Title: Title of your manuscript

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Your abstract.

Introduction

This is a manuscript template for Quarto markdown that uses R packages `targets` (Landau 2021) and `stantargets`. `R/functions.R` contains R codes that I often use.

Examples

Equations

A centered parameterization of the Eight Schools model (Eq. 1; Gelman et al. (2013)).

$$\begin{aligned} \mu &\sim N(0, 5) \\ \tau &\sim HalfCauchy(0, 5) \\ \theta_j &\sim N(\mu, \tau) \\ y_j &\sim N(\theta_j, \sigma_j) \end{aligned} \tag{1}$$

You can group multiple lines of equations to a single equation label.

In a non-centered parameterization of the Eq. 1, we fit latent Gaussian variables instead of directly estimating θ_j:

$$\tilde{\theta}_j \sim N(0, 1) \tag{2}$$

$$\theta_j = \mu + \tau\tilde{\theta}_j. \tag{3}$$

You can label each line too.

The half-cauchy distribution in the Eq. 1 can be further rewritten as following:

$$\begin{aligned} \tilde{\tau} &\sim U(0, \pi/2) \\ \tau &= 5tan(\tilde{\tau}) \end{aligned}$$

You can also write equations without labels.

Source codes can be loaded and printed, which may be useful for supporting information.

```
data {
  int<lower=0> J;
  vector[J] y;
  vector<lower=0>[J] sigma;
}

parameters {
  real mu;
  real<lower=0,upper=pi()/2> tau_unif;
  real theta_tilde[J];
}

transformed parameters {
  real<lower=0> tau;
  real theta[J];
  tau = 5 * tan(tau_unif);
  for (j in 1:J)
    theta[j] = mu + tau * theta_tilde[j];
}

model {
  mu ~ normal(0, 5);
  theta_tilde ~ std_normal();
  y ~ normal(theta, sigma);
}

generated quantities {
  vector[J] log_lik;
  for (j in 1:J) log_lik[j] = normal_lpdf(y[j] | theta[j],
   ↪  sigma[j]);
}
```

Tables

It's easier to use `kableExtra` than manually writing markdown tables. Here is the R code chunk to produce Table 1.

```
schools_data <- tibble(
  School = LETTERS[1:8],
  `Estimated treatment effect, $y_j$`  = c(28, 8, -3, 7, -1,
   ↪  1, 18, 12),
  `Standard error of effect estimate, $\\sigma_j$` = c(15,
   ↪  10, 16, 11, 9, 11, 10, 18))

schools_data |>
  kbl(booktabs = TRUE, escape = FALSE) |>
    kable_styling(latex_options = "striped")
```

Figures

I currently prefer to use `![]()` to insert images (Fig. 1; Fig. 2) rather than using R code chunks. It's easy for cross-references and putting greek letters. The path for Fig. 1 can be `figs/theta_tau_line.png` or `..figs/theta_tau_line.png` depending on where you are working. When you run `make` (i.e., Makefile), the first one is the correct path. When you use `render` in VSCode, the second one is correct. Using `here::here` is useful to specify the path to figures.

Cross-reference from different files

We can also do cross-reference from different files, which is useful to refer figures and tables in supporting information.

Fig. S`\ref{fig-hist}`.

The above command will render the following

Fig. S1.

You need these in the YAML.

```
\usepackage{xr}
\externaldocument{si}
```

This only works on LaTeX.

Parameterized text

The posterior median of treatment effect for school A (θ_1) is `` `r get_post_para(para, "theta[1]", "q50")` `` with the 95% credible interval of [`` `r get_post_para(para, "theta[1]", "q2.5")` ,`r get_post_para(para, "theta[1]", "q97.5", digits = 1, nsmall = 1)`].

The above text will be rendered as following:

The posterior median of treatment effect for school A (θ_1) is 5.68 with the 95% credible interval of [-3.10 , 19.2].

References

Gelman, A., J. B. Carlin, H. S. Stern, D. B. Dunson, A. Vehtari, and D. B. Rubin. 2013. Bayesian Data Analysis, Third Edition. Chapman & Hall/CRC, Boca Raton, FL, USA.

Landau, W. M. 2021. The targets R package: A dynamic Make-like function-oriented pipeline toolkit for reproducibility and high-performance computing. Journal of Open Source Software 6:2959.

Tables

Table 1: Observed effects of special preparation on SAT-V scores in eight randomized experiments

School	Estimated treatment effect, y_j	Standard error of effect estimate, σ_j
A	28	15
B	8	10
C	-3	16
D	7	11
E	-1	9
F	1	11
G	18	10
H	12	18

Estimates are based on separate analyses for the eight experiments (Gelman et al. 2013).

- I don't know how to add greek letters in the caption but at least I can put greek letters outside the caption (e.g., θ_j).
- There is a bug for table cross-reference (Section titles appear after tables (PDF) #2264).

Figures

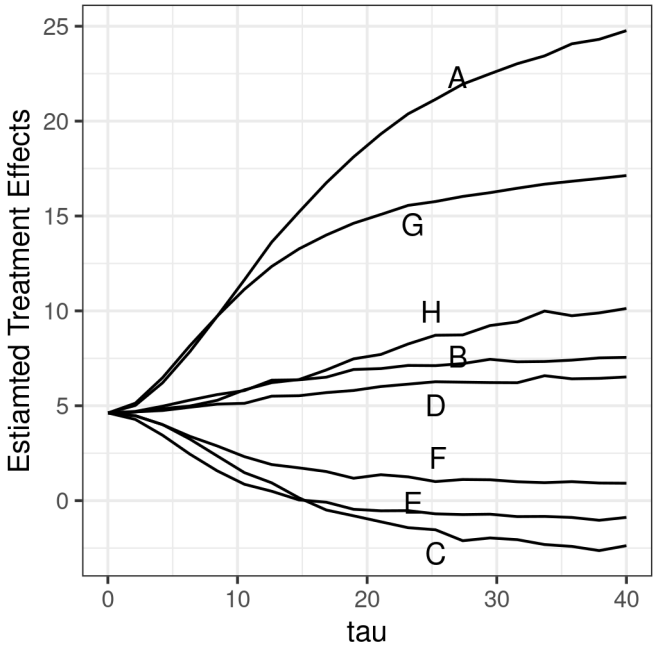

Fig. 1: The famous plot from Gelman et al. (2013). Conditional posterior means of treatment effects, $E(\theta_j|\tau, y)$ is plotted against the between school standard deviation τ. The stan model was fitted using dynamic branches.

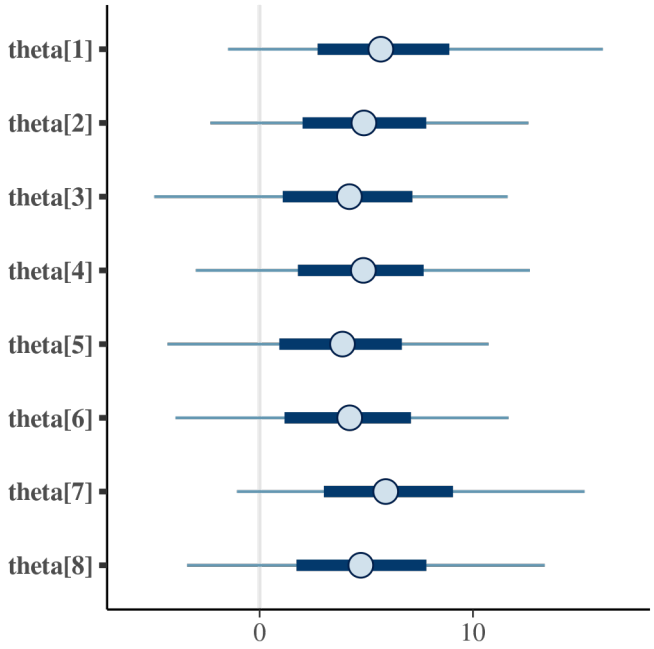

Fig. 2: The posterior means, 50% and 90% credible intervals of treatment effects (θ_j).