

# Geographic Data Science

Visualisation of Point Patterns

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# Visualization of PPs

Three routes (today):

- *One-to-one* mapping  $\leftrightarrow$  “Scatter plot”
- *Aggregate*  $\leftrightarrow$  “Histogram”
- *Smooth*  $\leftrightarrow$  KDE

**One-to-one**

# One-to-one

- Intuitive
- Effective in small datasets
- Limited as size increases until useless

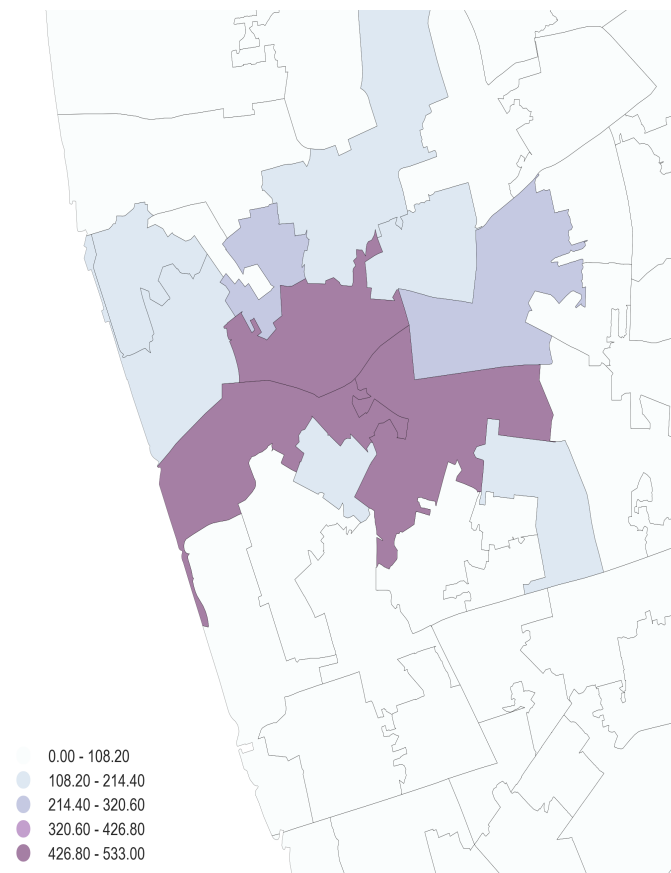
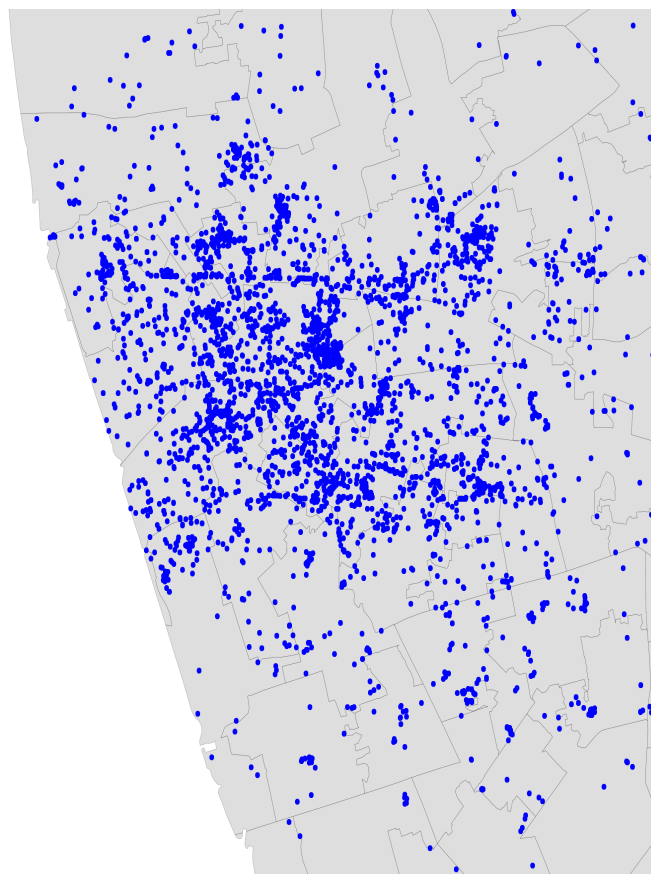
# Aggregation

## *Points meet polygons*

Use **polygon** boundaries and **count** points per area

[Insert your skills for **choropleth mapping** here!!!]

**But**, the polygons need to “*make sense*” (their delineation needs to relate to the point generating process)



# Hex-binning

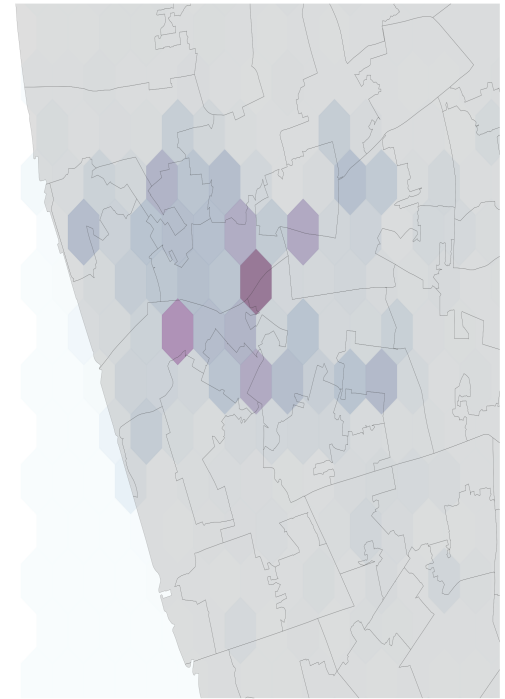
If no polygon boundary seems like a good candidate for aggregation...

...draw a hexagonal (or squared) tessellation!!!

Hexagons...

- Are regular
- Exhaust the space (Unlike circles)
- Have many sides (minimize boundary problems)





# But...

(Arbitrary) aggregation may induce **MAUP** (see Block D)

+

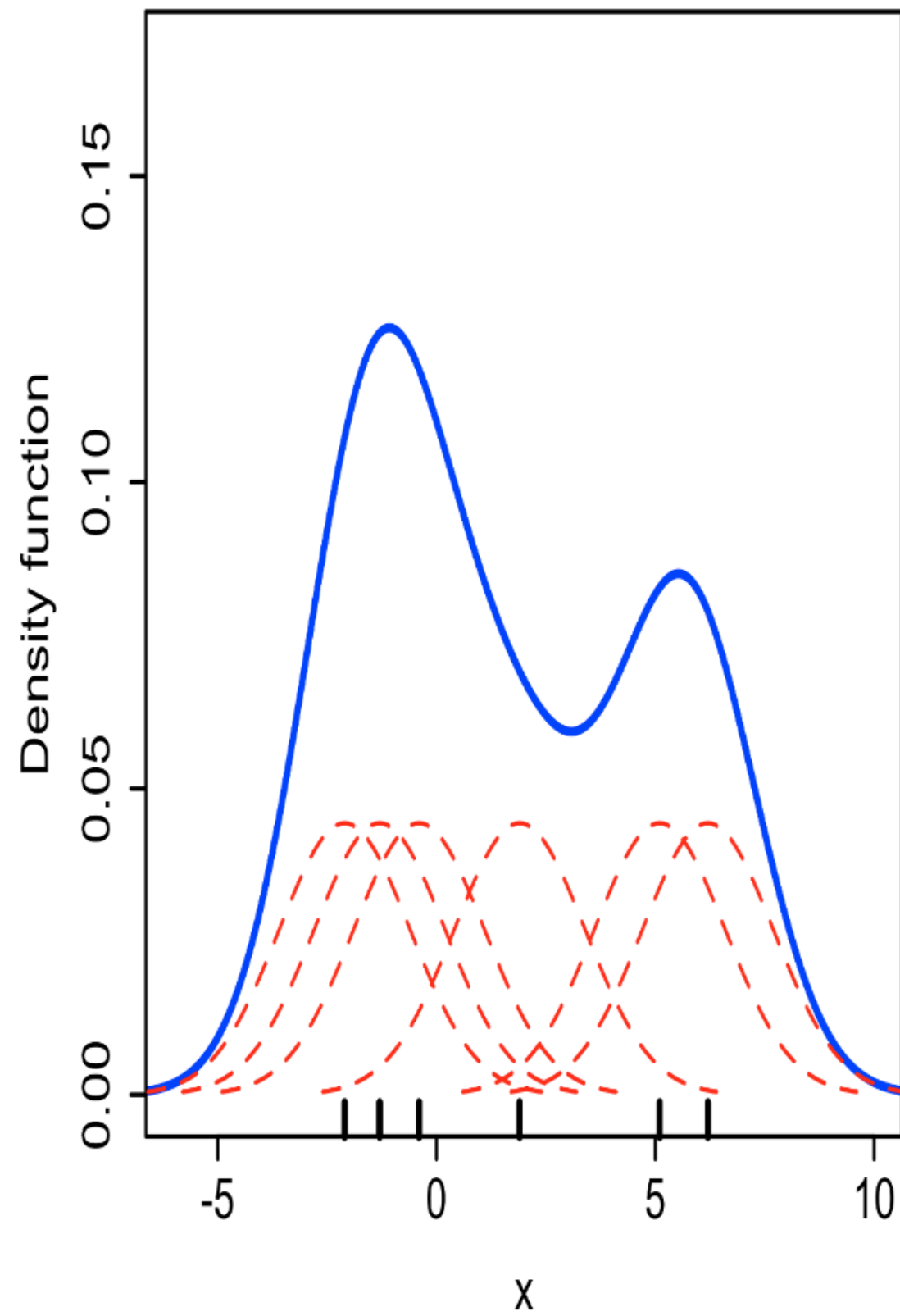
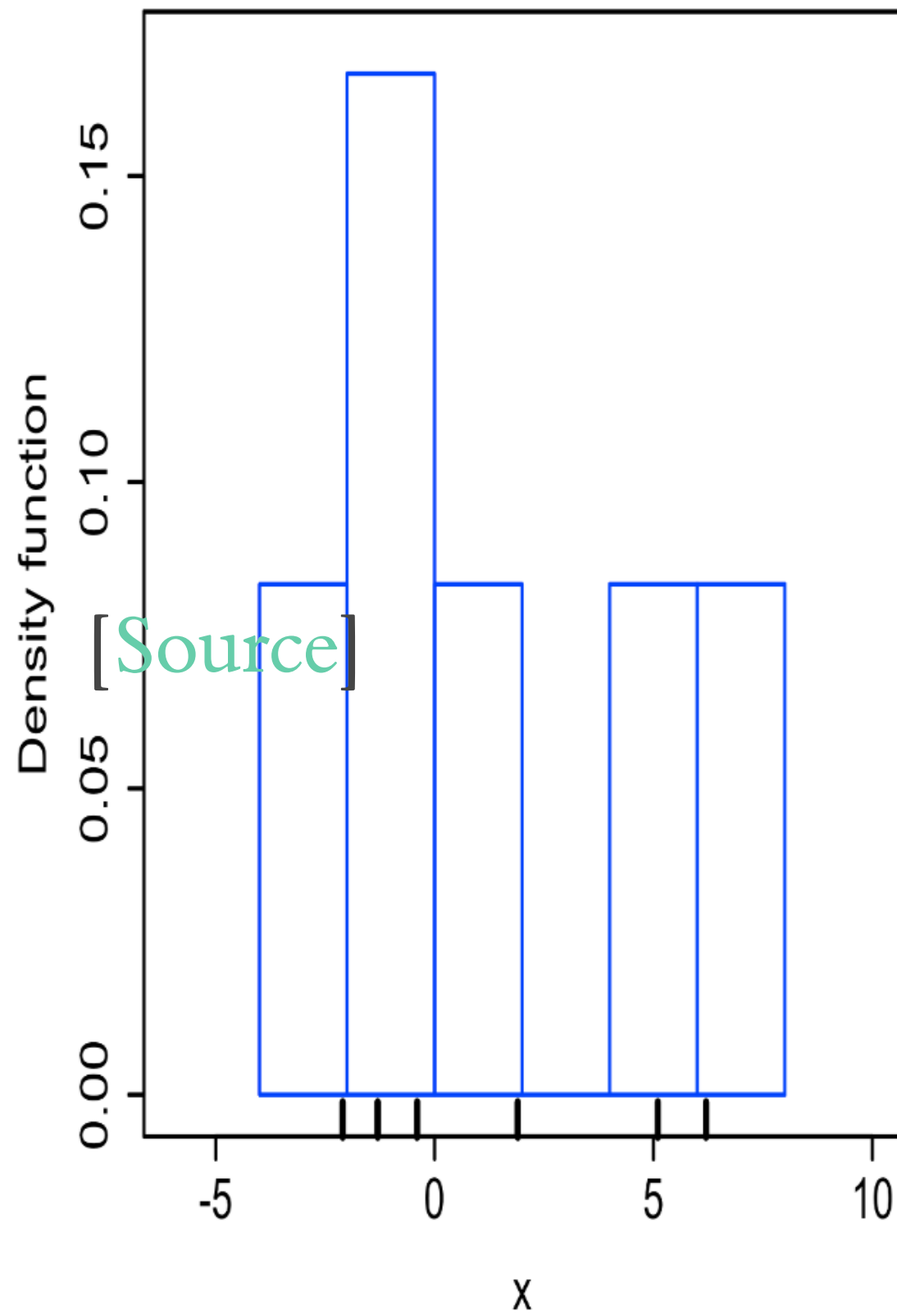
Points usually represent events that affect only **part** of the population and hence are best considered as **rates** (see Lecture 4)

# Kernel Density Estimation

# Kernel Density Estimation

*Estimate the (**continuous**) observed **distribution** of a variable*

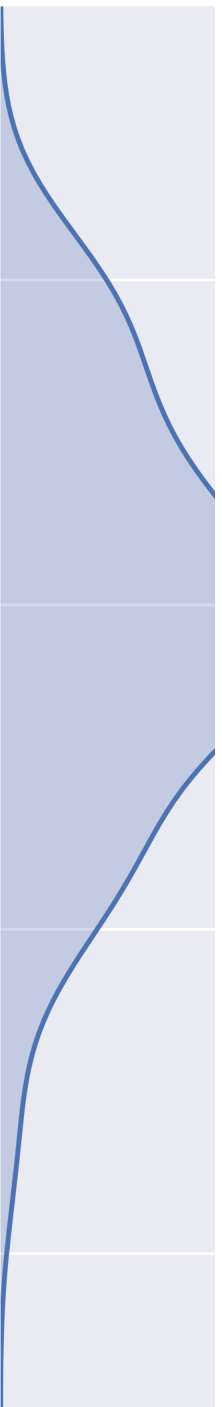
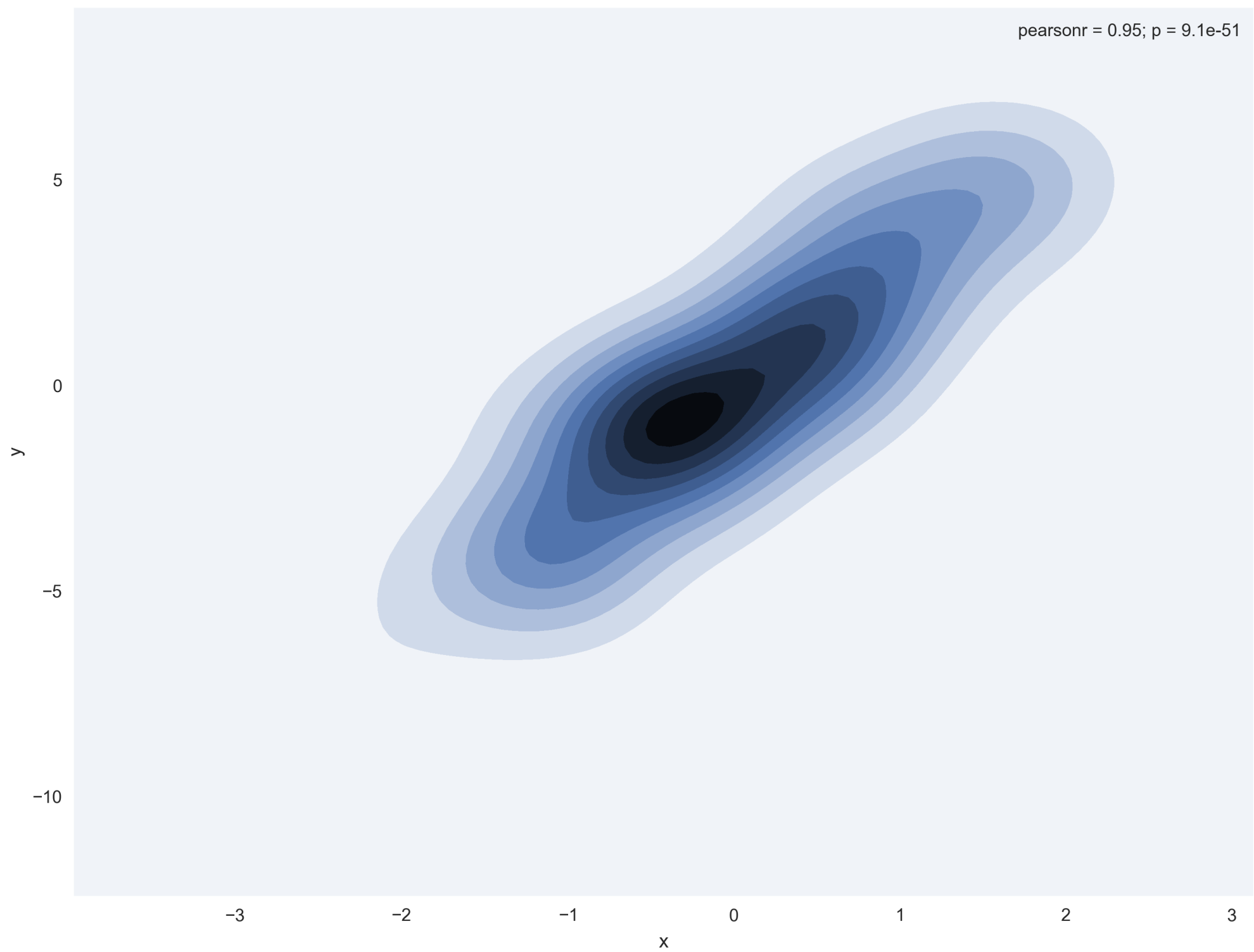
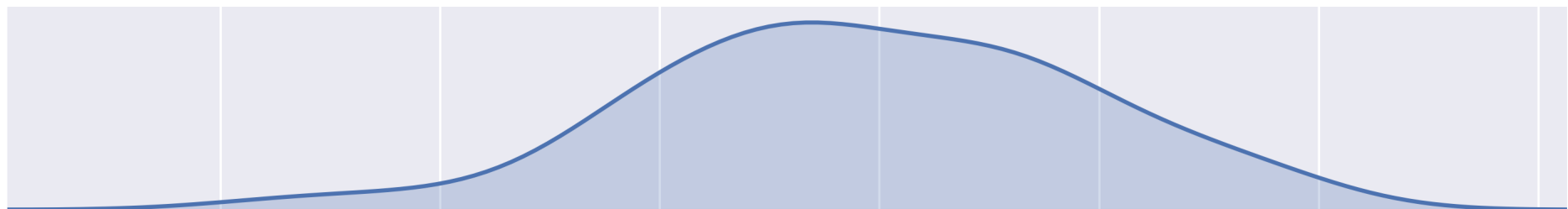
- Probability of finding an observation at a given point
- “Continuous histogram”
- Solves (much of) the MAUP problem, but not the underlying population issue

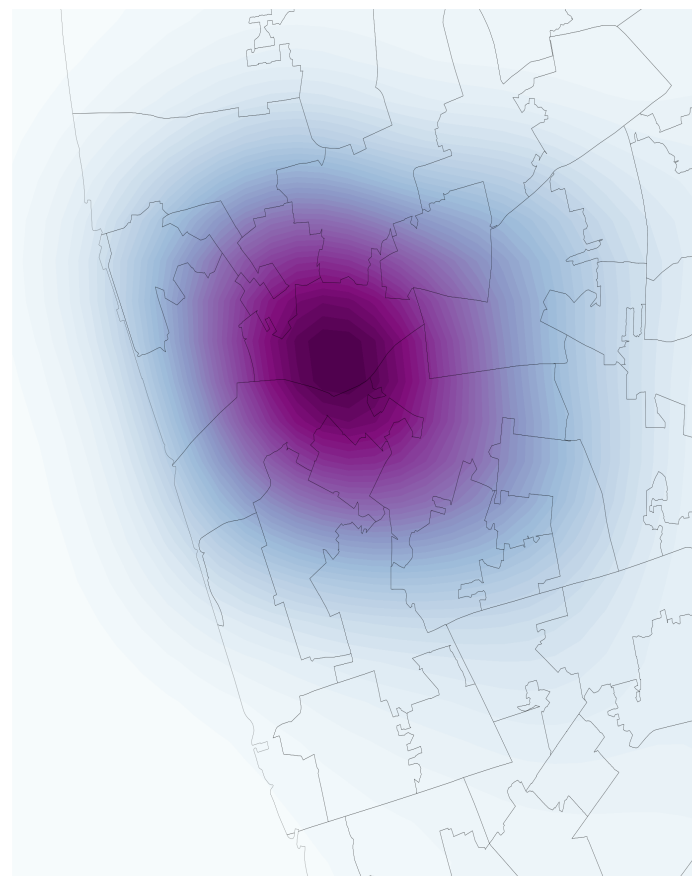
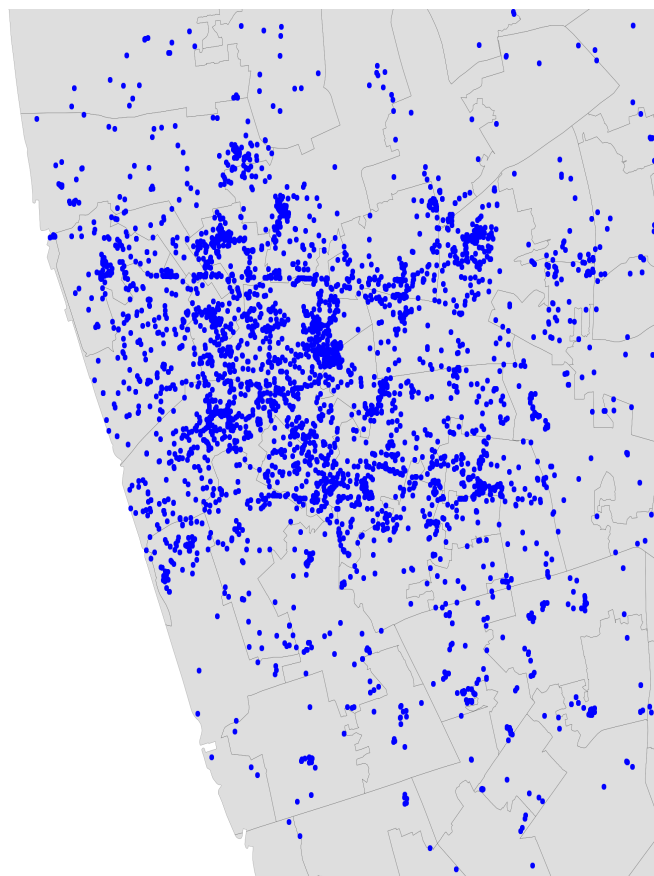


# Bivariate (spatial) KDE

*Probability of finding observations at a given point in space*

- **Bivariate** version: distribution of pairs of values
- In **space**: values are coordinates (XY), locations
- Continuous “version” of a choropleth









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