

My title*

My subtitle if needed

First author

Another author

November 26, 2024

First sentence. Second sentence. Third sentence. Fourth sentence.

1 Introduction

Overview paragraph

Estimand paragraph

Results paragraph

Why it matters paragraph

Telegraphing paragraph: The remainder of this paper is structured as follows. Section 2....

2 Data

2.1 Overview

We use the statistical programming language R (R Core Team 2023).... Our data (Toronto Shelter & Support Services 2024).... Following Alexander (2023), we consider...

Overview text

2.2 Measurement

Some paragraphs about how we go from a phenomena in the world to an entry in the dataset.

*Code and data are available at: https://github.com/RohanAlexander/starter_folder.

2.3 Outcome variables

Add graphs, tables and text. Use sub-sub-headings for each outcome variable or update the subheading to be singular.

Some of our data is of penguins (?@fig-bills), from Horst, Hill, and Gorman (2020).

Talk more about it.

And also planes (?@fig-planes). (You can change the height and width, but don't worry about doing that until you have finished every other aspect of the paper - Quarto will try to make it look nice and the defaults usually work well once you have enough text.)

Talk way more about it.

2.4 Predictor variables

Add graphs, tables and text.

Use sub-sub-headings for each outcome variable and feel free to combine a few into one if they go together naturally.

3 Model

In this paper, a Bayesian logistic model will be utilized to investigate how factors of application type, appealing date and planning district can affect the final decisaion of the application committee.

The goal of our modelling strategy is twofold. Firstly,...

Here we briefly describe the Bayesian analysis model used to investigate...

Background details and diagnostics are included in Appendix [B](#).

3.1 Model set-up

Define y_i as the number of seconds that the plane remained aloft. Then β_i is the wing width and γ_i is the wing length, both measured in millimeters.

$$y_i | \mu_i, \sigma \sim \text{Normal}(\mu_i, \sigma) \quad (1)$$

$$\mu_i = \alpha + \beta_i + \gamma_i \quad (2)$$

$$\alpha \sim \text{Normal}(0, 2.5) \quad (3)$$

$$\beta \sim \text{Normal}(0, 2.5) \quad (4)$$

$$\gamma \sim \text{Normal}(0, 2.5) \quad (5)$$

$$\sigma \sim \text{Exponential}(1) \quad (6)$$

Combining all the components, the complete model can be expressed as:

$$\log \left(\frac{\hat{p}}{1 - \hat{p}} \right) = \beta_0 + \beta_1 \times \text{application type} + \beta_2 \times \text{submission date} + \beta_3 \times \text{planning district} \quad (7)$$

- \hat{p} : Decision outcome (1 = approval, 0 = refusal).
- β_0 : Intercept, representing the baseline log-odds of approval for the reference levels of the predictors.
- β_1 : Coefficients for `application_type` (dummy-coded, with CO as the reference category).
- β_2 : Coefficient for `date` (measured as the year of submission to capture temporal trends).
- β_3 : Coefficients for `planning_district` (dummy-coded, with North York as the reference category).

We run the model in R (R Core Team 2023) using the `rstanarm` package of Goodrich et al. (2022). We use the default priors from `rstanarm`.

3.1.1 Model justification

We expect a ... relationship between ... In particular...

We can use maths by including latex between dollar signs, for instance θ .

4 Results

Our results are summarized in Table [1](#).

Table 1: Explanatory models of flight time based on wing width and wing length

	First model
(Intercept)	−4.53 (0.88)
application_typeMV	−0.23 (0.12)
date	0.00 (0.00)
planning_districtNorth York	0.37 (0.14)
planning_districtScarborough	0.01 (0.18)
planning_districtToronto East York	0.17 (0.15)
Num.Obs.	1940
R2	0.023
Log.Lik.	−1227.099
ELPD	−1233.1
ELPD s.e.	14.7
LOOIC	2466.3
LOOIC s.e.	29.5
WAIC	2466.2
RMSE	0.47

5 Discussion

5.1 First discussion point

If my paper were 10 pages, then should be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

5.2 Second discussion point

Please don't use these as sub-heading labels - change them to be what your point actually is.

5.3 Third discussion point

5.4 Weaknesses and next steps

Weaknesses and next steps should also be included.

Appendix

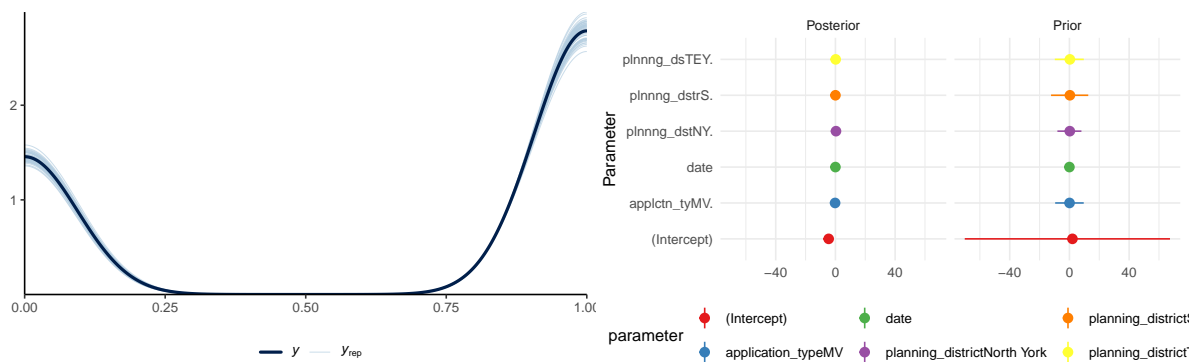
A Additional data details

B Model details

B.1 Posterior predictive check

In Figure 1a we implement a posterior predictive check. This shows...

In Figure 1b we compare the posterior with the prior. This shows...



(a) Posterior prediction check

(b) Comparing the posterior with the prior

Figure 1: Examining how the model fits, and is affected by, the data

B.2 Diagnostics

Figure 2a is a trace plot. It shows... This suggests...

Figure 2b is a Rhat plot. It shows... This suggests...

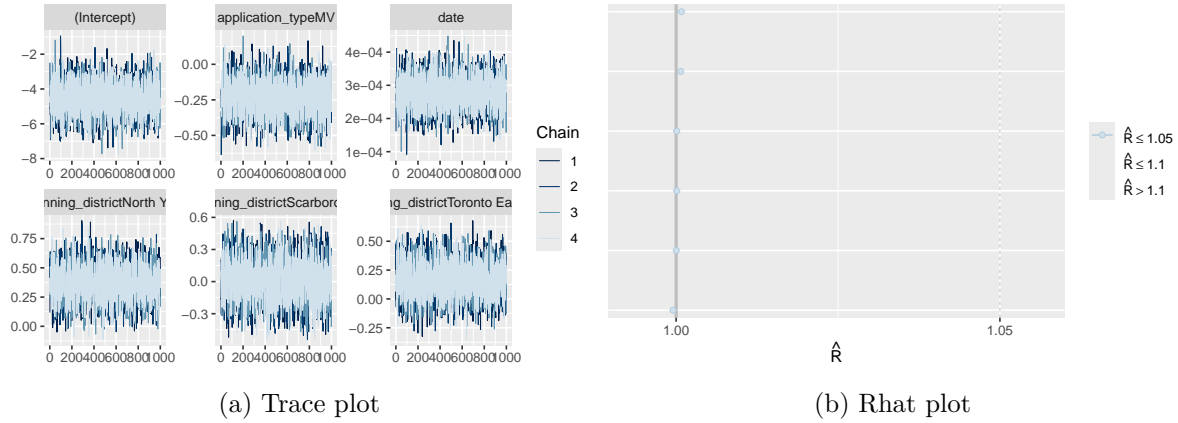


Figure 2: Checking the convergence of the MCMC algorithm

References

- Alexander, Rohan. 2023. *Telling Stories with Data*. Chapman; Hall/CRC. <https://tellingstorieswithdata.com/>.
- Goodrich, Ben, Jonah Gabry, Imad Ali, and Sam Brilleman. 2022. “rstanarm: Bayesian applied regression modeling via Stan.” <https://mc-stan.org/rstanarm/>.
- Horst, Allison Marie, Alison Presmanes Hill, and Kristen B Gorman. 2020. *palmerpenguins: Palmer Archipelago (Antarctica) penguin data*. <https://doi.org/10.5281/zenodo.3960218>.
- R Core Team. 2023. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. <https://www.R-project.org/>.
- Toronto Shelter & Support Services. 2024. *Deaths of Shelter Residents*. <https://open.toronto.ca/dataset/deaths-of-shelter-residents/>.