ProgrammingAssignment3 Coursera - Best Hospital

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# Programming Assignment 3

### Plot the 30-day mortality rates for heart attack

#Load the csv file into R  
outcome <- read.csv("outcome-of-care-measures.csv", colClasses = "character")  
head(outcome)

## Provider.Number Hospital.Name  
## 1 010001 SOUTHEAST ALABAMA MEDICAL CENTER  
## 2 010005 MARSHALL MEDICAL CENTER SOUTH  
## 3 010006 ELIZA COFFEE MEMORIAL HOSPITAL  
## 4 010007 MIZELL MEMORIAL HOSPITAL  
## 5 010008 CRENSHAW COMMUNITY HOSPITAL  
## 6 010010 MARSHALL MEDICAL CENTER NORTH  
## Address.1 Address.2 Address.3 City State  
## 1 1108 ROSS CLARK CIRCLE DOTHAN AL  
## 2 2505 U S HIGHWAY 431 NORTH BOAZ AL  
## 3 205 MARENGO STREET FLORENCE AL  
## 4 702 N MAIN ST OPP AL  
## 5 101 HOSPITAL CIRCLE LUVERNE AL  
## 6 8000 ALABAMA HIGHWAY 69 GUNTERSVILLE AL  
## ZIP.Code County.Name Phone.Number  
## 1 36301 HOUSTON 3347938701  
## 2 35957 MARSHALL 2565938310  
## 3 35631 LAUDERDALE 2567688400  
## 4 36467 COVINGTON 3344933541  
## 5 36049 CRENSHAW 3343353374  
## 6 35976 MARSHALL 2565718000  
## Hospital.30.Day.Death..Mortality..Rates.from.Heart.Attack  
## 1 14.3  
## 2 18.5  
## 3 18.1  
## 4 Not Available  
## 5 Not Available  
## 6 Not Available  
## Comparison.to.U.S..Rate...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Attack  
## 1 No Different than U.S. National Rate  
## 2 No Different than U.S. National Rate  
## 3 No Different than U.S. National Rate  
## 4 Number of Cases Too Small  
## 5 Number of Cases Too Small  
## 6 Number of Cases Too Small  
## Lower.Mortality.Estimate...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Attack  
## 1 12.1  
## 2 14.7  
## 3 14.8  
## 4 Not Available  
## 5 Not Available  
## 6 Not Available  
## Upper.Mortality.Estimate...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Attack  
## 1 17.0  
## 2 23.0  
## 3 21.8  
## 4 Not Available  
## 5 Not Available  
## 6 Not Available  
## Number.of.Patients...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Attack  
## 1 666  
## 2 44  
## 3 329  
## 4 14  
## 5 9  
## 6 22  
## Footnote...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Attack  
## 1   
## 2   
## 3   
## 4 number of cases is too small (fewer than 25) to reliably tell how well the hospital is performing  
## 5 number of cases is too small (fewer than 25) to reliably tell how well the hospital is performing  
## 6 number of cases is too small (fewer than 25) to reliably tell how well the hospital is performing  
## Hospital.30.Day.Death..Mortality..Rates.from.Heart.Failure  
## 1 11.4  
## 2 15.2  
## 3 11.3  
## 4 13.6  
## 5 13.8  
## 6 12.5  
## Comparison.to.U.S..Rate...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Failure  
## 1 No Different than U.S. National Rate  
## 2 Worse than U.S. National Rate  
## 3 No Different than U.S. National Rate  
## 4 No Different than U.S. National Rate  
## 5 No Different than U.S. National Rate  
## 6 No Different than U.S. National Rate  
## Lower.Mortality.Estimate...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Failure  
## 1 9.5  
## 2 12.2  
## 3 9.1  
## 4 10.0  
## 5 9.9  
## 6 9.9  
## Upper.Mortality.Estimate...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Failure  
## 1 13.7  
## 2 18.8  
## 3 13.9  
## 4 18.2  
## 5 18.7  
## 6 15.6  
## Number.of.Patients...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Failure  
## 1 741  
## 2 234  
## 3 523  
## 4 113  
## 5 53  
## 6 163  
## Footnote...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Failure  
## 1   
## 2   
## 3   
## 4   
## 5   
## 6   
## Hospital.30.Day.Death..Mortality..Rates.from.Pneumonia  
## 1 10.9  
## 2 13.9  
## 3 13.4  
## 4 14.9  
## 5 15.8  
## 6 8.7  
## Comparison.to.U.S..Rate...Hospital.30.Day.Death..Mortality..Rates.from.Pneumonia  
## 1 No Different than U.S. National Rate  
## 2 No Different than U.S. National Rate  
## 3 No Different than U.S. National Rate  
## 4 No Different than U.S. National Rate  
## 5 No Different than U.S. National Rate  
## 6 Better than U.S. National Rate  
## Lower.Mortality.Estimate...Hospital.30.Day.Death..Mortality..Rates.from.Pneumonia  
## 1 8.6  
## 2 11.3  
## 3 11.2  
## 4 11.6  
## 5 11.4  
## 6 6.8  
## Upper.Mortality.Estimate...Hospital.30.Day.Death..Mortality..Rates.from.Pneumonia  
## 1 13.7  
## 2 17.0  
## 3 15.8  
## 4 19.0  
## 5 21.5  
## 6 11.0  
## Number.of.Patients...Hospital.30.Day.Death..Mortality..Rates.from.Pneumonia  
## 1 371  
## 2 372  
## 3 836  
## 4 239  
## 5 61  
## 6 315  
## Footnote...Hospital.30.Day.Death..Mortality..Rates.from.Pneumonia  
## 1   
## 2   
## 3   
## 4   
## 5   
## 6   
## Hospital.30.Day.Readmission.Rates.from.Heart.Attack  
## 1 19.0  
## 2 Not Available  
## 3 17.8  
## 4 Not Available  
## 5 Not Available  
## 6 Not Available  
## Comparison.to.U.S..Rate...Hospital.30.Day.Readmission.Rates.from.Heart.Attack  
## 1 No Different than U.S. National Rate  
## 2 Number of Cases Too Small  
## 3 No Different than U.S. National Rate  
## 4 Number of Cases Too Small  
## 5 Number of Cases Too Small  
## 6 Number of Cases Too Small  
## Lower.Readmission.Estimate...Hospital.30.Day.Readmission.Rates.from.Heart.Attack  
## 1 16.6  
## 2 Not Available  
## 3 14.9  
## 4 Not Available  
## 5 Not Available  
## 6 Not Available  
## Upper.Readmission.Estimate...Hospital.30.Day.Readmission.Rates.from.Heart.Attack  
## 1 21.7  
## 2 Not Available  
## 3 21.5  
## 4 Not Available  
## 5 Not Available  
## 6 Not Available  
## Number.of.Patients...Hospital.30.Day.Readmission.Rates.from.Heart.Attack  
## 1 728  
## 2 21  
## 3 342  
## 4 1  
## 5 4  
## 6 13  
## Footnote...Hospital.30.Day.Readmission.Rates.from.Heart.Attack  
## 1   
## 2 number of cases is too small (fewer than 25) to reliably tell how well the hospital is performing  
## 3   
## 4 number of cases is too small (fewer than 25) to reliably tell how well the hospital is performing  
## 5 number of cases is too small (fewer than 25) to reliably tell how well the hospital is performing  
## 6 number of cases is too small (fewer than 25) to reliably tell how well the hospital is performing  
## Hospital.30.Day.Readmission.Rates.from.Heart.Failure  
## 1 23.7  
## 2 22.5  
## 3 19.8  
## 4 27.1  
## 5 24.7  
## 6 23.9  
## Comparison.to.U.S..Rate...Hospital.30.Day.Readmission.Rates.from.Heart.Failure  
## 1 No Different than U.S. National Rate  
## 2 No Different than U.S. National Rate  
## 3 Better than U.S. National Rate  
## 4 No Different than U.S. National Rate  
## 5 No Different than U.S. National Rate  
## 6 No Different than U.S. National Rate  
## Lower.Readmission.Estimate...Hospital.30.Day.Readmission.Rates.from.Heart.Failure  
## 1 21.3  
## 2 19.2  
## 3 17.2  
## 4 22.4  
## 5 19.9  
## 6 20.1  
## Upper.Readmission.Estimate...Hospital.30.Day.Readmission.Rates.from.Heart.Failure  
## 1 26.5  
## 2 26.1  
## 3 22.9  
## 4 31.9  
## 5 30.2  
## 6 28.2  
## Number.of.Patients...Hospital.30.Day.Readmission.Rates.from.Heart.Failure  
## 1 891  
## 2 264  
## 3 614  
## 4 135  
## 5 59  
## 6 173  
## Footnote...Hospital.30.Day.Readmission.Rates.from.Heart.Failure  
## 1   
## 2   
## 3   
## 4   
## 5   
## 6   
## Hospital.30.Day.Readmission.Rates.from.Pneumonia  
## 1 17.1  
## 2 17.6  
## 3 16.9  
## 4 19.4  
## 5 18.0  
## 6 18.7  
## Comparison.to.U.S..Rate...Hospital.30.Day.Readmission.Rates.from.Pneumonia  
## 1 No Different than U.S. National Rate  
## 2 No Different than U.S. National Rate  
## 3 No Different than U.S. National Rate  
## 4 No Different than U.S. National Rate  
## 5 No Different than U.S. National Rate  
## 6 No Different than U.S. National Rate  
## Lower.Readmission.Estimate...Hospital.30.Day.Readmission.Rates.from.Pneumonia  
## 1 14.4  
## 2 15.0  
## 3 14.7  
## 4 15.9  
## 5 14.0  
## 6 15.7  
## Upper.Readmission.Estimate...Hospital.30.Day.Readmission.Rates.from.Pneumonia  
## 1 20.4  
## 2 20.6  
## 3 19.5  
## 4 23.2  
## 5 22.8  
## 6 22.2  
## Number.of.Patients...Hospital.30.Day.Readmission.Rates.from.Pneumonia  
## 1 400  
## 2 374  
## 3 842  
## 4 254  
## 5 56  
## 6 326  
## Footnote...Hospital.30.Day.Readmission.Rates.from.Pneumonia  
## 1   
## 2   
## 3   
## 4   
## 5   
## 6

nrow(outcome)

## [1] 4706

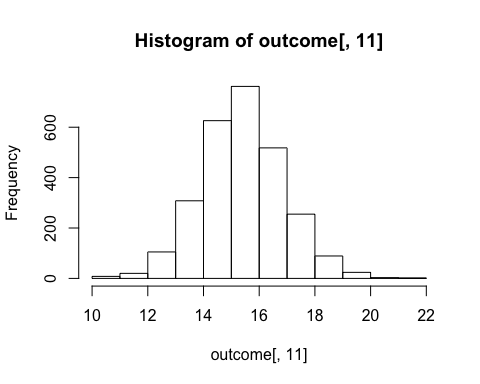
ncol(outcome)

## [1] 46

names(outcome)

## [1] "Provider.Number"   
## [2] "Hospital.Name"   
## [3] "Address.1"   
## [4] "Address.2"   
## [5] "Address.3"   
## [6] "City"   
## [7] "State"   
## [8] "ZIP.Code"   
## [9] "County.Name"   
## [10] "Phone.Number"   
## [11] "Hospital.30.Day.Death..Mortality..Rates.from.Heart.Attack"   
## [12] "Comparison.to.U.S..Rate...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Attack"   
## [13] "Lower.Mortality.Estimate...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Attack"   
## [14] "Upper.Mortality.Estimate...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Attack"   
## [15] "Number.of.Patients...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Attack"   
## [16] "Footnote...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Attack"   
## [17] "Hospital.30.Day.Death..Mortality..Rates.from.Heart.Failure"   
## [18] "Comparison.to.U.S..Rate...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Failure"   
## [19] "Lower.Mortality.Estimate...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Failure"  
## [20] "Upper.Mortality.Estimate...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Failure"  
## [21] "Number.of.Patients...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Failure"   
## [22] "Footnote...Hospital.30.Day.Death..Mortality..Rates.from.Heart.Failure"   
## [23] "Hospital.30.Day.Death..Mortality..Rates.from.Pneumonia"   
## [24] "Comparison.to.U.S..Rate...Hospital.30.Day.Death..Mortality..Rates.from.Pneumonia"   
## [25] "Lower.Mortality.Estimate...Hospital.30.Day.Death..Mortality..Rates.from.Pneumonia"   
## [26] "Upper.Mortality.Estimate...Hospital.30.Day.Death..Mortality..Rates.from.Pneumonia"   
## [27] "Number.of.Patients...Hospital.30.Day.Death..Mortality..Rates.from.Pneumonia"   
## [28] "Footnote...Hospital.30.Day.Death..Mortality..Rates.from.Pneumonia"   
## [29] "Hospital.30.Day.Readmission.Rates.from.Heart.Attack"   
## [30] "Comparison.to.U.S..Rate...Hospital.30.Day.Readmission.Rates.from.Heart.Attack"   
## [31] "Lower.Readmission.Estimate...Hospital.30.Day.Readmission.Rates.from.Heart.Attack"   
## [32] "Upper.Readmission.Estimate...Hospital.30.Day.Readmission.Rates.from.Heart.Attack"   
## [33] "Number.of.Patients...Hospital.30.Day.Readmission.Rates.from.Heart.Attack"   
## [34] "Footnote...Hospital.30.Day.Readmission.Rates.from.Heart.Attack"   
## [35] "Hospital.30.Day.Readmission.Rates.from.Heart.Failure"   
## [36] "Comparison.to.U.S..Rate...Hospital.30.Day.Readmission.Rates.from.Heart.Failure"   
## [37] "Lower.Readmission.Estimate...Hospital.30.Day.Readmission.Rates.from.Heart.Failure"   
## [38] "Upper.Readmission.Estimate...Hospital.30.Day.Readmission.Rates.from.Heart.Failure"   
## [39] "Number.of.Patients...Hospital.30.Day.Readmission.Rates.from.Heart.Failure"   
## [40] "Footnote...Hospital.30.Day.Readmission.Rates.from.Heart.Failure"   
## [41] "Hospital.30.Day.Readmission.Rates.from.Pneumonia"   
## [42] "Comparison.to.U.S..Rate...Hospital.30.Day.Readmission.Rates.from.Pneumonia"   
## [43] "Lower.Readmission.Estimate...Hospital.30.Day.Readmission.Rates.from.Pneumonia"   
## [44] "Upper.Readmission.Estimate...Hospital.30.Day.Readmission.Rates.from.Pneumonia"   
## [45] "Number.of.Patients...Hospital.30.Day.Readmission.Rates.from.Pneumonia"   
## [46] "Footnote...Hospital.30.Day.Readmission.Rates.from.Pneumonia"

## Warning: NAs introduced by coercion



### Finding the best hospital in a state

best <- function(state,outcome)  
{  
 #Read the data from csv file  
 outcome\_dataset <- read.csv("outcome-of-care-measures.csv", colClasses = "character")  
 #Read the subset of data required  
 outcome\_subset <- subset(outcome\_dataset, select = c(2,7,11,17,23))  
 #Assign simple column names  
 colnames(outcome\_subset) <- c("hospital name", "state", "heart attack", "heart failure",   
 "pneumonia")  
 #Check for state and outcome validity  
 if(!str\_to\_upper(state) %in% outcome\_subset$state)   
 {  
 stop("Invalid State")  
 }  
 else if(!(outcome %in% colnames(outcome\_subset[,3:5])))  
 {  
 stop("Invalid Outcome")  
 }  
 else {  
 #Get row indices of dataset matching the state  
 outcome\_rows <- which(outcome\_subset[,"state"]==str\_to\_upper(state))  
 #Get matching row indices dataset   
 outcome\_filtered\_dataset <- outcome\_subset[outcome\_rows,]  
 #Converting the outcome variable to numeric as loaded as factor by default  
 outcome\_numeric <- as.numeric(outcome\_filtered\_dataset[,outcome])  
 #Calculate the minimum value of the variable  
 outcome\_min <- min(outcome\_numeric, na.rm = TRUE)  
 #Using row indice number to filter  
 final\_result <- outcome\_filtered\_dataset[, "hospital name"][which(outcome\_numeric == outcome\_min)]  
 best\_hospital <- final\_result[order(final\_result)]  
 }  
 best\_hospital  
}

best("TX", "heart attack")

## [1] "CYPRESS FAIRBANKS MEDICAL CENTER"

best("TX", "heart failure")

## [1] "FORT DUNCAN MEDICAL CENTER"

best("MD", "heart attack")

## [1] "JOHNS HOPKINS HOSPITAL, THE"

best("MD", "pneumonia")

## [1] "GREATER BALTIMORE MEDICAL CENTER"

best("SC", "heart attack")

## [1] "MUSC MEDICAL CENTER"

best("NY", "pneumonia")

## [1] "MAIMONIDES MEDICAL CENTER"

best("AK", "pneumonia")

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

#Below calls are to check for invalid results  
#best("MD", "dog bite")  
#best("BB", "heart attack")  
#best("NY", "hert attack")