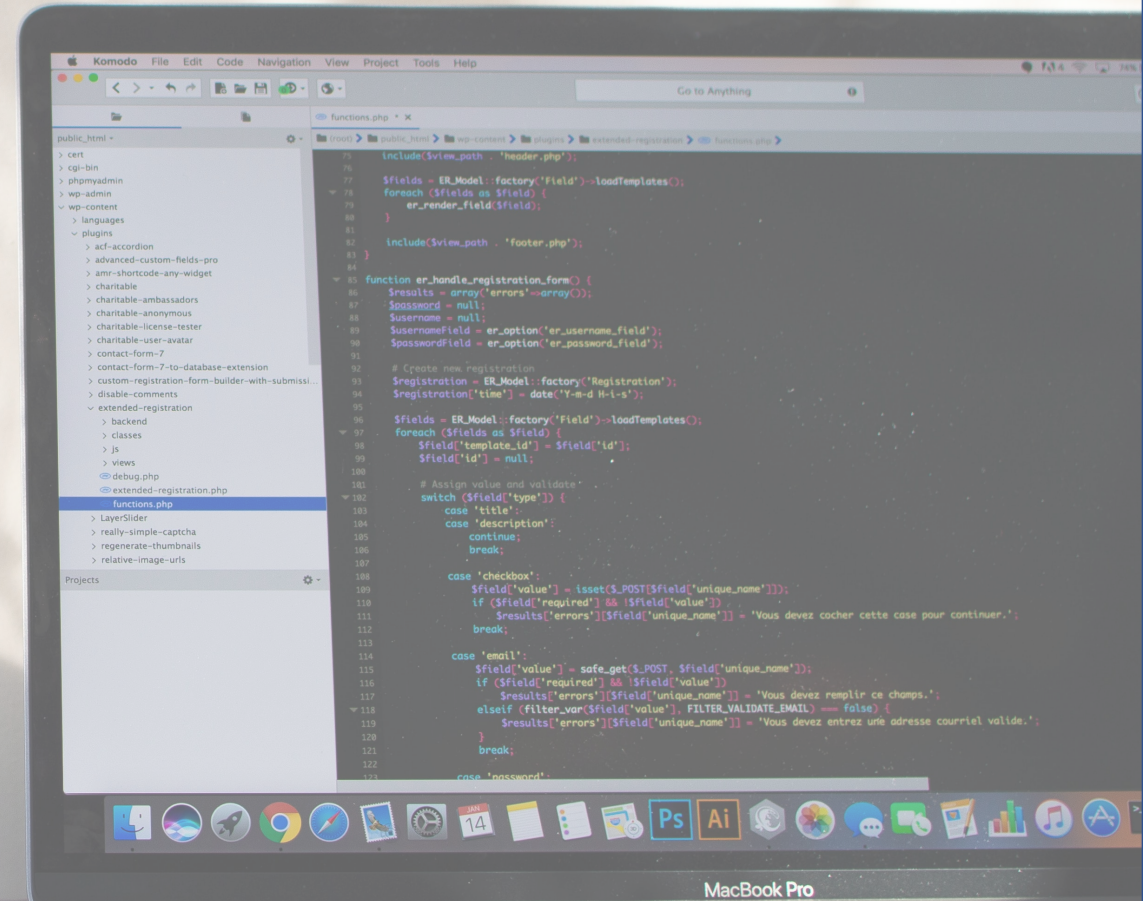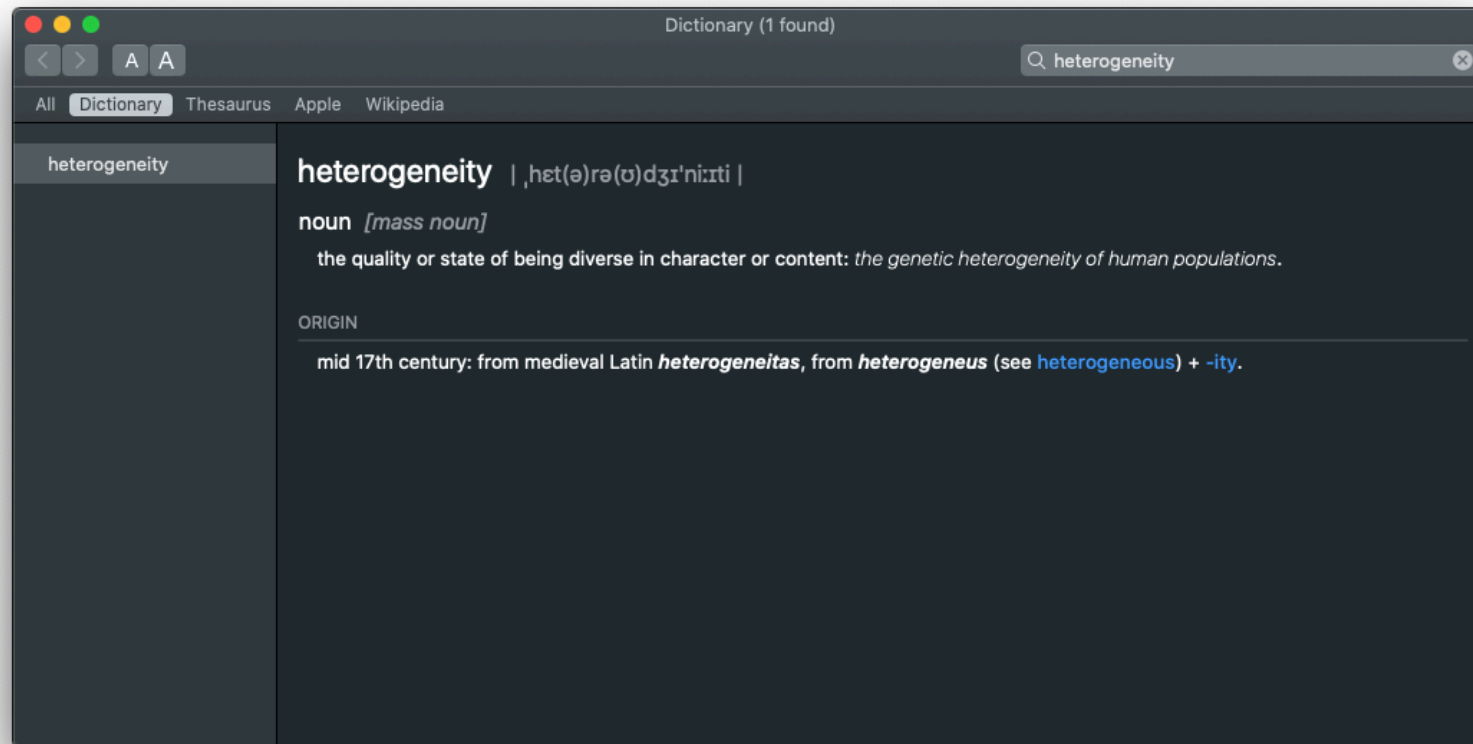# Principles of Spatial Analysis

SHORT LECTURE 03, WEEK 05: EXPLORATORY (SPATIAL) DATA ANALYSIS
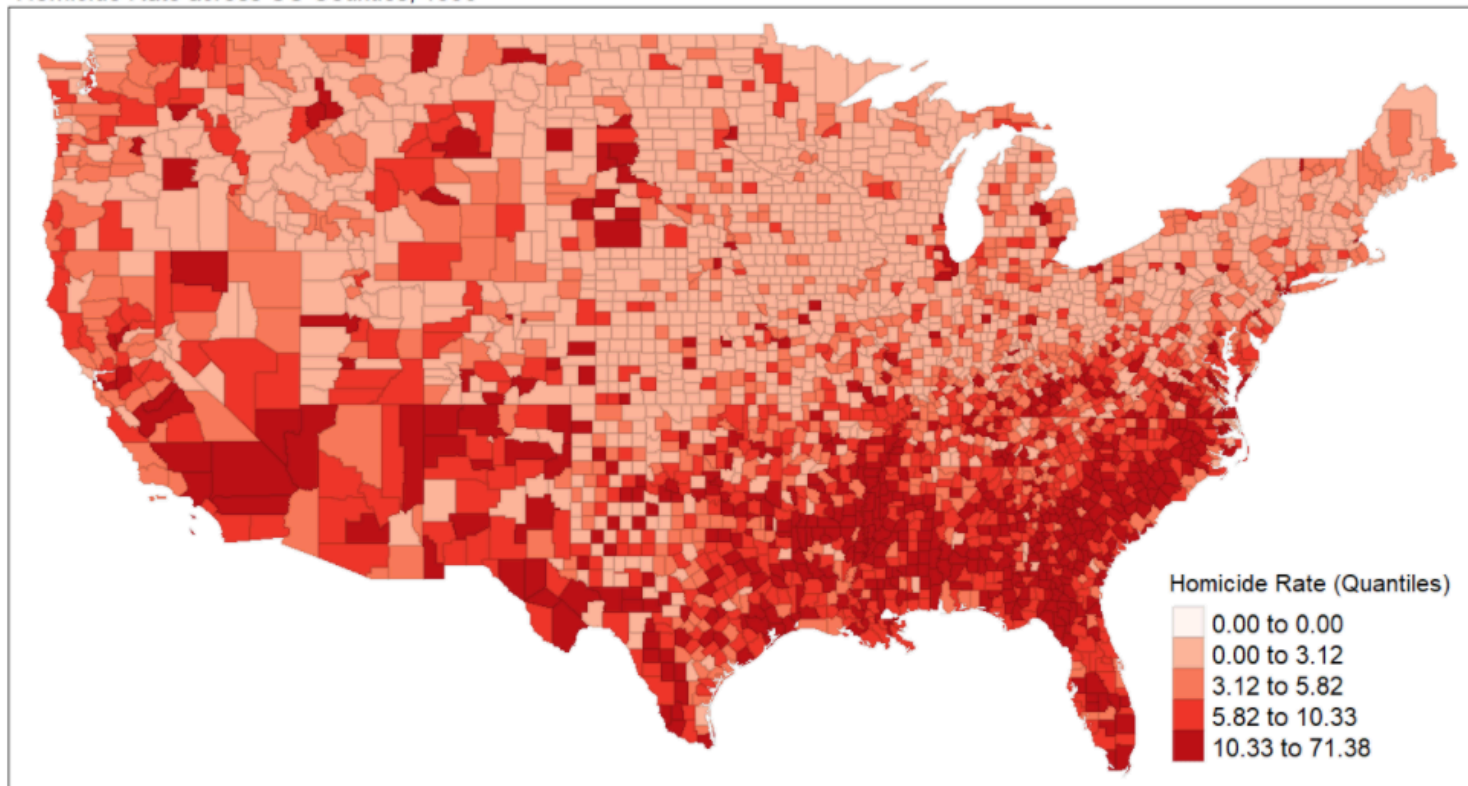
spatial heterogeneity

heterogeneity

All **Dictionary** Thesaurus Apple Wikipedia

heterogeneity

heterogeneity | ˌhɛt(ə)rə(ʊ)dʒɪˈniːɪti |

noun *[mass noun]*

the quality or state of being diverse in character or content: *the genetic heterogeneity of human populations*.

ORIGIN

mid 17th century: from medieval Latin *heterogeneitas*, from *heterogeneus* (see heterogeneous) + -ity.

spatial distribution

$$y_i = \beta_0 + \beta_1 x_i + \epsilon_i$$

Homicide Rate across US Counties, 1990

Homicide Rate (Quantiles)
- 0.00 to 0.00
- 0.00 to 3.12
- 3.12 to 5.82
- 5.82 to 10.33
- 10.33 to 71.38

Residuals
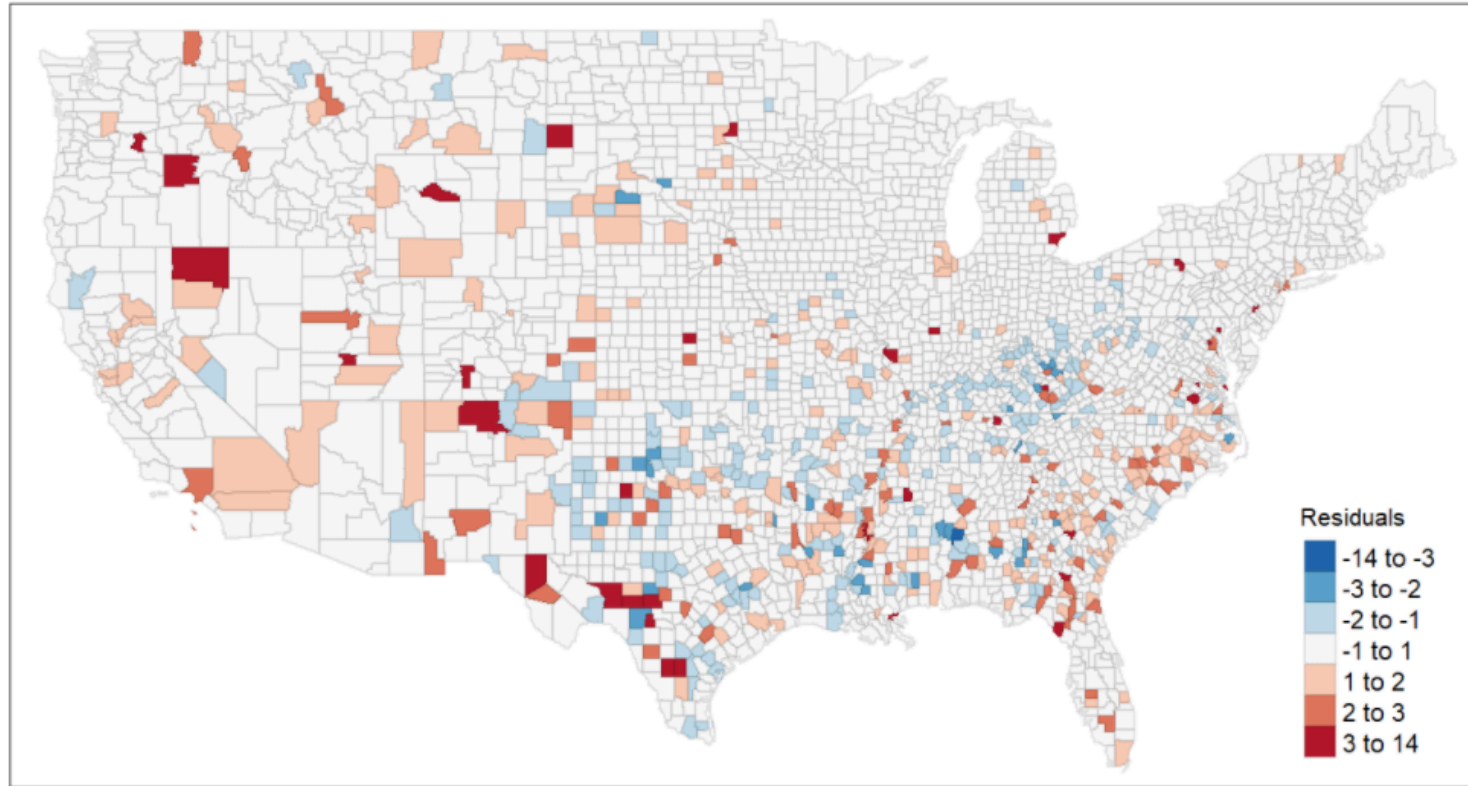
two ways of dealing with this

$$y_i = \beta_0 + \beta_1 x_i + \epsilon_i$$

spatial error model

$$y_i = \beta_0 + \beta_1 x_i + \boxed{\lambda w_i . \xi_i} + \epsilon_i$$

spatially lagged model

$$y_i = \beta_0 + \beta_1 x_i + \boxed{\rho w_i . y_i} + \epsilon_i$$

one model to rule the all?

geographically weighted regression

$$y_i = \beta_0 + \beta_1 x_i + \epsilon_i$$

let's put it into practice