Exercises: k-fold cross validation and LOO (Vasishth/Nicenboim)

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1 Exercise 1

Run the full 10-fold cross validation procedure for the Chinese RC data (in the code provided in the lecture notes, we only ran 2 folds to illustrate the procedure).

2 Exercise 2

Load the Chinese replication experiment.

```
crit_rep<-read.table("data/gibsonwu2012datarepeat.txt")
head(crit_rep)

##      subj item condition pos   rt      region
## 9    1m1   15   obj-ext   8  832 head noun
## 20   1m1    8  subj-ext   8 2131 head noun
## 33   1m1   11   obj-ext   8  553 head noun
## 46   1m1   10  subj-ext   8 1091 head noun
## 62   1m1   16  subj-ext   8  598 head noun
## 75   1m1   14  subj-ext   8  645 head noun

colnames(crit_rep)[3]<-"type"
crit_rep<-crit_rep[,c(1,2,3,5)]
head(crit_rep)

##      subj item     type   rt
## 9    1m1   15  obj-ext   832
## 20   1m1    8 subj-ext  2131
## 33   1m1   11  obj-ext   553
## 46   1m1   10 subj-ext  1091
## 62   1m1   16 subj-ext   598
## 75   1m1   14 subj-ext   645
```

Find out whether M0 or M1 has a better predictive performance on this data.

3 Exercise 3

Load the English relative clause data and preprocess it to get to the critical data:

```r
library(tidyverse)

## -- Attaching packages -------------- tidyverse 1.2.1 --
## v tibble  2.0.1     v purrr  0.2.5
## v tidyr  0.8.2     v dplyr  0.7.8
## v readr  1.1.1     v stringr 1.3.1
## v tibble  2.0.1     v forcats 0.3.0
## Warning:  package 'tibble' was built under R version 3.5.2
## -- Conflicts ---------------- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()

## Grodner and Gibson, this is a comma separated vector file
gge1<-read.csv("data/GrodnerGibson2005E1.csv", header=TRUE)
gge1 <- gge1 %>% filter(item != 0)

gge1 <- gge1 %>% mutate(word_positionnew = ifelse(item != 15 &
                        word_position > 10, word_position-1,
                        word_position))



## isolate critical data:
rDat3 <- subset(gge1, ( condition == "objgap" & word_position == 6 ) |
            ( condition == "subjgap" & word_position == 4 ))
```

Determine whether M0 or M1 is the better model using PSIS-LOO, and do the same comparison using the k-fold cross-validation procedure. Check whether both methods give the same conclusion.

4 Exercise 4

Optional: Generate fake data that actually has a mixture distribution (use the function I provide for generating fake data), and then test if the M1 model comes out showing a better fit than M0 using k-fold cross validation and PSIS-loo.