An example Latex document

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Abstract

Here is where you would put your Abstract. This analysis examines data from 1995 to 2018.

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1 Introduction

Here is where you would put your Introduction[1].

Here is an example of a citation to the Lacum *et al* (2014) paper that describes the seven key elements of scientific paper [1]. Other papers on this theme are References [2, 3].

Here is an example of how to insert an extra positive (or negative) vertical space in the text:

This space is separated 1cm below the preceding line.

Here is an example of how to insert an extra positive (or negative) horizontal space in the text.

2 Methods and Materials

2.1 Data

If your analysis involves data, here is where you would thoroughly describe it.

This is an example of a bulletted itemized list:

- Item 1
- Item 2
- Item 3

Here is an example of an enumerated itemized list:

1. Item 1
2. Item 2
3. Item 3

Here is an example of an descriptive itemized list:

Item 1: describe item 1

Item 2: describe item 2

Item 3: describe item 3

[1] This is an example of a footnote

2.2 Mathematical Model

If your analysis involves a mathematical model, here is where you would describe it.

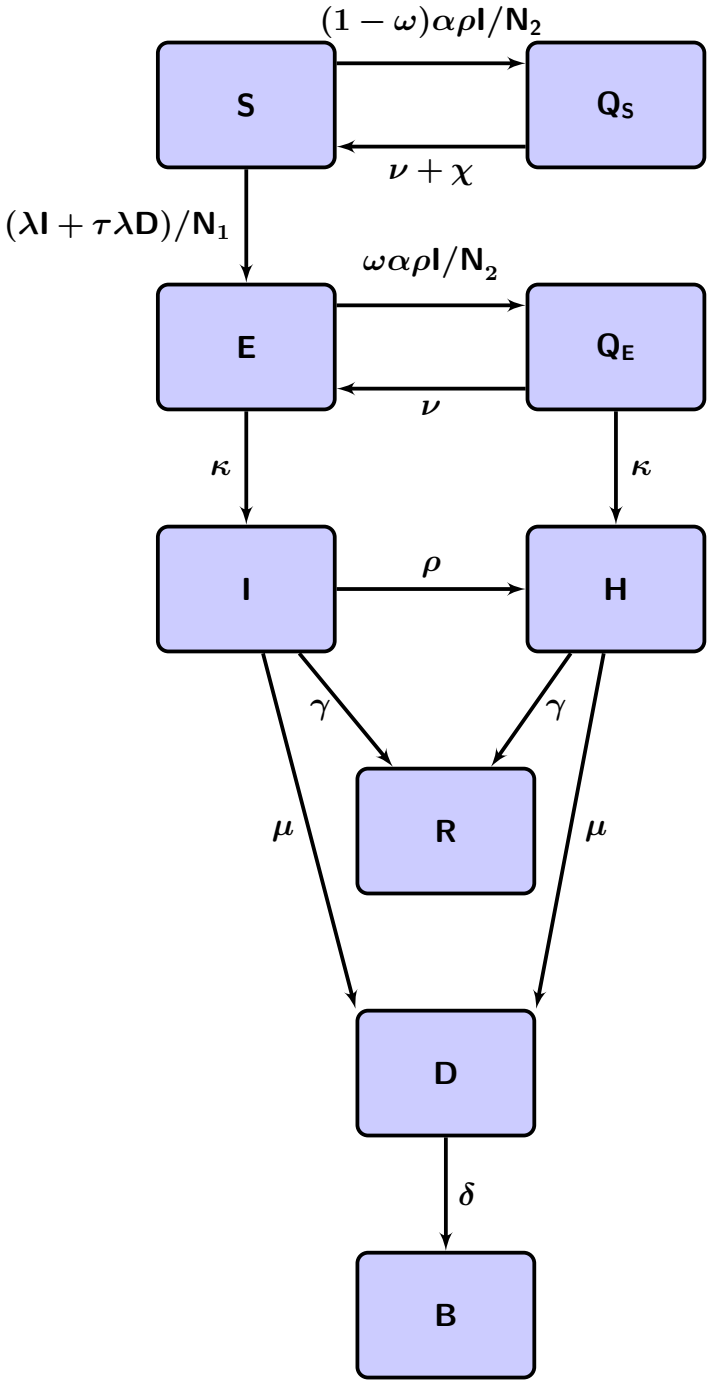
This is an example of a set of equations:

$$\begin{aligned} S' &= -\beta SI/N \\ I' &= +\beta SI/N - \gamma I \\ R' &= +\gamma I \end{aligned} \tag{1}$$

Here is an example of an inline equation $S' = -\beta SI/N$.

Here is a reference to Equation 1 in the text. Note that when you reference specific equations, tables, or paper sections in the text, you always capitalise those nouns. Here is a reference to Section 2.2.

Here is an example of a compartmental model diagram, using the tikz package in Latex:


$(1-\omega)\alpha\rho I/N_2$
S
Q_S
$\nu+\chi$
$(\lambda I+\tau\lambda D)/N_1$
$\omega\alpha\rho I/N_2$
E
Q_E
ν
κ
κ
I
ρ
H
γ
γ
R
μ
μ
D
δ
B

2.3 Statistical methods

If your analysis involves any kind of specialised statistical methodology, here is where you would describe it.

To account for potential over-dispersion in count data involved our analyses, we utilized Negative Binomial likelihood fits [4]. The probability mass function (PMF) of the Negative Binomial distribution for observing k counts when λ are expected is [4]

$$f(k|\lambda,\alpha) = \frac{\Gamma(\alpha+k)}{k!\Gamma(\alpha)}\left(\frac{\lambda}{\lambda+\alpha}\right)^{k}\left(1+\frac{\lambda}{\alpha}\right)^{-\alpha} \qquad \lambda>0,\alpha>0, \quad (2)$$

where α is the over-dispersion parameter. The mean of the PMF is λ. When $\alpha \to \infty$ the Poisson distribution is obtained, and when $\alpha \to 0$ (i.e. highly over-dispersed data) the log-series distribution is obtained [4]. The Akaike Information Criterion (AIC) was used for selection of the appropriate model [5].

Given a set of M observations of the number of violent crimes per day, k_i, with $i = 1, ..., M$ the likelihood of the observations is

$$\mathcal{L} = \prod_{i=1}^{M} f(k_i|\lambda(t_i),\alpha), \quad (3)$$

where $\lambda(t_i)$ is the expected number of counts on day t_i. The best-fit model values used in the calculation of the $\lambda(t_i)$ are the values that maximize this likelihood [6].

3 Results

Here, without discussion, is where you present your results, either within a paragraph, or as a figure, or a table.

Here is an example of a reference to Figure 1 in the text. Here is an example to a reference to Table 1, which is delimited by vertical lines. Table 2 is a rotated table in landscape format, with every second line coloured blue to aid in readability.

The one standard deviation uncertainty in my data was 0.998.

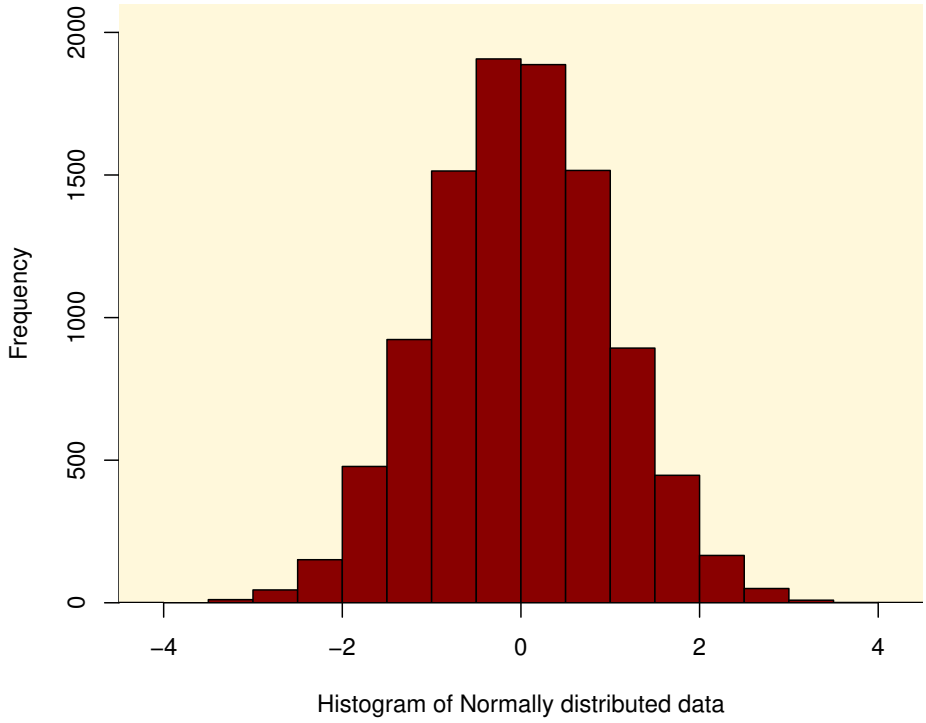


Figure 1: Histogram of Normally distributed data

Table 1: Here is an example of a table delimited by vertical lines.

	Percentage increase in casualties	p-value
Effect A	17% $[16\%, 18\%]$	$(p<0.001)$
Effect B	74% $[53\%, 97\%]$	$(p<0.001)$
Effect C	141% $[93\%, 197\%]$	$(p<0.001)$

Table 2: This is an example of a sideways table, with every second row coloured blue.

	Percentage increase in casualties	p-value
Each extra firearm used by perpetrator	12% $[7\%, 17\%]$	$(p < 0.001)$
Use of assault rifle by perpetrator	83% $[59\%, 109\%]$	$(p < 0.001)$
Perpetrator mental illness	129% $[83\%, 184\%]$	$(p < 0.001)$
End of FAWB	176% $[57\%, 352\%]$	$(p < 0.001)$
Beginning of changed response tactics	-49% $[-71\%, -16\%]$	$(p = 0.010)$

4 Discussion

Here is where you would discuss your results, putting them in context of past research. You would also discuss the weaknesses of the study methodology.

5 Summary

Here is where you would briefly summarise the results of the study and the conclusions and implications that can be drawn.

References

[1] Edwin B Van Lacum, Miriam A Ossevoort, and Martin J Goedhart. A teaching strategy with a focus on argumentation to improve undergraduate students ability to read research articles. *CBELife Sciences Education*, 13(2):253–264, 2014.

[2] Edwin van Lacum, Marcel Koeneman, Miriam Ossevoort, and Martin Goedhart. Scientific argumentation model (sam): A heuristic for reading research articles by science students. In *Insights from Research in Science Teaching and Learning*, pages 169–183. Springer, 2016.

[3] Emmanouela Seiradakis and Ioannis Spantidakis. Training undergraduate engineering students to read research articles: A qualitative think-aloud study. In *Global Engineering Education Conference (EDUCON), 2018 IEEE*, pages 1208–1213. IEEE, 2018.

[4] James O Lloyd-Smith. Maximum likelihood estimation of the negative binomial dispersion parameter for highly overdispersed data, with applications to infectious diseases. *PloS one*, 2(2):e180, 2007.

[5] Hirotugu Akaike. A new look at the statistical model identification. *IEEE transactions on automatic control*, 19(6):716–723, 1974.

[6] Glen Cowan. *Statistical data analysis*. Oxford university press, 1998.