Brooklyn Bridge Pedestrian Counts

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Group 14

Topic

- We are investigating the volume of pedestrians walking through Brooklyn Bridge.
- From this research, we will predict the number of people going through the Bridge when we know the weather and the time.
- This research will be potentially helpful for:
  - The department of transportation to regulate traffic.
  - The peddlers who would like to know how much snacks and drinks to prepare.

Source of Data

- https://data.cityofnewyork.us/Transportation/Brooklyn-Bridge-Automated-Pedestrian-Counts-Demons/6fi9-q3ta/data
- "The NYC Open Data portal is a powerful tool that ensures transparency and fosters civic innovation within our City to help improve the quality of life for all New Yorkers."

Data

- The data is collected by automatic counter. The counter is located on the Manhattan approach of the Brooklyn Bridge.
- The data is recorded from 10/1/2017 to 7/31/2018.
- The interval of the time is 1 hour.

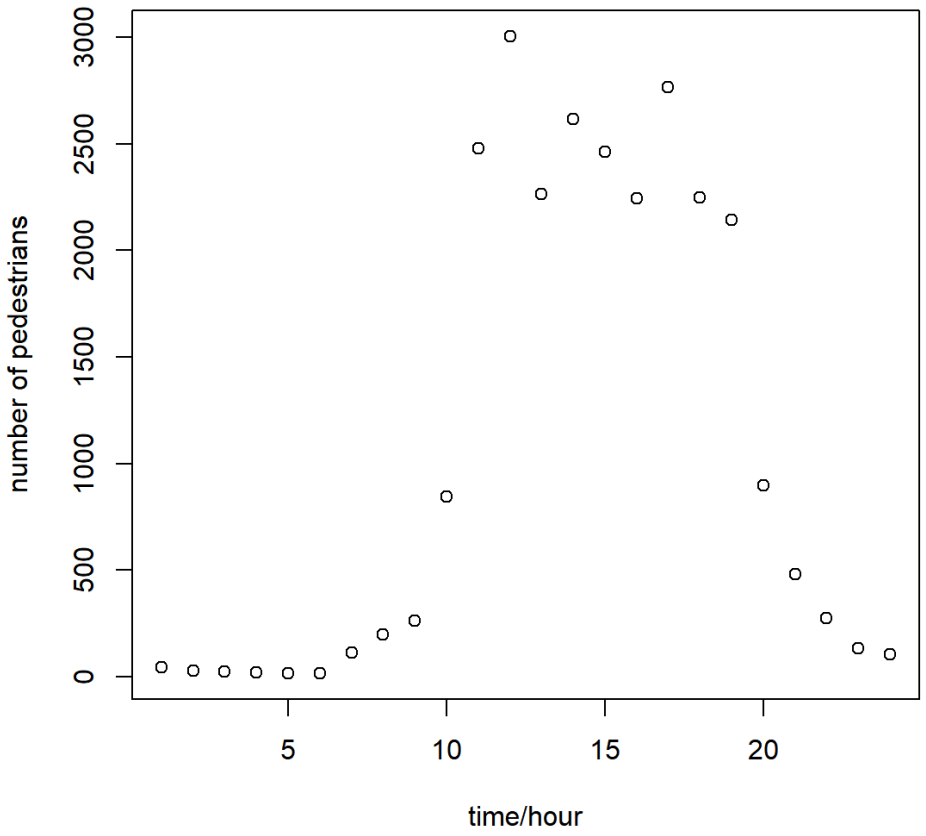
Factors

- Which factors influence the volume of pedestrians?
  - Weather (rain, cloud, snow)
  - Time (morning, noon, evening)
  - Temperature
  - Special events
  - Direction (Manhattan, Brooklyn)
  - Unknown factors

Methods

- Rules: Bayesian Rule
- Packages: Stan, ggplot, dpylr

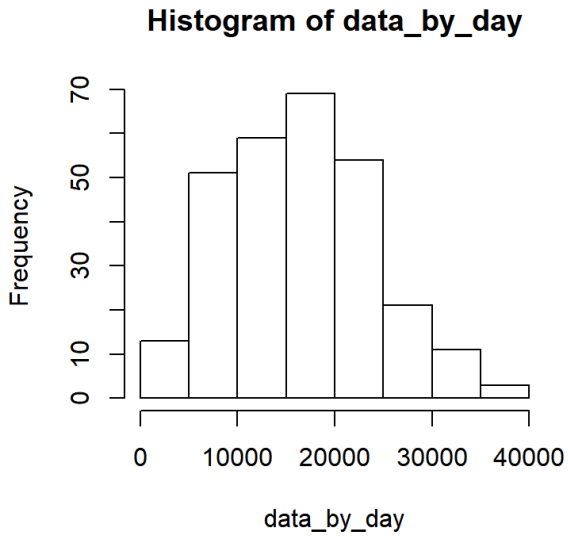
Daily Curve

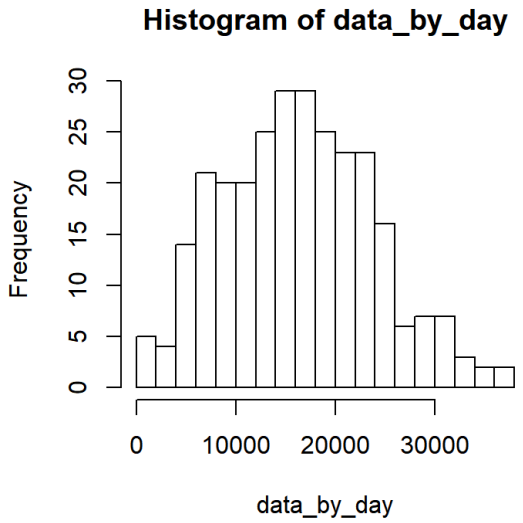


The volume of pedestrians fluctuates in a single day.

We can see that most people cross the bridge between 10am and 8pm.

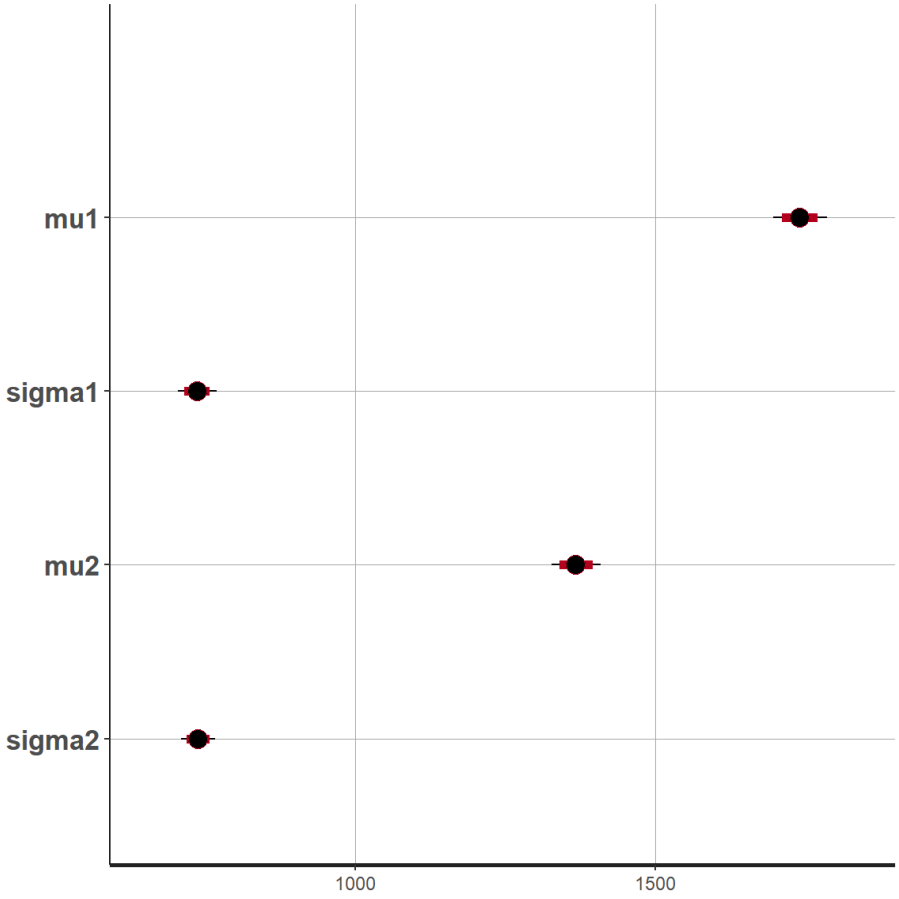
Which model we use?





- Histogram are drawn with different number of bars (same data).
- Gaussian distribution or Poisson distribution are both applicable.

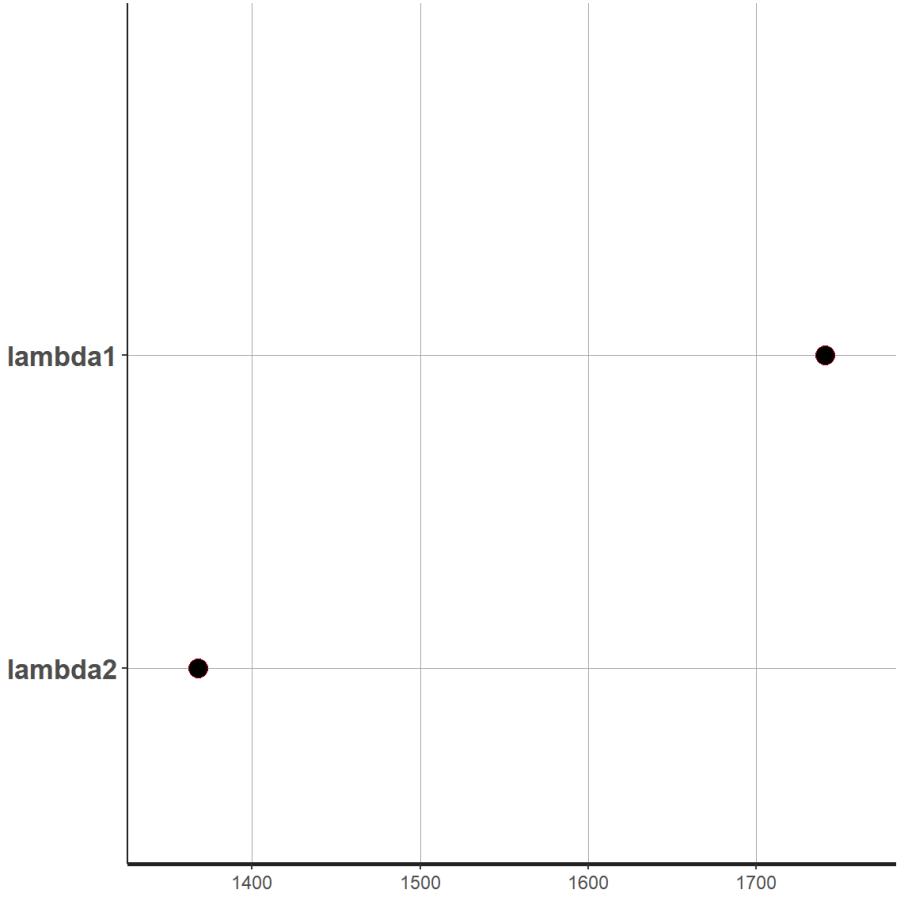
Gaussian Model for Weather



Good Weather ~ N(μ=1741, σ=736)

Bad Weather ~ N(μ=1368, σ=738)

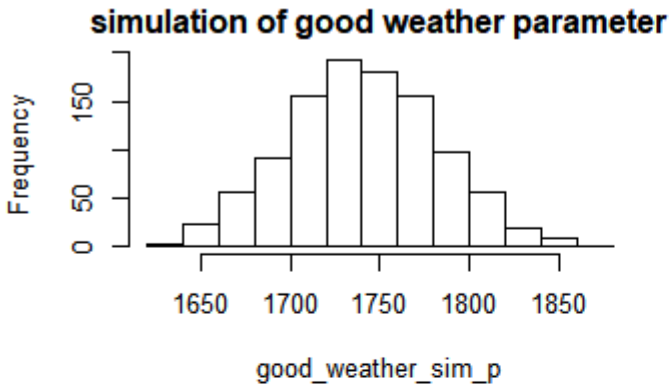
Poisson Model for Weather

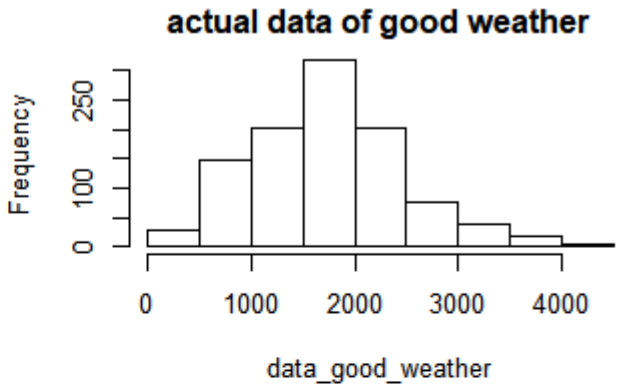


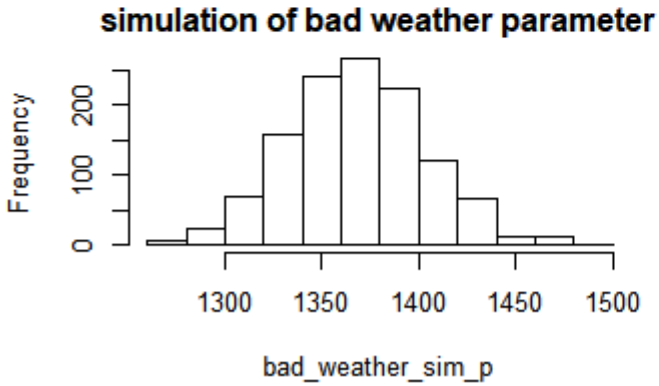
Good weather ~ Pois(λ=1741)

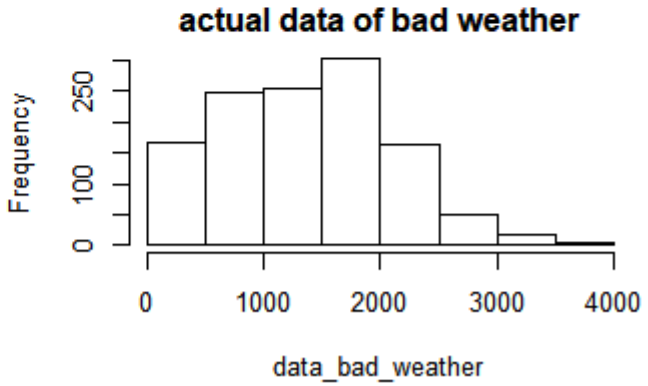
Bad weather ~ Pois(λ=1368)

Simulation for Weather

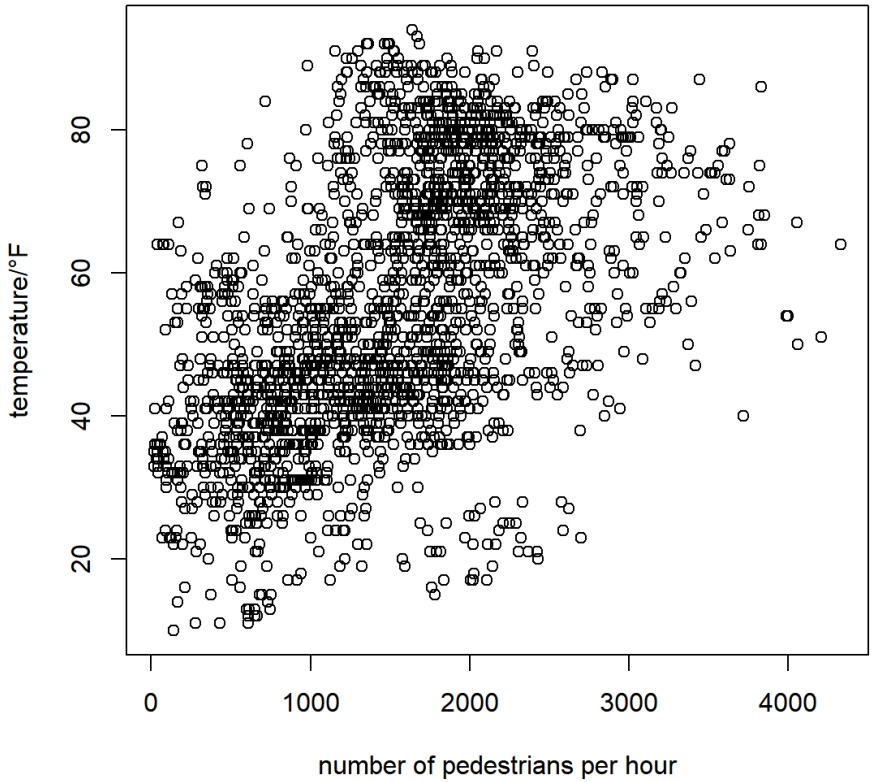






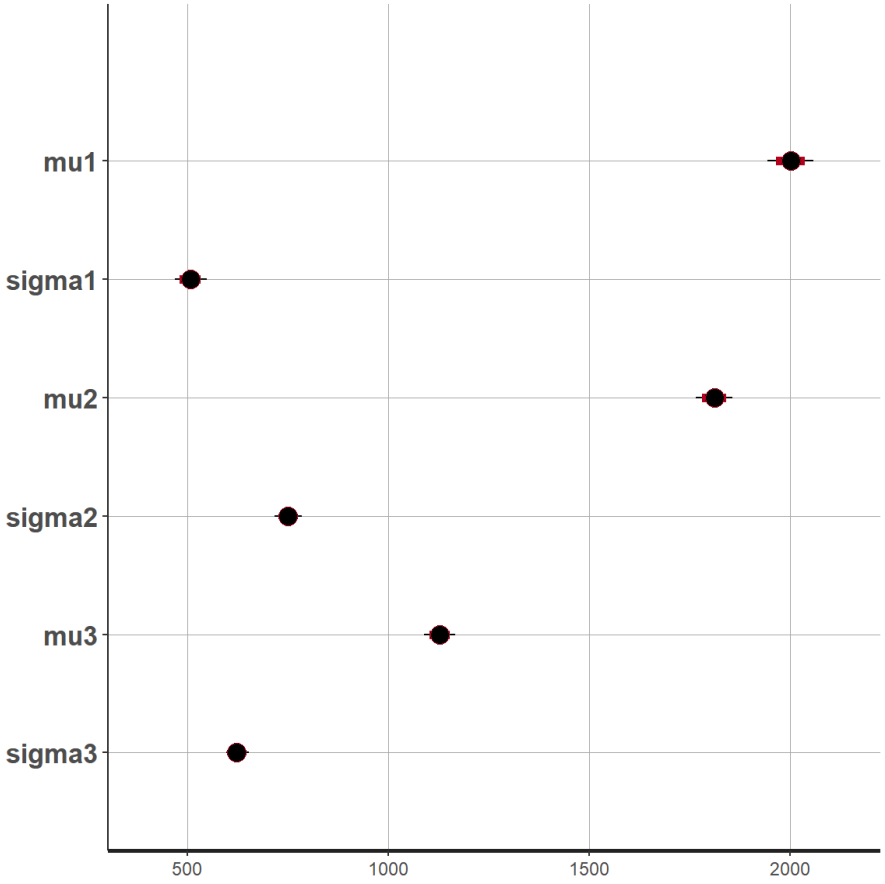


- Does Temperature Influence the Traffic?
- Yes



Higher temperature, more pedestrians

Gaussian Model for Weather

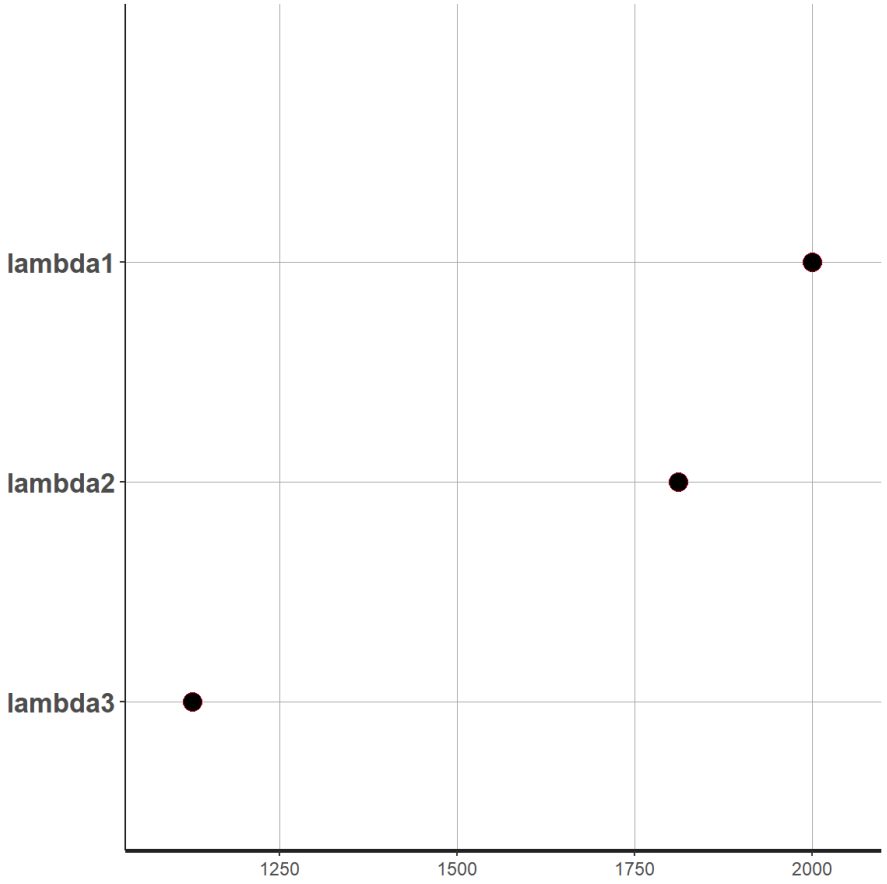


High Temperature ~ N(μ=2001, σ=507)

Medium Temperature ~ N(μ=1812, σ=749)

Low Temperature ~ N(μ=1128, σ=623)

Poisson Model for Weather



High Temperature ~ Pois(λ=2001)

Medium Temperature ~ Pois(λ=1812)

Low Temperature ~ Pois(λ=1128)

Simulation for Temeprature