02. Datové objekty

Harmonogram

- 1. Vector
- 2. Factor
- 3. Matrix
- 4. Data Frame

Co je to objekt?

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A Complete Catalog Of Every Time Someone Cursed Or Bled Out In A Quentin Tarantino Movie

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Filed under Word Count

Get the data on GitHub

RECOMMENDED

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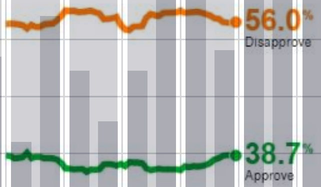

Vector

Vector je <u>jednoduchý</u> datový <u>objekt</u> o **různé délce** obsahující **hodnoty**

- c("Reservoir Dogs", "Pulp Fiction", "Inglorious Basterds")
- c(421, 469, 51)
- c(421, "Reservoir Dogs", "death", FALSE, 10)

Počet cursing words dle filmů

- Words_Movie = c(421, 469, 57, 51)

Co je co aneb **pojmenování** vektorů

- names(Words_Movie) = c("Reservoir Dogs", "Pulp Fiction", "Kill Bill 1", "Inglorious Basterds")

Výběr hodnot(y) z vektoru

- Words_Movie[c(1, 4)]
- Words_Movie[c("Reservoir Dogs", "Inglorious Basterds")]

Vektorová **aritmetika**

Sčítání vektorů

- Hell = c(12, 5, 3, 4)
- Goddamn = c(10, 28, 7, 8)
- Spirituality = Hell + Goddamn

Součet hodnot ve vektoru

- Words_N <- sum(Spirituality)

Vector

Logické operátory

< for less than
> for greater than
<= for less than or equal to
>= for greater than or equal to
== for equal to each other
!= not equal to each other

Ve kterých filmech padlo více cursing words, než byl jejich průměrný počet za osm filmů?
- Words_Movie > 213

Zaznívalo ve filmech více slovo "Hell" nebo "Goddamn"?
- Hell < Goddamn

Porovnání hodnot(y) <u>mezi vektory</u>
- names(Hell) = c("Reservoir Dogs", "Pulp Fiction", "Kill Bill 1", "Inglorious Basterds")
- names(Goddamn) = c("Reservoir Dogs", "Pulp Fiction", "Kill Bill 1", "Inglorious Basterds")
- Hell[c(1, 4)] > Goddamn[c(1, 4)]
- Hell[c("Reservoir Dogs", "Inglorious Basterds")] != Goddamn[c("Reservoir Dogs", "Inglorious Basterds")]
- names(Spirituality) = c("Reservoir Dogs", "Pulp Fiction", "Kill Bill 1", "Inglorious Basterds")
- PulpFiction_Celkem <- Spirituality[c(2)] > 50

Factor

```
Filmy = c("Kill Bill 1", "Reservoir Dogs", "Inglorious Basterds", "Pulp Fiction")
class(Filmy)
```

Nominální kategorie

```
Factor_Filmy = as.factor(Filmy)
class(Factor_Filmy)
levels(Factor_Filmy) <- c("Reservoir Dogs", "Pulp Fiction", "Kill Bill 1", "Inglorious Basterds")
```

Ordinalizace

```
Factor_Filmy <- factor(Filmy, order = TRUE, levels = c("Reservoir Dogs", "Pulp Fiction", "Kill Bill
1", "Inglorious Basterds")
```

Matrix

In R, a matrix is

- a collection of elements of the same data type (numeric, character, or logical)
- arranged into a fixed number of **rows** and **columns**.
- Since you are only working with rows and columns, a matrix is called two-**dimensional**.

You can construct a matrix in R with the **matrix()** function. Consider the following example:

- matrix(1:9, byrow = TRUE, nrow = 3)

The **first argument** is the collection of elements that R will arrange into the rows and columns of the matrix. Here, we use 1:9 which is a shortcut for c(1, 2, 3, 4, 5, 6, 7, 8, 9).

The argument **byrow** indicates that the matrix is *filled by the rows*. If we want the matrix to be filled by the columns, we just place byrow = FALSE.

The third argument **nrow** indicates that the matrix should have three rows.

- Analogicky "**ncol**"

Matrix

O cursing words v Tarantinových filmech už něco víme. Co ale počet mrtvých?

Budeme se věnovat Pulp Fiction, Inglorious Basterds a Django Unchained spolu s počtem zesnulých postav. Přidáme k tomu známý počet cursing words v příslušných filmech:

```
Pulp_Fiction = c(7, 469)
Inglorious_Basterds = c(48, 58)
Django_Unchained = c(47, 262)

Filmy <- matrix(c(Pulp Fiction, Inglorious Basterds, Django Unchained), nrow = 3,
byrow = TRUE)
view(Filmy)
```

Pojmenování řádků/sloupců

```
rownames(Filmy) <- c("Pulp_Fiction", "Inglorious_Basterds", "Django_Unchained")
colnames(Filmy) <- c("Deaths", "Words")
View(Filmy)
```

Matrix

```
Death_Curse = c(7, 48, 47, 469, 58, 262)
Death_Curse_Matrix = matrix(Death_Curse, nrow = 3, byrow = FALSE,
dimnames = list(c("Pulp_Fiction", "Inglorious_Basterds", "Django_Unchained")))

colnames(Death_Curse_Matrix) <- c("Deaths", "Curses")
colSums(Death_Curse_Matrix)
```

Jak do matice přidat sloupec / řádek?
Skrze příkaz **cbind() / rbind()**

Filmy si rozdělíme z hlediska období tvorby (90s, 00s a 10s) s kódy "0", "1" a "2":

```
Period = c(0, 1, 2)
Period_Matrix = matrix(Period)
rownames(Period_Matrix) = c("90s", "00s", "10s")
colnames(Period_Matrix) <- c("Period")

Death_Curse_Period = cbind(Death_Curse_Matrix, Period_Matrix)
Death_Curse_Period
```

Matrix

<u>Jak příkazem zjistit aktivní objekty?</u>
ls()

<u>Jak vybrat konkrétní prvky z matice?</u>
Similar to vectors, you can use the square brackets [ ] to select one or multiple elements from a matrix.

- Whereas vectors have one dimension, matrices have two dimensions. You should therefore use a comma to separate that what to select from the rows from that what you want to select from the columns. For example:
    - Death_Curse_Period[1,2] selects the element at the first row and second column.
    - Death_Curse_Period[1:3,2:3] results in a matrix with the data on the rows 1, 2, 3 and columns 2 and 3.

If you want to select all elements of a row or a column, no number is needed before or after the comma, respectively:

- Death_Curse_Period[,1] selects all elements of the first column.
- Death_Curse_Period[1,] selects all elements of the first row.

Matrix

Jaký byl průměrný počet mrtvých ve sledovaných filmech?

```
Mean_Dead = Death_Curse_Period[,1]
mean(Mean_Dead)
```

Jaký je Tarantino index (tj. počet mrtvých na počet nadávek) pro Inglorious Basterds?

```
Dead_Curse = data.frame(Death_Curse_Period[2,1:2])
Dead_Curse[2,1]/Dead_Curse[1,1]
View(Dead_Curse[2,1])
```

I DON'T SEE THE CODE ANYMORE.
ALL I SEE IS DATA FRAMES, LISTS, AND OPTIONAL ARGUMENTS.

Data Frame

Data Frame je **matice** tak, <u>jak ji chápeme při analýze dat</u>

- A data frame has the **variables** of a data set as **columns** and the **observations** as **rows**

V čem se v R "*Data Frame*" liší od "*Matrix*"?

- All the elements that you put in a matrix should be of the same type

Data Frame

Vyvolání Data Frame z R

data()

data(USArrests)

View(USArrests)

??USArrests

Jak se zorientovat v Data Frame?

- head() - show the first observations of a data frame
- tail() - prints out the last observations in your data set
- str() - struktura dat

RESPECT MY AUTHORITAH!

Data Frame

Tvorba vlastní Data Frame

data.frame()

# Planety - definování vektorů

- name <- c("Mercury", "Venus", "Earth", "Mars", "Jupiter", "Saturn", "Uranus",
- "Neptune")
- type <- c("Terrestrial planet", "Terrestrial planet", "Terrestrial planet","Terrestrial
- planet", "Gas giant", "Gas giant", "Gas giant", "Gas giant")
- diameter <- c(0.382, 0.949, 1, 0.532, 11.209, 9.449, 4.007, 3.883)
- rotation <- c(58.64, -243.02, 1, 1.03, 0.41, 0.43, -0.72, 0.67)
- rings <- c(FALSE, FALSE, FALSE, FALSE, TRUE, TRUE, TRUE, TRUE)

# Planety

- Planets = data.frame(name, type, diameter, rotation, rings)

# Struktura dat

- str(Planets)
- head(Planets)
- tail(Planets)

NEVER FORGET PLUTO

(1930 -2006)

Data Frame

Výběr prvků

- Planets[1:3,1]
- Planets[1:3,"name"]
- Planets$name
- Planets[rings, "name"]

Subsoubory

- subset(Planets, subset = rings)
- subset(Planets, subset = (diameter < 4))

Seřazování

- order(Planets$diameter)
- Planets[order("diameter")]

Zdroje

Cornelissen, J. (n.d.) Introduction to R. Dostupné online na:

https://www.datacamp.com/courses/free-introduction-to-r