R Programming Johns Hopkins University Coursera

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1 Plot the 30-day mortality rates for heart attack

```
library(tidyverse) #data wrangling
```

```
## ─ Attaching packages ─────────────────────────────── tidyverse 1.3.1 ─
```

```
## ✓ ggplot2 3.3.5     ✓ purrr   0.3.4
## ✓ tibble  3.1.2     ✓ dplyr   1.0.7
## ✓ tidyr   1.1.3     ✓ stringr 1.4.0
## ✓ readr   1.4.0     ✓ forcats 0.5.1
```

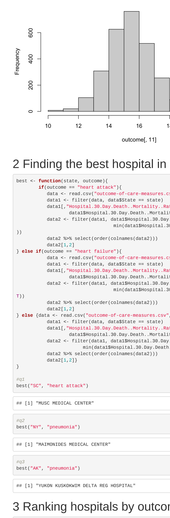
```
## ─ Conflicts ──────────────────────────── tidyverse_conflicts() ─
## ✖ dplyr::filter() masks stats::filter()
## ✖ dplyr::lag()    masks stats::lag()
```

```
outcome <- read.csv("outcome-of-care-measures.csv", colClasses = "character") #read data into R studio
```

```
outcome[,11] <- as.numeric(outcome[,11])
```

```
## Warning: 强制改变过程中产生了NA
```

```
hist(outcome[,11])
```



2 Finding the best hospital in a state

```
best <- function(state, outcome){
        if(outcome == "heart attack"){
                data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                data1 <- filter(data, data$dState == state)
                data2 <- data1[order(data1$Hospital.Name),]
                data3$Rank <- suppressWarnings(as.numeric(rank(data1$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Attack,na.last = "keep", ties.method = "first")))
        }
        else if(outcome == "heart failure"){
                data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                data1 <- filter(data, data$dState == state)
                data2 <- data1[order(data1$Hospital.Name),]
                data3$Rank <- suppressWarnings(as.numeric(rank(data1$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure,na.last = "keep", ties.method = "first")))
        }
        else if(outcome == "pneumonia"){
                data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                data1 <- filter(data, data$dState == state)
                data2 <- data1[order(data1$Hospital.Name),]
                data3$Rank <- suppressWarnings(as.numeric(rank(data1$Hospital.30-Day.Death..Mortality..Rates.from.Pneumonia,na.last = "keep", ties.method = "first")))
        }
        else{
                stop("invalid outcome")
        }
        data4 <- cbind(data2,data3$Rank)
        data5 <- data4[order(data4$data3.Rank, data4$Hospital.Name),]
        data6 <- data5[,c(2,7)]
        return(data6[1,1])
}
```

```
#q1
best("SC", "heart attack")
```

```
## [1] "MUSC MEDICAL CENTER"
```

```
#q2
best("NY", "pneumonia")
```

```
## [1] "MAIMONIDES MEDICAL CENTER"
```

```
#q3
best("AK", "pneumonia")
```

```
## [1] "YUKON KUSKOKWIM DELTA REG HOSPITAL"
```

3 Ranking hospitals by outcome in a state

```
rankhospital_worst <- function(state, outcome){
        if(outcome == "heart attack"){
                data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                data1 <- filter(data, data$dState == state)
                data$Rank <- NA
                data[,"Hospital.30-Day.Death..Mortality..Rates.from.Heart.Attack"] <- suppressWarnings(as.numeric(data$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Attack))
                data1 <- data[order(data$Hospital.Name),]
                data1$Rank <- suppressWarnings(as.numeric(rank(data1$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Attack,na.last = "keep", ties.method = "first")))
        }
        else if(outcome == "heart failure"){
                data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                data1 <- filter(data, data$dState == state)
                data$Rank <- NA
                data[,"Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure"] <- suppressWarnings(as.numeric(data$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure))
                data1 <- data[order(data$Hospital.Name),]
                data1$Rank <- suppressWarnings(as.numeric(rank(data1$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure,na.last = "keep", ties.method = "first")))
        }
        else if(outcome == "pneumonia"){
                data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                data1 <- filter(data, data$dState == state)
                data$Rank <- NA
                data[,"Hospital.30-Day.Death..Mortality..Rates.from.Pneumonia"] <- suppressWarnings(as.numeric(data$Hospital.30-Day.Death..Mortality..Rates.from.Pneumonia))
                data1 <- data[order(data$Hospital.Name),]
                data1$Rank <- suppressWarnings(as.numeric(rank(data1$Hospital.30-Day.Death..Mortality..Rates.from.Pneumonia,na.last = "keep", ties.method = "first")))
        }
        else{data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                data1 <- filter(data, data$dState == state)
                data$Rank <- NA
                data[,"Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure"] <- suppressWarnings(as.numeric(data$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure))
                data1 <- data[order(data$Hospital.Name),]
                data1$Rank <- suppressWarnings(as.numeric(rank(data1$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure,na.last = "keep", ties.method = "first")))
        }
        data2 <- filter(data1, data1$Rank == max(data1$Rank, na.rm = T))
        data3[1,2]
}
```

```
#q4
rankhospital_worst(state = "MC", outcome = "heart attack")
```

```
## [1] "WAYNE MEMORIAL HOSPITAL"
```

```
rankhospital<- function(state, outcome, num){
        if(outcome == "heart attack"){
                data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                data1 <- filter(data, data$dState == state)
                data$Rank <- NA
                data[,"Hospital.30-Day.Death..Mortality..Rates.from.Heart.Attack"] <- suppressWarnings(as.numeric(data$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Attack))
                data1 <- data[order(data$Hospital.Name),]
                data1$Rank <- suppressWarnings(as.numeric(rank(data$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Attack,na.last = "keep", ties.method = "first")))
        }
        else if(outcome == "pneumonia"){
                data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                data1 <- filter(data, data$dState == state)
                data$Rank <- NA
                data[,"Hospital.30-Day.Death..Mortality..Rates.from.Pneumonia"] <- suppressWarnings(as.numeric(data$Hospital.30-Day.Death..Mortality..Rates.from.Pneumonia))
                data1 <- data[order(data$Hospital.Name),]
                data1$Rank <- as.numeric(rank(data$Hospital.30-Day.Death..Mortality..Rates.from.Pneumonia,
                                              na.last = "keep", ties.method = "first"))
        }else{data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                data1 <- filter(data, data$dState == state)
                data$Rank <- NA
                data[,"Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure"] <- suppressWarnings(as.numeric(data$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure))
                data1 <- data[order(data$Hospital.Name),]
                data1$Rank <- suppressWarnings(as.numeric(rank(data$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure,na.last = "keep", ties.method = "first")))
        }
        data2 <- filter(data1, data1$Rank == num)
        data3[1,2]
}
```

```
#q5
rankhospital(state = "WA", outcome = "heart attack", num=7)
```

```
## [1] "YAKIMA VALLEY MEMORIAL HOSPITAL"
```

```
#q6
rankhospital("TX", "pneumonia", 10)
```

```
## [1] "SETON SMITHVILLE REGIONAL HOSPITAL"
```

```
#q7
rankhospital("NY", "heart attack", 7)
```

```
## [1] "BELLEVUE HOSPITAL CENTER"
```

4 Ranking hospitals in all states

```
data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
list1 <- unique(sort(strsplit(data$dState, " ")))
```

```
r <- data.frame()
r1 <- data.frame()
```

```
rankall <- function(outcome,num){
        if(outcome == "heart attack"){
                data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                for( in list1){
                        data1 <- filter(data, data$dState == i)
                        data1$Rank <- NA
                        data1[,"Hospital.30-Day.Death..Mortality..Rates.from.Heart.Attack"] <- suppressWarnings(as.numeric(data1$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Attack))
                        data1 <- data1[order(data1$Hospital.Name),]
                        data1$Rank <- suppressWarnings(as.numeric(rank(data1$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Attack,
                                                                       na.last = "keep",ties.method = "first")))
                        data2 <- filter(data1, data1$Rank == num)
                        hospital <- data2[1,2]
                        state <- data2[1,7]
                        r <- rbind(r, hospital)
                        r1 <- rbind(r1, state)
                        r2 <- cbind(r,r1)
                }
        }else if(outcome == "heart failure"){
                data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                for( in list1){
                        data1 <- filter(data, data$dState == i)
                        data1$Rank <- NA
                        data1[,"Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure"] <- suppressWarnings(as.numeric(data1$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure))
                        data1 <- data1[order(data1$Hospital.Name),]
                        data1$Rank <- suppressWarnings(as.numeric(rank(data1$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure,
                                                                       na.last = "keep",ties.method = "first")))
                        data2 <- filter(data1, data1$Rank == num)
                        hospital <- data2[1,2]
                        state <- data2[1,7]
                        r <- rbind(r, hospital)
                        r1 <- rbind(r1, state)
                        r2 <- cbind(r,r1)
                }
        }else{data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                list1 <- unique(sort(strsplit(data$dState, " ")))
                for( in list1){
                        data1 <- filter(data, data$dState == i)
                        data1$Rank <- NA
                        data1[,"Hospital.30-Day.Death..Mortality..Rates.from.Pneumonia"] <- suppressWarnings(as.numeric(data1$Hospital.30-Day.Death..Mortality..Rates.from.Pneumonia))
                        data1 <- data1[order(data1$Hospital.Name),]
                        data1$Rank <- suppressWarnings(as.numeric(rank(data1$Hospital.30-Day.Death..Mortality..Rates.from.Pneumonia,
                                                                       na.last = "keep",ties.method = "first")))
                        data2 <- filter(data1, data1$Rank == num)
                        hospital <- data2[1,2]
                        state <- data2[1,7]
                        r <- rbind(r, hospital)
                        r1 <- rbind(r1, state)
                        r2 <- cbind(r,r1)
                }
        }
        return(r2)
}
```

```
rankall_worst <- function(outcome){
        if(outcome == "heart attack"){
                data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                for( in list1){
                        data1 <- filter(data, data$dState == i)
                        data1$Rank <- NA
                        data1[,"Hospital.30-Day.Death..Mortality..Rates.from.Heart.Attack"] <- suppressWarnings(as.numeric(data1$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Attack))
                        data1 <- data1[order(data1$Hospital.Name),]
                        data1$Rank <- suppressWarnings(as.numeric(rank(data1$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Attack,
                                                                       na.last = "keep",ties.method = "first")))
                        data2 <- filter(data1, data1$Rank == max(data1$Rank, na.rm = T))
                        hospital <- data2[1,2]
                        state <- data2[1,7]
                        r <- rbind(r, hospital)
                        r1 <- rbind(r1, state)
                        r2 <- cbind(r,r1)
                }
        }else if(outcome == "heart failure"){
                data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                for( in list1){
                        data1 <- filter(data, data$dState == i)
                        data1$Rank <- NA
                        data1[,"Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure"] <- suppressWarnings(as.numeric(data1$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure))
                        data1 <- data1[order(data1$Hospital.Name),]
                        data1$Rank <- suppressWarnings(as.numeric(rank(data1$Hospital.30-Day.Death..Mortality..Rates.from.Heart.Failure,
                                                                       na.last = "keep",ties.method = "first")))
                        data2 <- filter(data1, data1$Rank == max(data1$Rank, na.rm = T))
                        hospital <- data2[1,2]
                        state <- data2[1,7]
                        r <- rbind(r, hospital)
                        r1 <- rbind(r1, state)
                        r2 <- cbind(r,r1)
                }
        }else{data <- read.csv("outcome-of-care-measures.csv", colClasses = "character")
                list1 <- unique(sort(strsplit(data$dState, " ")))
                for( in list1){
                        data1 <- filter(data, data$dState == i)
                        data1$Rank <- NA
                        data1[,"Hospital.30-Day.Death..Mortality..Rates.from.Pneumonia"] <- suppressWarnings(as.numeric(data1$Hospital.30-Day.Death..Mortality..Rates.from.Pneumonia))
                        data1 <- data1[order(data1$Hospital.Name),]
                        data1$Rank <- suppressWarnings(as.numeric(rank(data1$Hospital.30-Day.Death..Mortality..Rates.from.Pneumonia,
                                                                       na.last = "keep",ties.method = "first")))
                        data2 <- filter(data1, data1$Rank == max(data1$Rank, na.rm = T))
                        hospital <- data2[1,2]
                        state <- data2[1,7]
                        r <- rbind(r, hospital)
                        r1 <- rbind(r1, state)
                        r2 <- cbind(r,r1)
                }
        }
        return(r2)
}
```

```
#q8
q8 <- rankall(outcome = "heart attack", num = 4)
filter(q8, q8$X.AL.=="AL")
```

X.GEORGIANA.HOSPITAL.	X.AL.
<chr>	<chr>
CASTLE MEDICAL CENTER	HI

1 row

```
#q9
q9 <- rankall_worst(outcome = "pneumonia")
filter(q9, q9$X.AL. =="NJ")
```

X.JACKSONVILLE.MEDICAL.CENTER.	X.AL.
<chr>	<chr>
BERGEN REGIONAL MEDICAL CENTER	NJ

1 row

```
#q10
q10 <- rankall(outcome = "heart failure", num = 10)
filter(q10, q10$X.AL. =="NV")
```

X.SPRINGHILL.MEDICAL.CENTER.	X.AL.
<chr>	<chr>
RENOWN SOUTH MEADOWS MEDICAL CENTER	NV

1 row