ST509\_midterm\_2024020409

Hwijun Kwon

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# 1. Introduction

Poisson Distribution is Data for Count Data.

Since Poisson Regression is a form for generalized linear model, we could compute it We typically use the log-linear model.

Competing Methods are Unpenalized, Ridge penalized, Lasso penalized, Elatic-Net Penalized, SCAD penalized Poisson Regression.

# 2. Computing Methods

## 1. Poisson Regression with GLM

## 2. Algorthim

### 1. Newton Raphson

### 2. Coordinate Descent

Coordinate Descent The Algortim is to fix the penalty parameter in the Lagrangian form and optimize successively over each parameter, holding the other parameters fixed at their current values

## 2. Penlaty

This paper uses 5 different penalty

### 1. Non-penalty

Poisson negative log-likelihood is given by

### 2. Ridge

L1-penalized negative log-likelihood is given by

### 3. LASSO

L2-penalized negative log-likelihood is given by

### 4. Elastic Net

Elastic Net Penalty negative log-likelihood is given by

### 5. SCAD

* (SCAD) SCAD

# 3. Simulation Set Up

## 1. Parameter Setting

## 2. Perfromance Measure

### 1. Estimation Accuracy

* MC MSE
* MC Variance
* MC Bias ### 2. Variable Selection Performance
* CS
* IS
* AC ### 3. Averaged Computing Time

# 4. Result

# 5. Discussion

## 1. Overdisperion Problem

* Dean and lawless

## 2. Zero-inflated Poisson

* Lambert