SAP - projekt - Milijarderi

Uspjeh učenika u nastavi

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Uvod

Pitanja:

1. Ima li neki kontinent statistički značajno više miljarda?
2. Jesu li milijarderi koji su nasljedili bogastvo statistički značajno bogatiji od onih koji nisu?
3. Možete li iz danih varijabli predvidjeti njihovo bogatstvo?
4. Kada biste birali karijeru isključivo prema kriteriju da se obogatite, koju biste industriju izabrali?

Dodatna pitanja:

5. ???

Deskriptivna analiza

```
# Pomoćna funkcija za izbacivanje stršećih vrijednosti
remove_outliers <- function(data, data_column) {
  quartiles <- quantile(data_column, probs=c(.25, .75), na.rm = FALSE)
  IQR <- IQR(data_column)
  Lower <- quartiles[1] - 1.5*IQR
  Upper <- quartiles[2] + 1.5*IQR

  return(subset(data, data_column >= Lower & data_column <= Upper))
}

cat('\n Dimenzija podataka: ', dim(bill_data))
```

```
##
##  Dimenzija podataka:  2614 22
```

```
for (col_name in names(bill_data)){
  if (sum(is.na(bill_data[,col_name])) > 0){
    cat('Ukupno nedostajućih vrijednosti za varijablu'
        ,col_name, ': ', sum(is.na(bill_data[,col_name])),'\n')
  }
}
```

```
## Ukupno nedostajućih vrijednosti za varijablu company.name :  38
## Ukupno nedostajućih vrijednosti za varijablu company.relationship :  46
## Ukupno nedostajućih vrijednosti za varijablu company.sector :  23
```

```
## Ukupno nedostajućih vrijednosti za varijablu company.type :  36
## Ukupno nedostajućih vrijednosti za varijablu demographics.gender :  34
## Ukupno nedostajućih vrijednosti za varijablu wealth.type :  22
## Ukupno nedostajućih vrijednosti za varijablu wealth.how.category :  1
## Ukupno nedostajućih vrijednosti za varijablu wealth.how.industry :  1
```

Postoje podaci koji nedostaju. Što s njima?

Pitanja

1. Ima li neki kontinent statistički značajno više miljarda?

2. Jesu li milijarderi koji su nasljedili bogastvo statistički značajno bogatiji od onih koji nisu?

```
# Učitavanje podataka iz excel datoteke

inherited = bill_data[bill_data$wealth.how.inherited!="not inherited",]
print(inherited)
```

```
## # A tibble: 926 x 22
##    name       rank  year compa~1 compa~2 compa~3 compa~4 compa~5 demog~6 demog~7
##    <chr>     <dbl> <dbl>   <dbl> <chr>   <chr>   <chr>   <chr>     <dbl> <chr>
##  1 Oeri Hof~     3  1996    1896 F. Hof~ <NA>    pharma~ new           0 <NA>
##  2 Walter T~     6  1996    1963 Sun Hu~ Relati~ real e~ new           0 male
##  3 Charles ~     6  2014    1940 Koch i~ relati~ Oil re~ new          78 male
##  4 David Ko~     6  2014    1940 Koch i~ relati~ Oil re~ new          73 male
##  5 Jim Walt~     7  2001    1962 Walmart relati~ retail  new          53 male
##  6 Yoshiaki~     8  1996    1894 Seibu ~ relati~ real e~ aquired      61 male
##  7 John Wal~     8  2001    1962 Walmart relati~ retail  new          55 male
##  8 Theo and~     9  1996    1913 Aldi N~ Relati~ grocer~ new           0 male
##  9 S Robson~     9  2001    1962 Walmart relati~ retail  new          57 male
## 10 Christy ~     9  2014    1962 Walmart relati~ retail  new          59 female
## # ... with 916 more rows, 12 more variables: location.citizenship <chr>,
## #   `location.country code` <chr>, location.gdp <dbl>, location.region <chr>,
## #   wealth.type <chr>, `wealth.worth in billions` <dbl>,
## #   wealth.how.category <chr>, `wealth.how.from emerging` <chr>,
## #   wealth.how.industry <chr>, wealth.how.inherited <chr>,
## #   `wealth.how.was founder` <chr>, `wealth.how.was political` <chr>, and
## #   abbreviated variable names 1: company.founded, 2: company.name, ...
```

```
non_inherited = bill_data[bill_data$wealth.how.inherited=="not inherited",]
print(non_inherited)
```

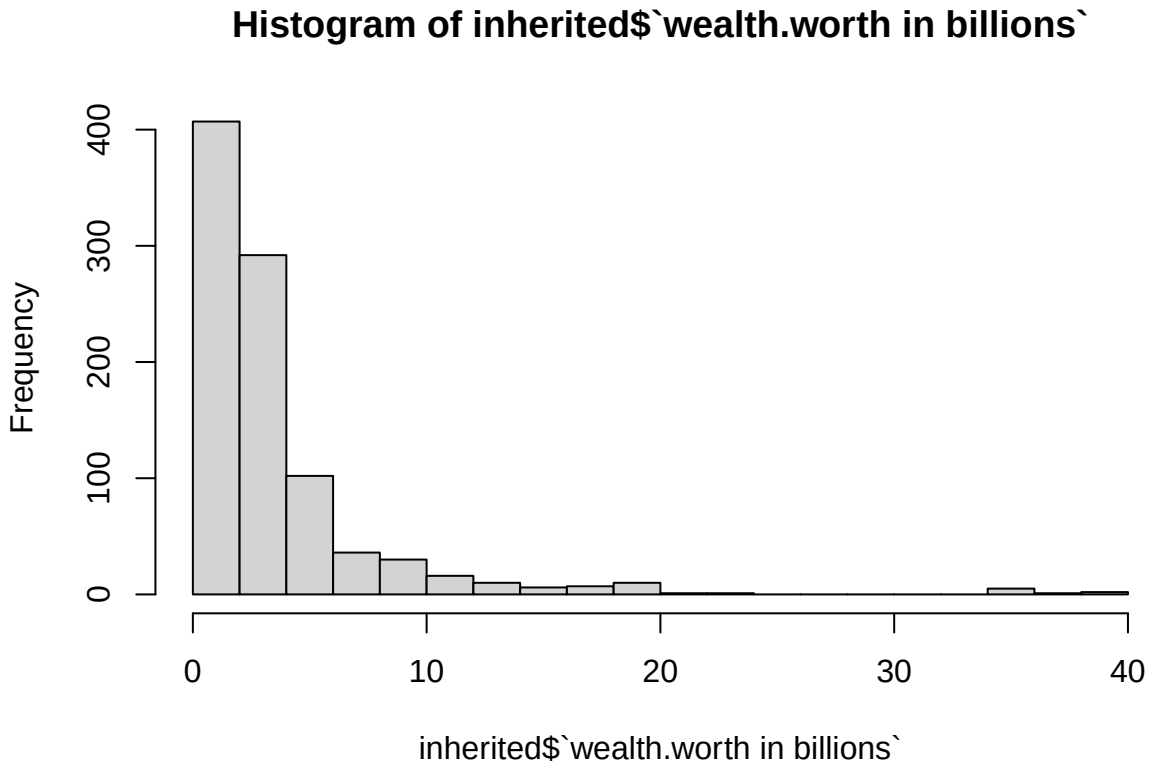
```
## # A tibble: 1,688 x 22
##    name       rank  year compa~1 compa~2 compa~3 compa~4 compa~5 demog~6 demog~7
##    <chr>     <dbl> <dbl>   <dbl> <chr>   <chr>   <chr>   <chr>     <dbl> <chr>
##  1 Bill Gat~     1  1996    1975 Micros~ founder Softwa~ new          40 male
##  2 Bill Gat~     1  2001    1975 Micros~ founder Softwa~ new          45 male
##  3 Bill Gat~     1  2014    1975 Micros~ founder Softwa~ new          58 male
##  4 Warren B~     2  1996    1962 Berksh~ founder Finance new          65 male
##  5 Warren B~     2  2001    1962 Berksh~ founder Finance new          70 male
##  6 Carlos S~     2  2014    1990 Telmex  founder Commun~ privat~      74 male
##  7 Paul All~     3  2001    1975 Micros~ founder techno~ new          48 male
##  8 Amancio ~     3  2014    1975 Zara    founder Fashion new          77 male
```

```
##  9 Lee Shau~     4  1996    1976 Hender~ founde~ real e~ new          68 male
## 10 Larry El~     4  2001    1977 Oracle  founder softwa~ new          56 male
## # ... with 1,678 more rows, 12 more variables: location.citizenship <chr>,
## #   `location.country code` <chr>, location.gdp <dbl>, location.region <chr>,
## #   wealth.type <chr>, `wealth.worth in billions` <dbl>,
## #   wealth.how.category <chr>, `wealth.how.from emerging` <chr>,
## #   wealth.how.industry <chr>, wealth.how.inherited <chr>,
## #   `wealth.how.was founder` <chr>, `wealth.how.was political` <chr>, and
## #   abbreviated variable names 1: company.founded, 2: company.name, ...
```

```
inherited_mean = mean(inherited$`wealth.worth in billions`)
print(inherited_mean)
```

```
## [1] 3.750756
```

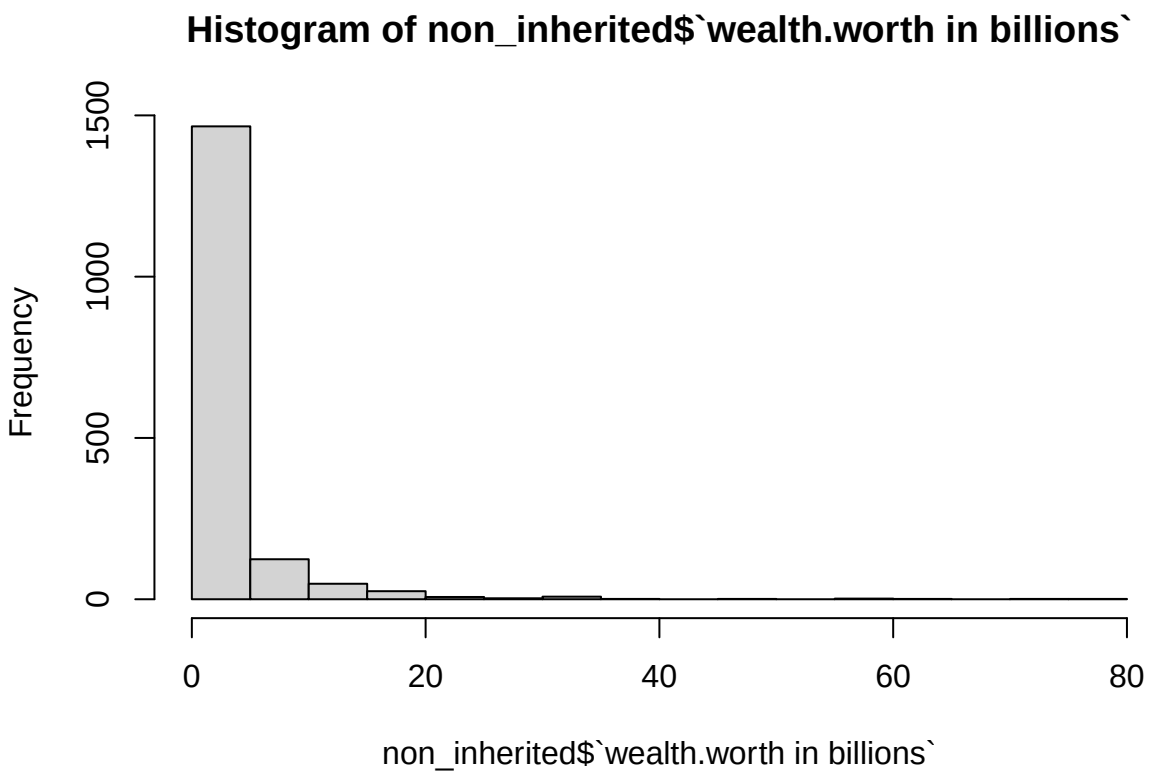
```
hist(inherited$`wealth.worth in billions`, breaks = 20)
```



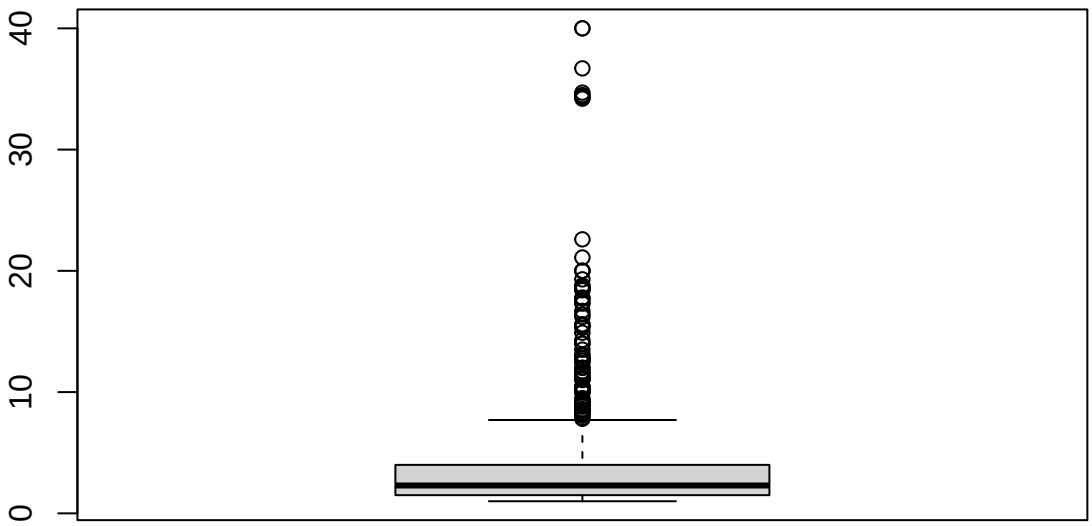

```
non_inherited_mean = mean(non_inherited$`wealth.worth in billions`)
print(non_inherited_mean)
```

```
## [1] 3.411908
```

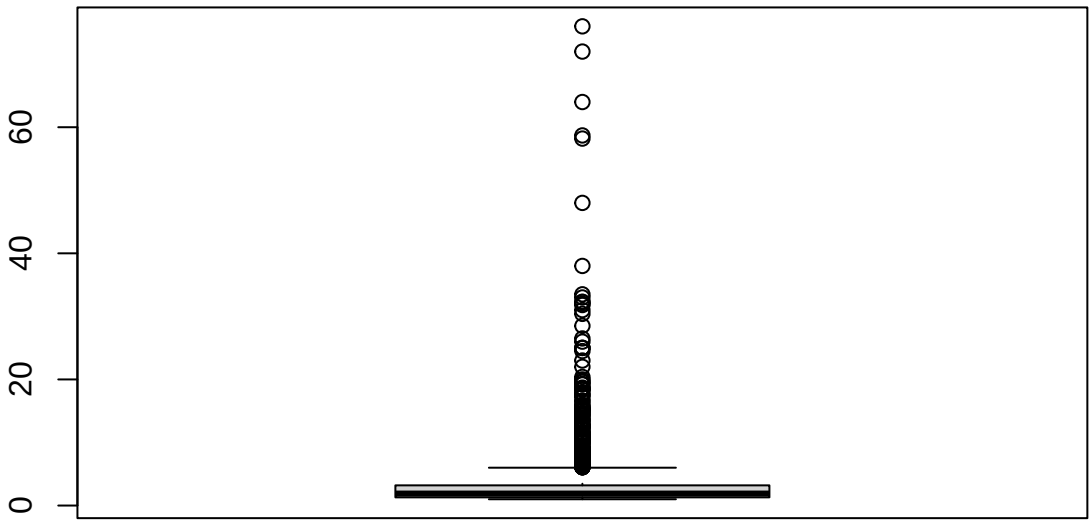
```
hist(non_inherited$`wealth.worth in billions`, breaks = 20)
```




```
boxplot(inherited$`wealth.worth in billions`)
```




```
boxplot(non_inherited$`wealth.worth in billions`)
```




```
wilcox.test(inherited_mean, non_inherited_mean, alternative = "two.sided")
```

```
##
##  Wilcoxon rank sum exact test
##
## data:  inherited_mean and non_inherited_mean
## W = 1, p-value = 1
## alternative hypothesis: true location shift is not equal to 0
```

```
# jel smijem odrezat dio podataka (pogledati histogram i box plot), koji dio?
# ako ne, koji test koristi? t-test za mediane umjesto meana? ili neparametarski test? kao sto je wilco
```

Formiranje hipoteza

Vizualizacija podataka

Pretpostavke za provođenje testa

Test xy

Provođenje T-testa

Zaključak

3. Možete li iz danih varijabli predvidjeti njihovo bogatstvo?

- je li dobro tu koristiti sve milijardere s popisa 2014 + milijarderi s prethodnih popisa (ako nisu na popisu iz 2014. godine)

4. Kada biste birali karijeru isključivo prema kriteriju da se obogatite, koju biste industriju izabrali?

Pretpostavljamo da karijerom u određenoj industriji, a ne nasljedstvom zarađujemo novac. Zbog toga gledamo samo milijardere koji nisu nasljedili svoje bogatstvo. Također, zanimaju nas samo najnoviji milijarderi odnosno oni s popisa iz 2014. godine.

- kako prikazati trend kroz godine na grafu (dijagram paralelnih koordinata?)
- možda gledati razliku iz popisa 2014 i 2001, odnosno nove milijardere - pa napraviti raspodjelu industrija novonastalih milijardera

```
#
non_inherited_2014 <- non_inherited[non_inherited$year == 2014,]

par(mar=c(10,5,1,1))
barplot(sort(table(subset(non_inherited_2014$wealth.how.industry, non_inherited_2014$wealth.how.industry
        main = "Billionaires distribution by industry (non-inherited wealth)",
        las = 2)
```