Exercise 5: Functions and Loops

Dillon Laaker

11/5/2021

Thank you Veronica for assistance with some of the functions and with formulating the loops for part 2.

Functions

1. Create a function for the mean, median, and standard deviation.

```
national <- read.csv("national.csv")

library(tidyverse)

## Function for the mean ##

M <- function(x) {
  y <- (sum(x))/length(x)
  return(y)

}

## Function for the standard deviation ##

SD <- function(x) {
  y <- sqrt(sum((x - M(x))^2) / (length(x) - 1))
  return(y)
}

## Function for the median ##

MD <- function(lst) {
  a <- length(lst)
  b <- sort(lst)
  y <- ifelse(a%%2==1,b[(a+1)/2], M(b[n/2+0:1]))
  return(y)
}
```

2. Create a function that finds the mean and excludes the lowest and highest value.

```
M_exclude <- function(x) {
  x1 <- sort(x)
  y1 <- x1[-c(1, length(x1))]
```

```
  y2 <- M(x1)
  return(y2)
}
```

3. Apply the functions to the Christianity variables.

```
## Mean ##

M(national$christianity_protestant)
```

```
## [1] 2157768
```

```
M(national$christianity_romancatholic)
```

```
## [1] 5233370
```

```
M(national$christianity_easternorthodox)
```

```
## [1] 1118405
```

```
M(national$christianity_anglican)
```

```
## [1] 373176
```

```
M(national$christianity_other)
```

```
## [1] 703896.7
```

```
M(national$christianity_all)
```

```
## [1] 9586615
```

```
## Standard Deviation ##


SD(national$christianity_protestant)
```

```
## [1] 9404066
```

```
SD(national$christianity_romancatholic)
```

```
## [1] 13592649
```

```
SD(national$christianity_easternorthodox)
```

```
## [1] 6573343
```

```
SD(national$christianity_anglican)
```

```
## [1] 2426476
```

```
SD(national$christianity_other)
```

```
## [1] 2489590
```

```
SD(national$christianity_all)
```

```
## [1] 22495214
```

```
## Median ##


MD(national$christianity_protestant)
```

```
## [1] 120748
```

```
MD(national$christianity_romancatholic)
```

```
## [1] 424768
```

```
MD(national$christianity_easternorthodox)
```

```
## [1] 415
```

```
MD(national$christianity_anglican)
```

```
## [1] 107
```

```
MD(national$christianity_other)
```

```
## [1] 15792
```

```
MD(national$christianity_all)
```

```
## [1] 1974000
```

```
## Mean that excludes values ##

M_exclude(national$christianity_protestant)
```

```
## [1] 2157768
```

```
M_exclude(national$christianity_romancatholic)
```

```
## [1] 5233370
```

```
M_exclude(national$christianity_easternorthodox)
```

```
## [1] 1118405
```

```
M_exclude(national$christianity_anglican)
```

```
## [1] 373176
```

```
M_exclude(national$christianity_other)
```

```
## [1] 703896.7
```

```
M_exclude(national$christianity_all)
```

```
## [1] 9586615
```

4. Write a function that lists all the unique years with more than 300,000 Christians in total.

```
unique_years <- function(C) {
  y <- C %>% group_by(year, state) %>%
  summarise(C1 = christianity_all > 300000) %>%
  filter(C1 == T)
 return(y)
}

y3 <- unique_years(national)
```

Loops/apply

1. Write a loop to find how many variables there are per observation.

```
LV <- rep(0, ncol(national))
for (i in 1:length(national)) {
  LV[i] <- ncol(national[i, ])
}

LV
```

```
##  [1] 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79
## [26] 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79
## [51] 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79 79
## [76] 79 79 79 79
```

2. Write a loop to find the mean number of Protestant Christians in each country (i.e., the state column). Then use an apply family function to do the same.

```
MP <- data.frame(state = unique(national$state, prots = NA))

for (i in 1:length(MP$state)) {
  state1 <- MP[i,1]
  y <- national %>% filter(state == state1) %>%
    summarise(mean = mean(christianity_protestant, na.rm = TRUE)) %>%
    pull(mean)
  MP[i, 2] <- y

}
```

3. Check the column type for each variable.

```
sapply(national, class)
```

```
##                         year                        state
##                    "integer"                     "factor"
##                         code      christianity_protestant
##                     "factor"                    "integer"
##   christianity_romancatholic christianity_easternorthodox
##                    "integer"                    "integer"
##        christianity_anglican           christianity_other
##                    "integer"                    "integer"
##             christianity_all             judaism_orthodox
##                    "integer"                    "integer"
##         judaism_conservative               judaism_reform
##                    "integer"                    "integer"
##                judaism_other                  judaism_all
##                    "integer"                    "integer"
##                  islam_sunni                  islam_shi.a
##                    "integer"                    "integer"
##                 islam_ibadhi          islam_nationofislam
##                    "integer"                    "integer"
##                islam_alawite              islam_ahmadiyya
##                    "integer"                    "integer"
##                  islam_other                    islam_all
##                    "integer"                    "integer"
##            buddhism_mahayana           buddhism_theravada
##                    "integer"                    "integer"
##               buddhism_other                 buddhism_all
##                    "integer"                    "integer"
##           zoroastrianism_all                hinduism_all
##                    "integer"                    "integer"
##                  sikhism_all                   shinto_all
##                    "integer"                    "integer"
##                  baha.i_all                   taoism_all
##                    "integer"                    "integer"
##                 jainism_all              confucianism_all
##                    "integer"                    "integer"
##               syncretism_all                 animism_all
##                    "integer"                    "integer"
##               noreligion_all            otherreligion_all
##                    "integer"                    "integer"
```

```
##                religion_all                  population
##                   "integer"                   "integer"
##          protestant_percent       romancatholic_percent
##                   "numeric"                   "numeric"
##     easternorthodox_percent           anglican_percent
##                   "numeric"                   "numeric"
##   otherchristianity_percent        christianity_percent
##                   "numeric"                   "numeric"
##            orthodox_percent        conservative_percent
##                   "numeric"                   "numeric"
##              reform_percent        otherjudaism_percent
##                   "numeric"                   "numeric"
##             judaism_percent               sunni_percent
##                   "numeric"                   "numeric"
##               shi.a_percent              ibadhi_percent
##                   "numeric"                   "numeric"
##       nationofislam_percent             alawite_percent
##                   "integer"                   "numeric"
##           ahmadiyya_percent          otherislam_percent
##                   "numeric"                   "numeric"
##               islam_percent           mahayana_percent
##                   "numeric"                   "numeric"
##           theravada_percent       otherbuddhism_percent
##                   "numeric"                   "numeric"
##            buddhism_percent      zoroastrianism_percent
##                   "numeric"                   "numeric"
##            hinduism_percent             sikhism_percent
##                   "numeric"                   "numeric"
##              shinto_percent              baha.i_percent
##                   "numeric"                   "numeric"
##              taoism_percent             jainism_percent
##                   "numeric"                   "numeric"
##        confucianism_percent          syncretism_percent
##                   "numeric"                   "numeric"
##             animism_percent          noreligion_percent
##                   "numeric"                   "numeric"
##       otherreligion_percent         religion_sumpercent
##                   "numeric"                   "numeric"
##               total_percent               dual_religion
##                   "numeric"                   "integer"
##                 source_code
##                   "integer"
```