Part III

Multiscale Spatially Varying Poisson Model

Multiscale Geographically Weighted Poisson Regression (MGWPR)

Problem Statement

Multiscale Geographically Weighted Poisson Regression (MGWPR)

- Normally distributed response variables though ubiquitous in statistics are not the only kind.
- Other distributions of response variables are observed such as Poisson, Binomial etc.



- Expand the MGWR model to accommodate a Poisson distributed response variable.
- **Design and implement an algorithm to model generalized response variables** and check performance using simulated data in comparison to Poisson GWR, GLM results.
- Develop inference calculations to accommodate for ramifications from associated link functions.
- Apply model expansions to real world datasets to exhibit use of model with noisy, real data.

Research Design

What is the plan to solve the problem?



Monte Carlo experiment: 1000 runs using simulated data

- 1. Estimation of the scale across which processes vary
- 2. Reproduction accuracy of the spatial heterogeneity of different processes
- 3. Goodness of fit
- 4. Computation overhead

Monte Carlo experiment: 1000 runs using the following constructed data:

Original Beta Intercept

Original Beta 1

Original Beta 2

Monte Carlo experiment: 1000 runs using the following constructed data:

1.Estimation of the scale across which processes vary

2. Reproduction accuracy of the spatial heterogeneity of different processes - RMSE

2. Reproduction accuracy of the spatial heterogeneity of different processes

Beta 2

3. Goodness of fit - AICc

4. Computational overhead

Intellectual merits and Broader impacts

• **Expands applicability of local models** in wider research areas within the social and natural sciences

• Generalizes local modeling techniques to **expand user-base**

• **Implements novel adaptations** in local spatial modeling framework from generally established statistical techniques

Thank you!

Any Questions?