

R -2022

Norimitsu Nishida

2023-11-12

Table of contents

Udemy

<https://bunseki-data.com/r-onlinecourse/>

1

2022 9 18 Ver0.00 ()

1.1 R ?

R

•
•
•
•

•

R

R

Part I

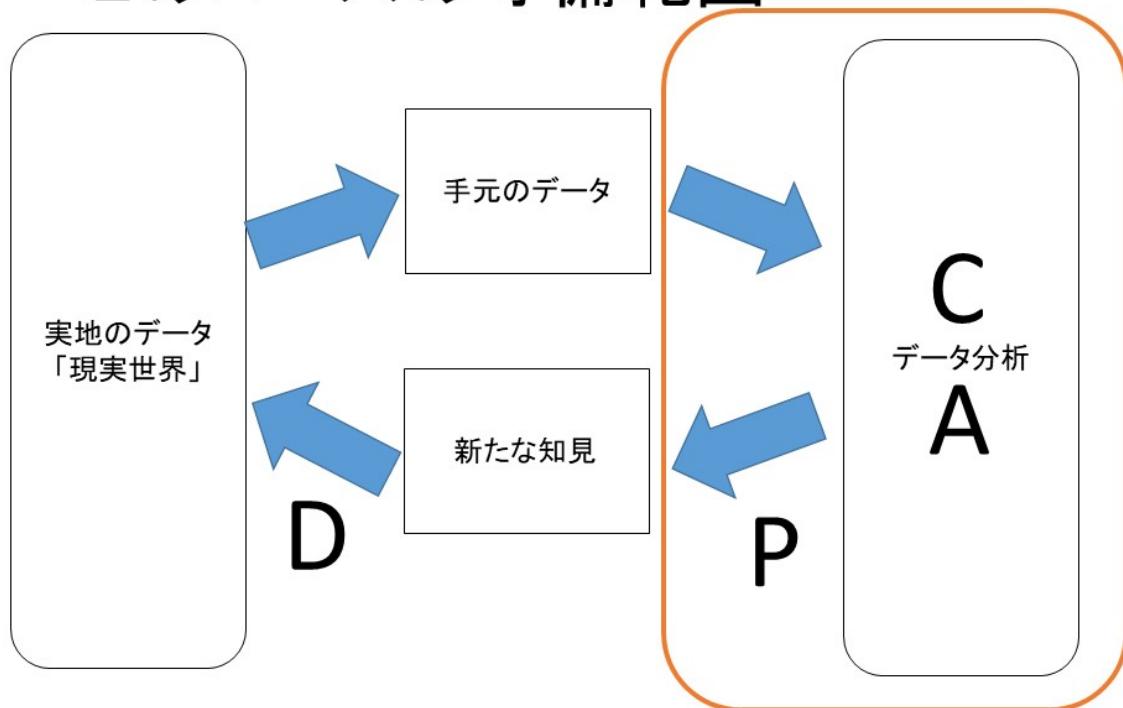
1:

R R RStudio

2 ! (L1)

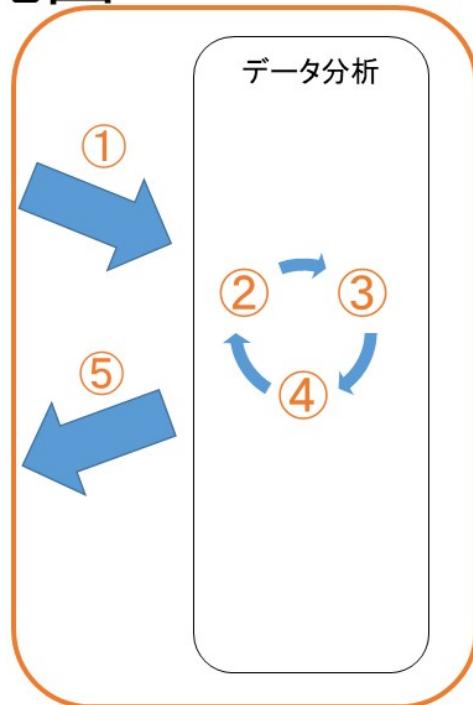
2.1 R

このコースの守備範囲



このコースの守備範囲

- ①インポート
データの読み込み
- ②データクリーニング
「変」なデータの除去
分析できる形へ加工
- ③可視化
「みえる」化
- ④統計モデル
- ⑤共有
プレゼン資料化
レポート作成



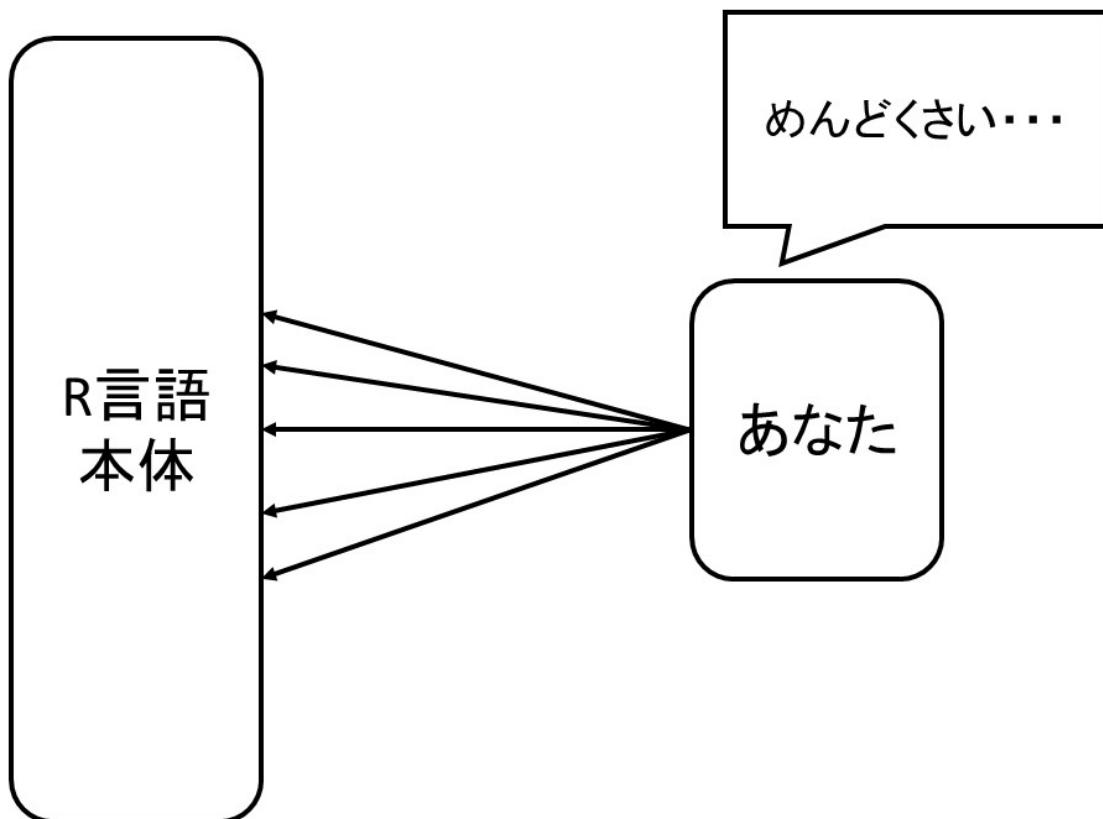
R

R

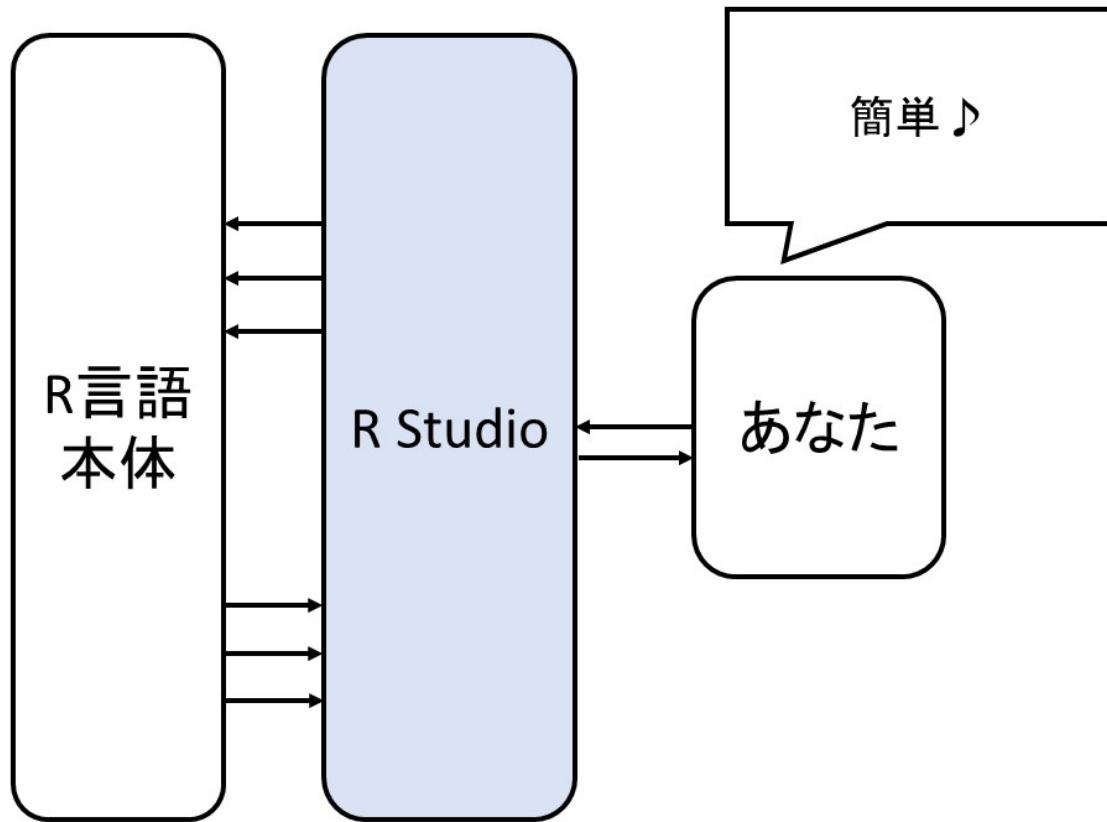
3 R R Studio(L2)

3.1 R ?

R
R Studio R EZR EZR R Studio
R R



R Studio R Studio R
R R Studio R



R R Studio

4 OS ! (L3-6)

4.1

- R <https://cran.r-project.org>
- R Studio <https://www.rstudio.com/>

Windows MacOS [Udemy](#)

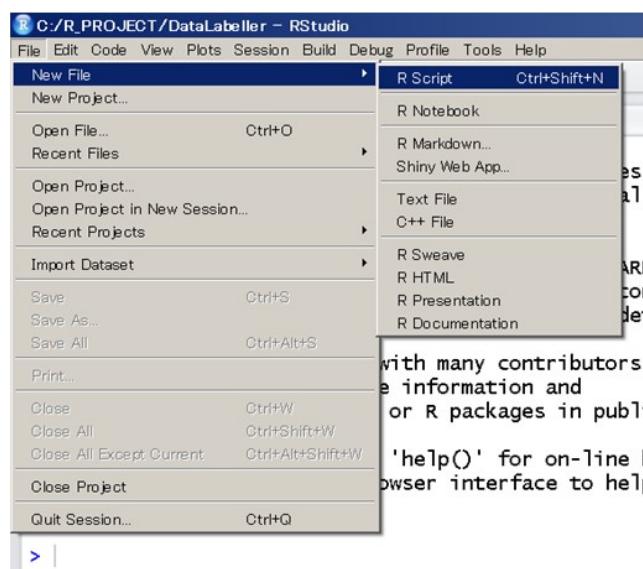
Part II

R

5 R Studio (L9)

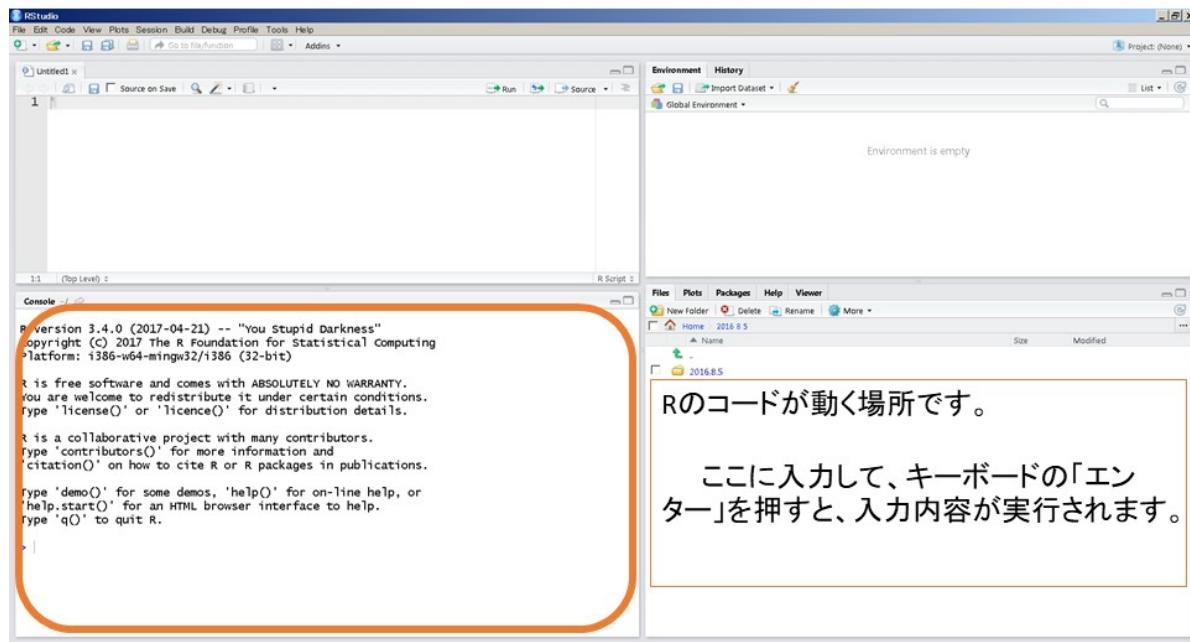
R Studio File

スクリプトファイルを作ります



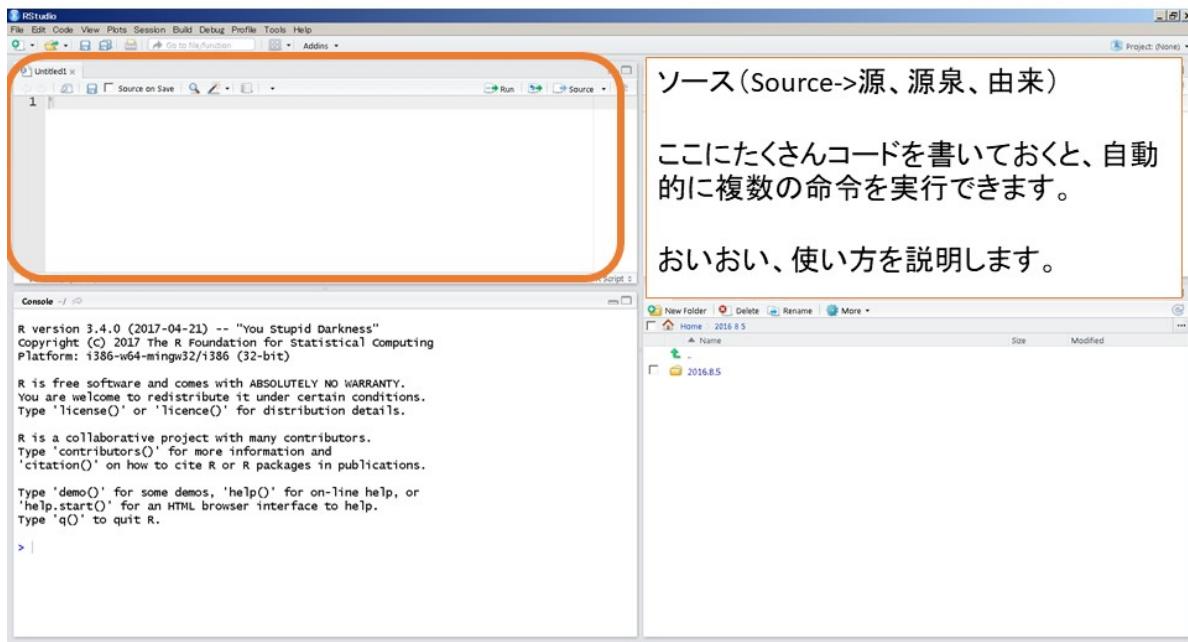
4

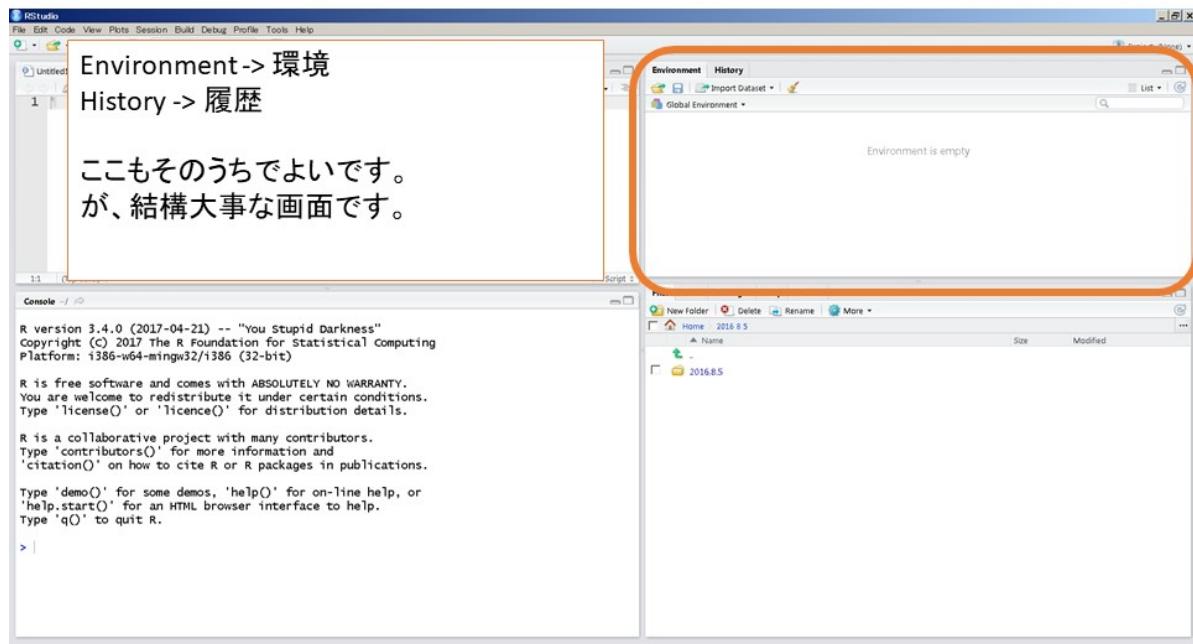
13

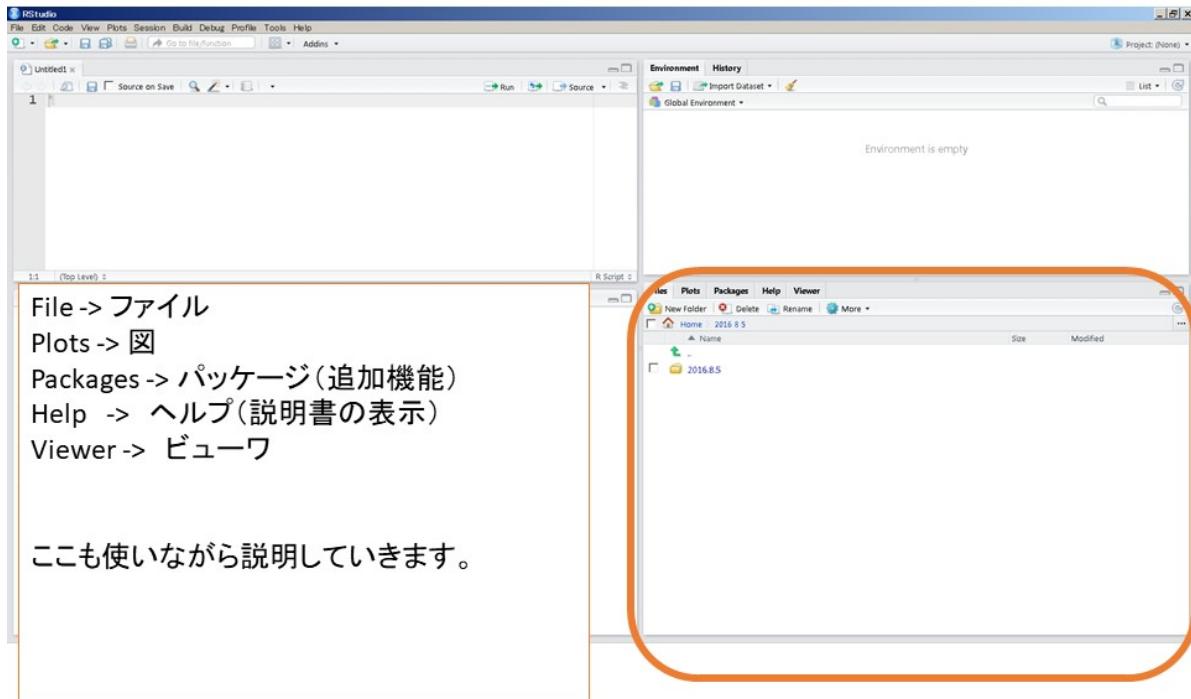


コンソール画面(Pane->窓ガラス)

ソース画面(Pane)



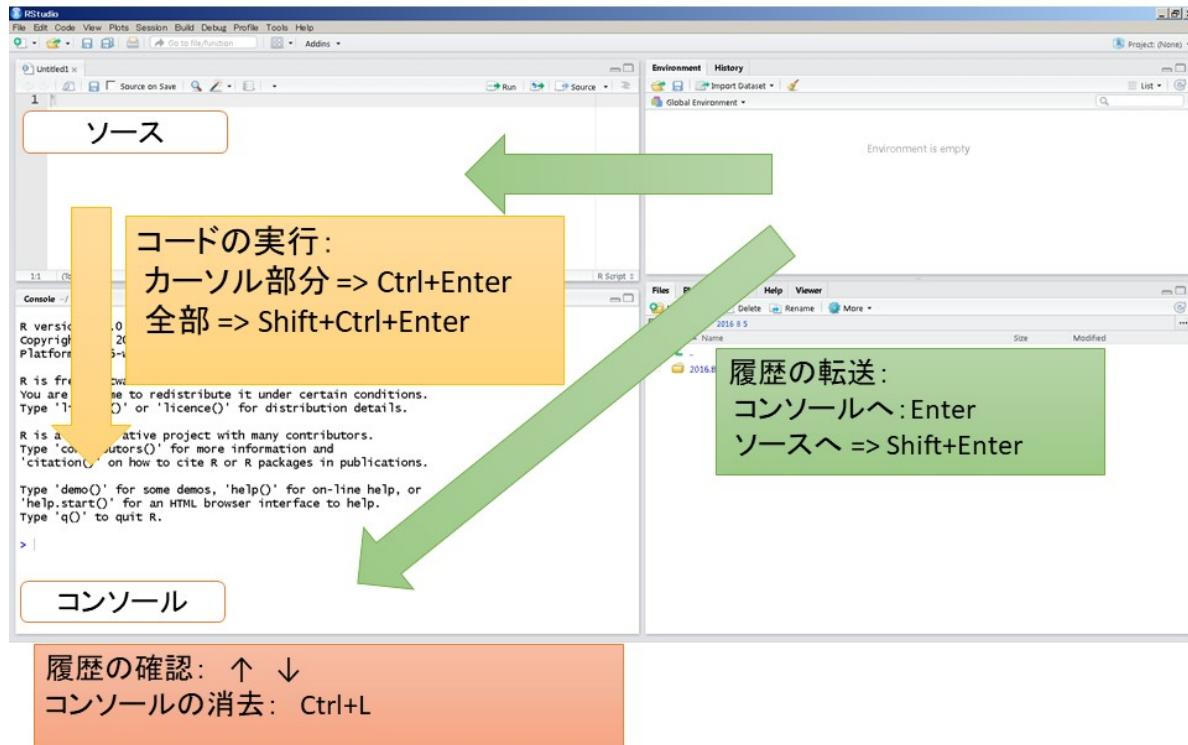




6 R Studio (L10)

-
- History
-
-
-
-

6.0.1



7 (L11)

7.1

R

1

プロジェクト



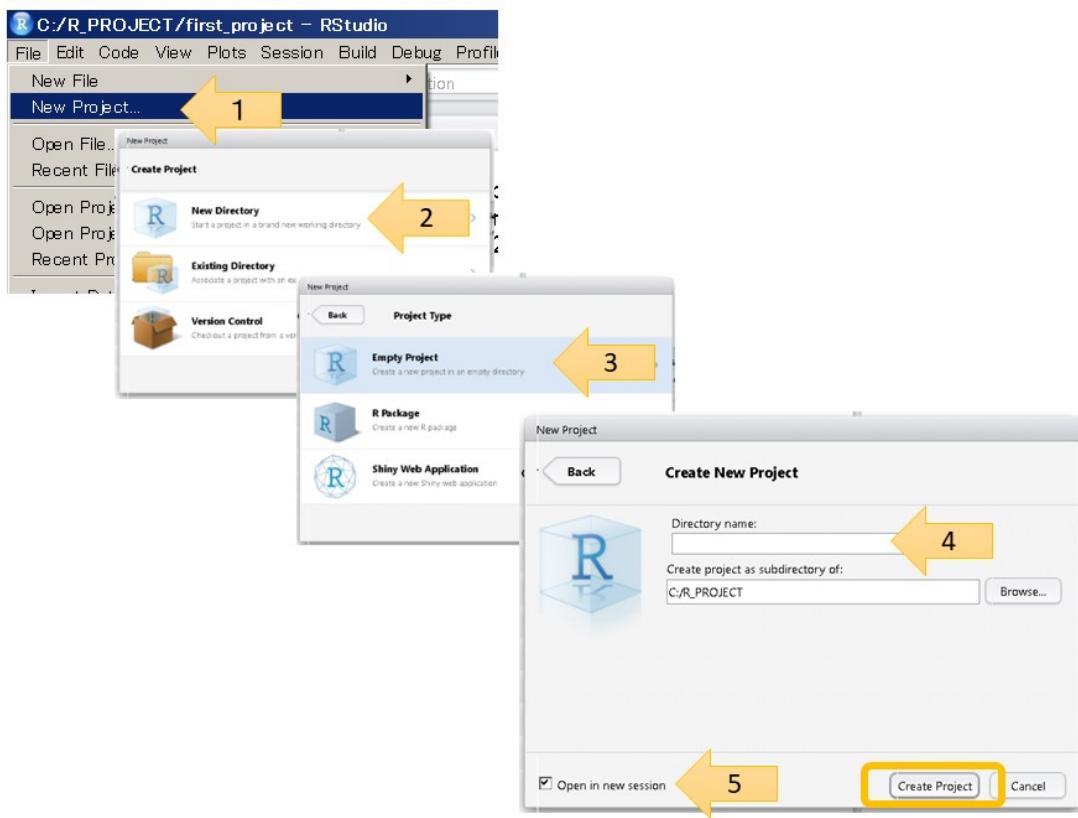
R

プロジェクト



RStudio

新しいプロジェクトの作成:



8 ()(L12)

型とは？

- ・「いち + に =？」 → 答えは？
- ・1 + 2 = 3

型とは？

・「いち + に =？」 → 答えは？

人：さん？ 3？

コンピューター：エラー！

3

型とは？

- ・「いち + に =？」



- ・「1 + 2 =？」

R

Rの型の基礎の基礎

- 数値型 numeric / integer(数値/整数)
- 文字列 character

→Rへ！

R

9 () (L13)

```
+  
"1"+"2" 1+2 R  
1 + 2  
[1] 3  
3  
"1"+"2"  
Error in "1" + "2": non-numeric argument to binary operator
```

```
R      1      "1"  
" "    R  
      R  


|         |        |
|---------|--------|
| 1       | 2      |
| 1.123   | 2/3    |
| 4L      | 3L     |
| "1.123" | "ABCD" |


```

```
str()  
str(1.123)  
num 1.12
```

```
str(4L)
```

```
int 4
```

```
str("ABCD")
```

```
chr "ABCD"
```

```
1.123 4L L
```

10 (L14)

11

1 + 2

12

#

1 + 2

1 + 2

1 + 2 #

13 ()(L15)

変数 Variable の紹介

- ・高校数学を思い出してください。

- ・ $x = 5$ のとき、

- ・ $x + 4x = ?$

$$(5) + 4 \times (5) = 25$$

変数 Variable の紹介

- 高校数学を思い出してください。

- $x = 5$ のとき、

- $x + 4x = ?$

$$(5) + 4 \times (5) = 25$$

14 ()(L16)

R

hako 5

```
hako <- 5
```

<-

```
hako
```

[1] 5

Environment hako 5

hako

```
hako <- 489
```

```
hako
```

[1] 489

5 489

14.0.1 1: hako “hako”

```
"hako" <- 987
```

```
hako
```

[1] 987

14.0.2 2:

```
hako <- " "
```

14.0.3 3:

```
# -hako <- 5  
# _hako <- 10  
# +hako <- 10  
# @hako <- 15  
# 1hako <- 12
```

```
.hako <- 10  
.hako
```

```
[1] 10
```

```
.
```

```
hako1 <- 20
```

```
hako_1 <- 25
```

```
(_)
```

```
.1 .2 . .3
```

```
rm(.hako)
```

```
rm remove
```

```
rm(hako1, hako_1)
```

14.0.4 4:

```
<- 123
```

```
rm( )
```

```
rm(list=ls())
```

15 rm (L17)

```
rm           rm str      rm() str()      R      (       function  )
```

```
list=ls()
```

```
hako1 <- 3  
hako2 <- 4  
hako3 <- 5  
hako4 <- 6  
hako5 <- 7
```

```
5
```

```
ls()
```

```
[1] "hako1"          "hako2"          "hako3"          "hako4"  
[5] "hako5"          "has_annotations"
```

```
ls           rm list      ls()
```

```
rm(list=ls())
```

16 (L18)

```
hako1 hako5 5

hako1 <- 3
hako2 <- 4
hako3 <- 5
hako4 <- 6
hako5 <- 7

5

hako_dai <- hako1 + hako2 + hako3 + hako4 + hako5 hako_dai

::: {.cell}

```{.r .cell-code}
rm(list=ls())
```

:::

hako1 <- "hello"
hako2 <- "world"

hako1 + hako2

Error in hako1 + hako2: non-numeric argument to binary operator
```

```
hako <- "5"
```

```
hako + hako
```

```
Error in hako + hako: non-numeric argument to binary operator
```

```
as.numeric("5")
```

```
[1] 5
```

```
as.numeric
```

```
as.numeric
```

```
as.numeric("5.12") as.numeric("5000") as.numeric("5,000") as.numeric("1/2")
```

```
5,000
```

```
1/2 0.5
```

```
NA Not Available
```

```
as.character(1000)
```

```
as.character
```

```
R
```

17 () (L19)

combine c()

```
c(1,2,3,4,5)
```

```
[1] 1 2 3 4 5
```

```
[1] 1 2 3 4 5
```

```
a <- c(1,2,3,4,5)
```

```
a
```

```
[1] 1 2 3 4 5
```

```
a <- c(" "," "," "," "," ")
```

```
a
```

```
[1] " " " " " "
```

”“

```
a <- c( 1 , 2 , 3 , 4 , 5 )
b <- c("1","2","3","4","5")
```

```
a
```

```
[1] 1 2 3 4 5
```

```
b
```

```
[1] "1" "2" "3" "4" "5"
```

```
a <- c(1,2,3,4, " ")
a
```

```
[1] "1" "2" "3" "4" " "
```

```
[1] "1" "2" "3" "4" " "
```

- combine c
-

2

18 () (L20)

```
a <- c("1","2","3","4","5")
```

```
1 + 10 #OK  
"1" + 10 #NG  
a 10
```

```
a + 10
```

```
Error in a + 10: non-numeric argument to binary operator
```

```
as.numeric("1") + 10
```

```
[1] 11
```

```
10
```

```
a
```

```
as.numeric(a)
```

```
[1] 1 2 3 4 5
```

```
as.numeric(a) + 10
```

```
[1] 11 12 13 14 15
```

```
b <- as.numeric(a)  
b + 10
```

```
[1] 11 12 13 14 15
```

```
a <- c("1","2","3","4","5","4","3","2","1","0","1","2")  
as.numeric(a)
```

Warning: NAs introduced by coercion

```
[1] 1 2 3 4 5 4 3 2 1 NA 1 2
```

Warning/

```
[1] 1 2 3 4 5 4 3 2 1 NA 1 2  
NA,
```

```
a
```

```
[1] "1" "2" "3" "4" "5" "4" "3" "2" "1" "0" "1" "2"  
10 0 O( )
```

19 () (L21)

```
a <- c(1,2,3,4,5)
```

```
a + 10
```

```
[1] 11 12 13 14 15
```

```
+
```

```
a + 10 # +
```

```
[1] 11 12 13 14 15
```

```
a - 5 # -
```

```
[1] -4 -3 -2 -1 0
```

```
a * 5 # *
```

```
[1] 5 10 15 20 25
```

```
a / 10 # /
```

```
[1] 0.1 0.2 0.3 0.4 0.5
```

```
a ** 2
```

```
[1] 1 4 9 16 25
```

```
a ^ 2 # ** ^
```

```
[1] 1 4 9 16 25
```

```
a %% 2 # %%
```

```
[1] 1 0 1 0 1
```

```
a %/% 2 # %/%
```

```
[1] 0 1 1 2 2
```

```
b <- c(10,11,12,13,14)
```

```
a
```

```
[1] 1 2 3 4 5
```

```
b
```

```
[1] 10 11 12 13 14
```

```
a + b
```

```
[1] 11 13 15 17 19
```

```
a : 1 2 3 4 5  
b : 10 11 12 13 14  
a+b: 11 13 15 17 19
```

```
a + b
```

```
[1] 11 13 15 17 19
```

```
a * b
```

```
[1] 10 22 36 52 70
```

```
a - b
```

```
[1] -9 -9 -9 -9 -9
```

```
a / b
```

```
[1] 0.1000000 0.1818182 0.2500000 0.3076923 0.3571429
```

```
b ** a
```

```
[1] 10 121 1728 28561 537824
```

```
b %% a
```

```
[1] 0 1 0 1 4
```

```
b %/% a
```

[1] 10 5 4 3 2

1 R

20 () (L22)

20.1

```
1:           4  
  
birth_year  <- c(1986, 1960, 1979, 1990)  
current_year <- c(2020, 2020, 2020, 2020)  
  
2:           4           BMI  
  
height_cm <- c(150.2, 176.1, 180.2, 150.9)  
  
BMI    ( [kg] ) / ( ^2[m] )  
  
3:           4           eGFR  
  
age <- c( 60,   64,   59,   46)  
cr  <- c(1.01, 0.80, 0.97, 1.02)  
  
eGFR      194×(Cr -1.094) -1.094×( -0.287 )
```

20.2

```
1:           4  
  
birth_year  <- c(1986, 1960, 1979, 1990)  
current_year <- c(2020, 2020, 2020, 2020)  
  
:
```

```

current_year - birth_year

[1] 34 60 41 30

2:          4          BMI

height_cm <- c(150.2, 176.1, 180.2, 150.9)

BMI   ( [kg] ) / ( ^2[m] )

1:
100

2:

height_m <- height_cm/100

3:          4          eGFR

age <- c( 60,    64,    59,    46)
cr  <- c(1.01,  0.80,  0.97, 1.02)

eGFR


$$194 \times Cr^{-1.094} \times -0.287$$


$$194 \times (Cr - 1.094) \times (-0.287)$$


$$\vdots$$


$$194 * (cr^{-1.094}) * (age^{-0.287})$$


[1] 59.25769 75.06675 62.23561 63.26764

```

21 () (L23)

```
len_5 <- c(1,2,3,4,5)
len_10 <- c(10,20,30,40,50,60,70,80,90,100)
```

```
5     10
```

```
len_5 + len_10
```

```
[1] 11 22 33 44 55 61 72 83 94 105
```

```
[1] 11 22 33 44 55 61 72 83 94 105
```

```
1   2   3   4   5   1   2   3   4   5   <-len_5 2
10  20  30  40  50  60  70  80  90  100 <-len_10 1
```

```
len_10 + len_5
```

```
[1] 11 22 33 44 55 61 72 83 94 105
```

```
1
```

```
len_5 + 1
```

```
[1] 2 3 4 5 6
```

```
1 + len_5
```

```
[1] 2 3 4 5 6
```

```
1 5
```

```
1 2 3 4 5 <- len_5 1  
1 1 1 1 1 <- 1 5
```

```
1
```

```
len_3 <- c(1,2,3)  
len_7 <- c(10,20,30,40,50,60,70)
```

```
len_3 + len_7
```

```
Warning in len_3 + len_7: longer object length is not a multiple of shorter  
object length
```

```
[1] 11 22 33 41 52 63 71
```

```
len_7 + len_3
```

```
Warning in len_7 + len_3: longer object length is not a multiple of shorter  
object length
```

```
[1] 11 22 33 41 52 63 71
```

```
-> 11 22 33 41 52 63 71
```

```
len_7 7
```

```
1 2 3 1 2 3 1 2 3 len_3 3  
10 20 30 40 50 60 70 len_7 1
```

```
/Warning
```

22 (L24)

変数操作の基本



変数

- ・rm(hako) で、変数「hako」が消える。
- ・rm(list = ls()) で全部消える。
- ・アルファベットと「_」(アンダースコア)、「.」(ピリオド)、数字が使えます
- ・先頭につかえるものはアルファベットとピリオドのみです

型の変換



23 (L25)

データフレーム このように ベクトル を複数くっつけると

| ID | 名前 | 生年 | 性別 | 入院日 | 退院日 | 死亡の有無 |
|----|-----|------|----|-----------|-----------|-------|
| 1 | Aさん | 1987 | 男 | 2018-1-23 | 2018-1-30 | 0 |
| 2 | Bさん | 1930 | 女 | 2018-1-27 | 2018-2-1 | 0 |
| 3 | Cさん | 1940 | 男 | 2018-2-4 | 2018-2-9 | 0 |
| 4 | Dさん | 1972 | 男 | 2018-3-2 | 2018-3-3 | 0 |
| 5 | Eさん | 1954 | 女 | 2018-3-10 | 2018-3-13 | 0 |
| 6 | Aさん | 1987 | 男 | 2018-3-12 | 2018-3-13 | 1 |
| 7 | Fさん | 1930 | 女 | 2018-3-15 | 2018-4-1 | 0 |

データフレーム

| ID | 名前 | 生年 | 性別 | 入院日 | 退院日 | 死亡の有無 |
|----|-----|------|----|-----------------|-----------|-------|
| 1 | Aさん | 1987 | 男 | 2018-1-23 | 2018-1-30 | 0 |
| 2 | Bさん | 1930 | 女 | 2018-1-27 | 2018-2-1 | 0 |
| 3 | Cさん | 1940 | 男 | 2018-2-4 | 2018-2-9 | 0 |
| 4 | Dさん | 1972 | 男 | 2018-3-2 | 2018-3-3 | 0 |
| 5 | Eさん | 1954 | 女 | 2018-3-10
54 | 2018-3-13 | 0 |
| 6 | Aさん | 1987 | 男 | 2018-3-12 | 2018-3-13 | 1 |
| 7 | Fさん | 1930 | 女 | 2018-3-15 | 2018-4-1 | 0 |

データフレームの利点

- ベクトルだと、1列、1列に名前をつけてました
- データフレームだと、「表」に名前をつけることができます
- 管理が楽！

このデータフレームを作つてみましょう

| ID | 名前 | 生年 | 性別 | 入院日 | 退院日 | 死亡の有無 |
|----|-----|------|----|-----------|-----------|-------|
| 1 | Aさん | 1987 | 男 | 2018-1-23 | 2018-1-30 | 0 |
| 2 | Bさん | 1930 | 女 | 2018-1-27 | 2018-2-1 | 0 |
| 3 | Cさん | 1940 | 男 | 2018-2-4 | 2018-2-9 | 0 |
| 4 | Dさん | 1972 | 男 | 2018-3-2 | 2018-3-3 | 0 |
| 5 | Eさん | 1954 | 女 | 2018-3-10 | 2018-3-13 | 0 |
| 6 | Aさん | 1987 | 男 | 2018-3-12 | 2018-3-13 | 1 |
| 7 | Fさん | 1930 | 女 | 2018-3-15 | 2018-4-1 | 0 |

→Rへ

24 () (L26)

1.

2.

3. 1

data.frame

```
data.frame(< >=< >, < >=< >, ... )
```

OK

number name c()

```
data.frame(number = c(1,2,3,4),name = c("A ","B ","C ","D "))
```

| | number | name |
|---|--------|------|
| 1 | 1 | A |
| 2 | 2 | B |
| 3 | 3 | C |
| 4 | 4 | D |

```
data.frame(number = c(1,2,3,4),
           name = c("A ","B ","C ","D "))
```

| | number | name |
|---|--------|------|
| 1 | 1 | A |
| 2 | 2 | B |
| 3 | 3 | C |
| 4 | 4 | D |

```
data.frame(  
  number = c(1,2,3,4),  
  name = c("A ", "B ", "C ", "D ")  
)
```

```
number name  
1      1 A  
2      2 B  
3      3 C  
4      4 D
```

```
vec_num <- c(1,2,3,4)  
vec_name <- c("A", "B", "C", "D")  
  
data.frame(number = vec_num, name = vec_name)
```

```
number name  
1      1 A  
2      2 B  
3      3 C  
4      4 D
```

```
data.frame(number = c(1,2,3),  
           name = c("A ", "B ", "C ", "D "))
```

```
Error in data.frame(number = c(1, 2, 3), name = c("A ", "B ", : arguments imply differing nu
```

```
name 4    number 2  )
```

```
data.frame(number = c(1,2),  
           name = c("A ","B ","C ","D "))
```

| | number | name |
|---|--------|------|
| 1 | 1 | A |
| 2 | 2 | B |
| 3 | 1 | C |
| 4 | 2 | D |

25 () (L27)

```
hyou <- data.frame(number = c(1,2,3,4),  
                    name = c("A","B","C","D"))
```

R View() \$

25.1 View()

View v iew V iew V hyou

```
View(hyou)
```

25.2 \$

```
hyou <- data.frame(number = c(1,2,3,4),  
                    name = c("A ","B ","C ","D "))
```

name

```
hyou$name
```

```
[1] "A " "B " "C " "D "
```

```
hyou$number
```

```
[1] 1 2 3 4
```

```
hyou$name
```

```
[1] "A" "B" "C" "D"
```

Levels

Factor

25.3

```
hyou$number
```

```
[1] 1 2 3 4
```

```
hyou$new_number
```

NULL

NULL

```
hyou$new_number <- c(100,200,300,400)
```

```
View(hyou)
```

```
hyou$number <- c(100,200,300,400)
hyou$name <- " "
```

```
hyou
```

```
number      name new_number
1    100          100
2    200          200
3    300          300
4    400          400
```

```
name      1
```

```
hyou$name <- c(" ", " ")
```

```
OK
```

```
hyou$name <- c(" ", " ", " ")
```

```
Error in `\$<-`(.data.frame`(`*tmp*`, name, value = c(" ", " ", : replacement has 3 rows, data
```

26 (L28)

26.1

このデータフレームを作つてみましょう

| ID | 名前 | 生年 | 性別 | 入院日 | 退院日 | 死亡の有無 |
|----|-----|------|----|-----------|-----------|-------|
| 1 | Aさん | 1987 | 男 | 2018-1-23 | 2018-1-30 | 0 |
| 2 | Bさん | 1930 | 女 | 2018-1-27 | 2018-2-1 | 0 |
| 3 | Cさん | 1940 | 男 | 2018-2-4 | 2018-2-9 | 0 |
| 4 | Dさん | 1972 | 男 | 2018-3-2 | 2018-3-3 | 0 |
| 5 | Eさん | 1954 | 女 | 2018-3-10 | 2018-3-13 | 0 |
| 6 | Aさん | 1987 | 男 | 2018-3-12 | 2018-3-13 | 1 |
| 7 | Fさん | 1930 | 女 | 2018-3-15 | 2018-4-1 | 0 |

→Rへ

26.2 :

1:

```
vec_id      <- c(1:7)
vec_namae   <- c("A", "B", "C", "D", "E", "F", "G")
vec_by      <- c(1987, 1930, 1940, 1972, 1954, 1987, 1930)
vec_gender  <- c(" ", " ", " ", " ", " ", " ", " ")

vec_admission <- c("2018-1-23", "2018-1-27", "2018-2-4",
                  "2018-3-2", "2018-3-10", "2018-3-12",
                  "2018-3-15")
vec_discharge <- c("2018-1-30", "2018-2-1", "2018-2-9",
                   "2018-3-3", "2018-3-13", "2018-3-13",
                   "2018-4-1")

vec_is_dead <- c(0, 0, 0, 0, 0, 1, 0)
```

```
hyou <- data.frame(
  id = vec_id,
  name = vec_namae,
  seinen = vec_by,
  seibetu = vec_gender,
  admission_date = vec_admission,
  discharge_date = vec_discharge,
  is_dead = vec_is_dead
)
View(hyou)
```

```
hyou <- data.frame(id = vec_id)
hyou$id <- vec_id
hyou$name <- vec_namae
hyou$seinen <- vec_by
hyou$seibetu <- vec_gender
hyou$admission_date <- vec_admission
```

```
hyou$discharge_date<- vec_discharge  
hyou$is_dead <- vec_is_dead
```

```
View(hyou)
```

8

```
data.frame( )
```

コラム名1 = ベクトル1,
コラム名2 = ベクトル2,
.
.
.

View()

| コラム名1 | コラム名2 | ... |
|-------|-------|-----|
| 1 | A | ... |
| 2 | B | ... |
| 3 | C | ... |
| . | . | . |

```
hyou <- data.frame(...)
```

hyou\$コラム名1 → ベクトル1

hyou\$コラム名1 <- ベクトル3

View(hyou)

| コラム名1 | コラム名2 | ... |
|-------|-------|-----|
| 犬 | A | ... |
| 猫 | B | ... |
| 猫 | C | ... |
| . | . | . |

27 () (L29)

パッケージとは？

基本的な機能

R

パッケージとは？

自然言語処理
がやりたい

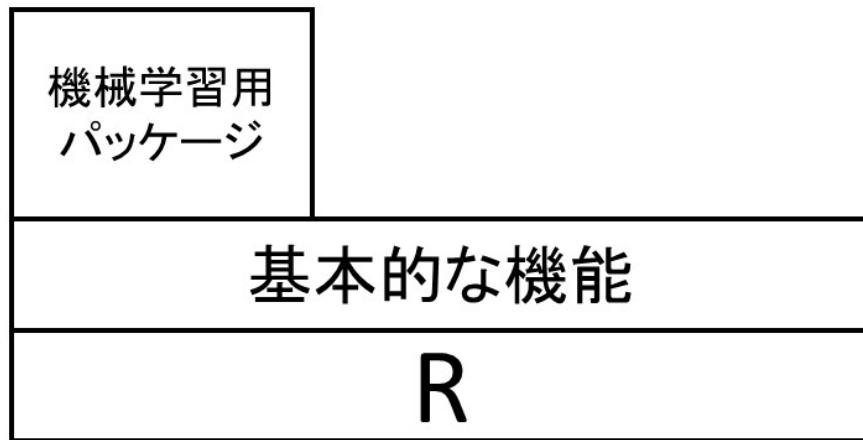
機械学習
がやりたい

きれいな
グラフを
描きたい

基本的な機能

R

パッケージとは？



パッケージとは？

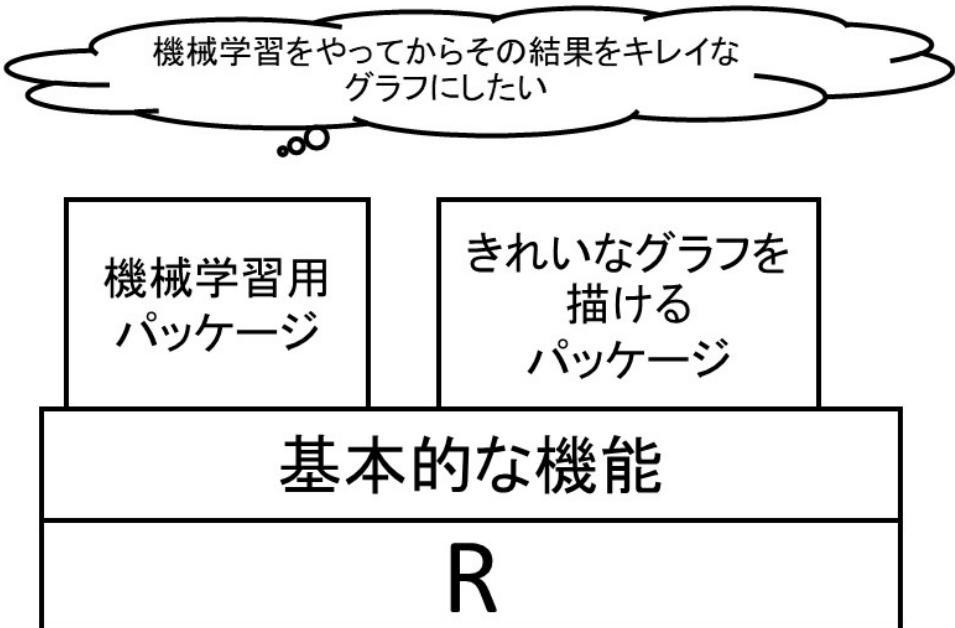


きれいなグラフを
描ける
パッケージ

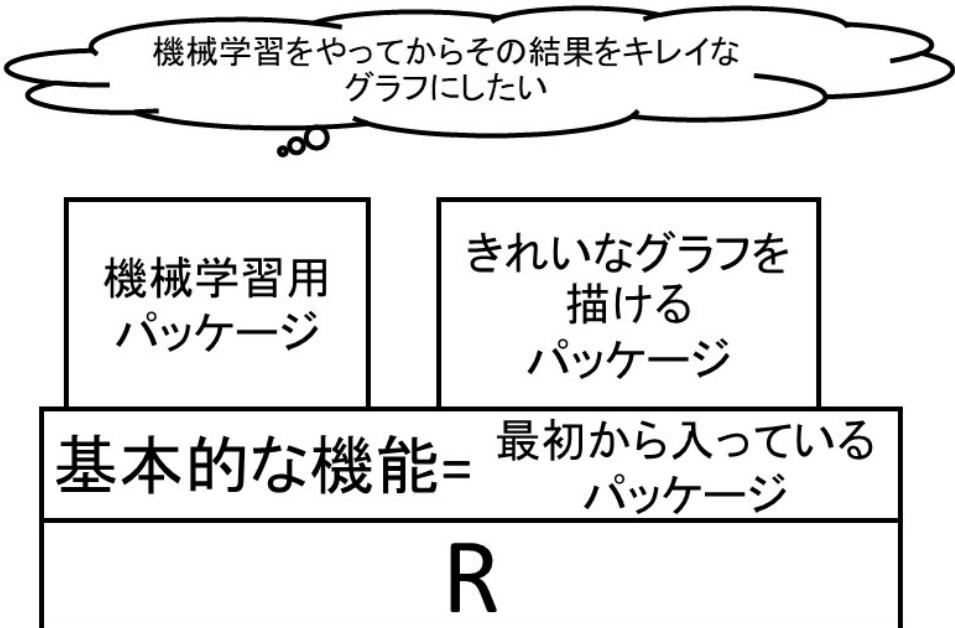
基本的な機能

R

パッケージとは？



パッケージとは？



本コースで利用するパッケージ

| | | |
|----------------------|--------------------|---------------|
| 文字列加工:stringr | パイプ関数:magrittr | 因子型処理:forcats |
| グラフ描画:ggplot2 | データ加工:dplyr | データ加工:tidyr |
| データフレーム拡張:
tibble | データインポート:
readr | …他、多数 |

| |
|--------|
| 基本的な機能 |
| R |

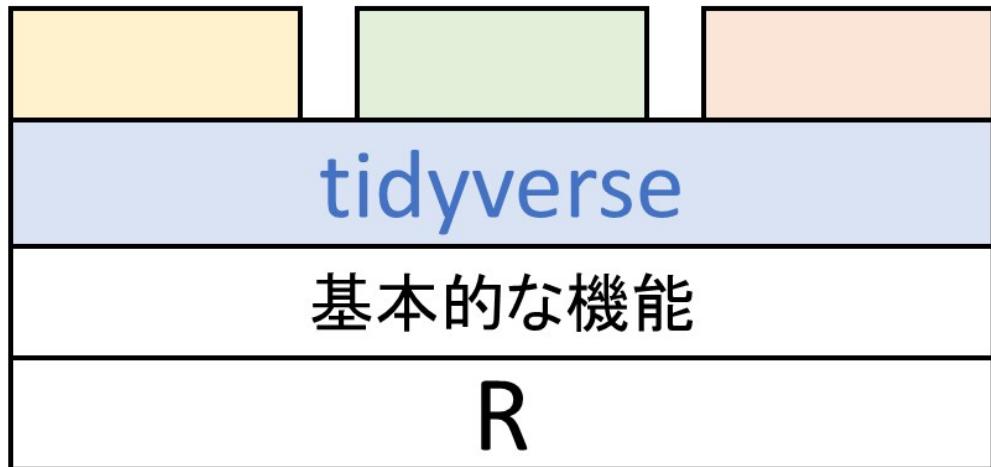
本コースで利用するパッケージ

tidyverse

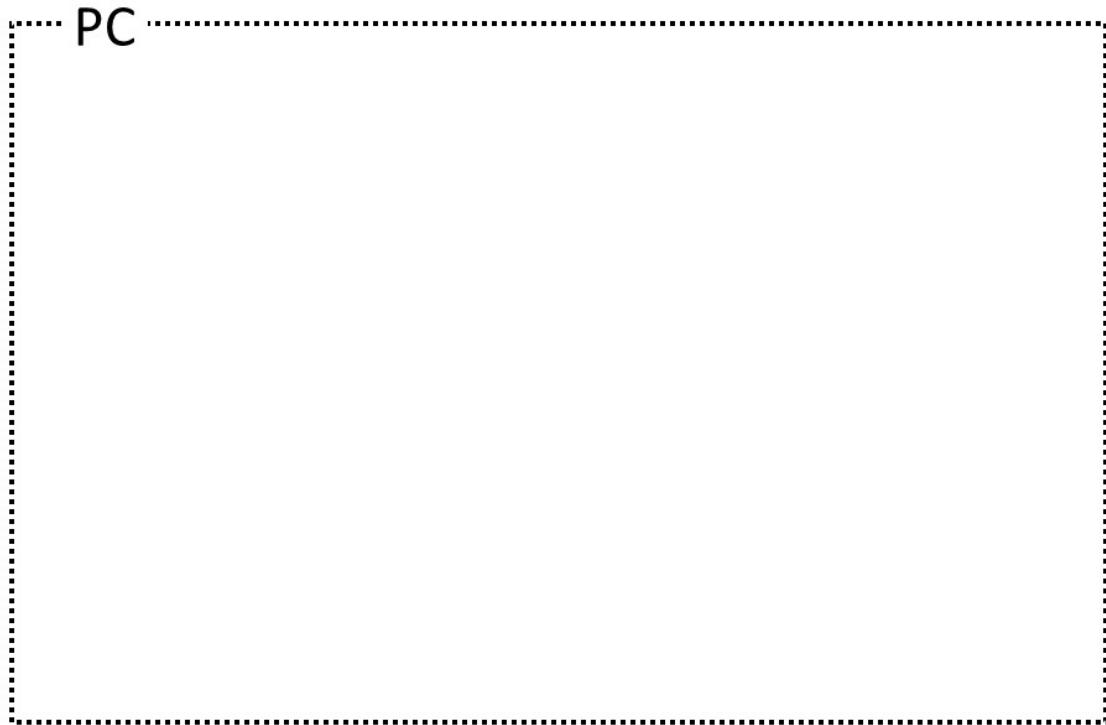
基本的な機能

R

本コースで利用するパッケージ



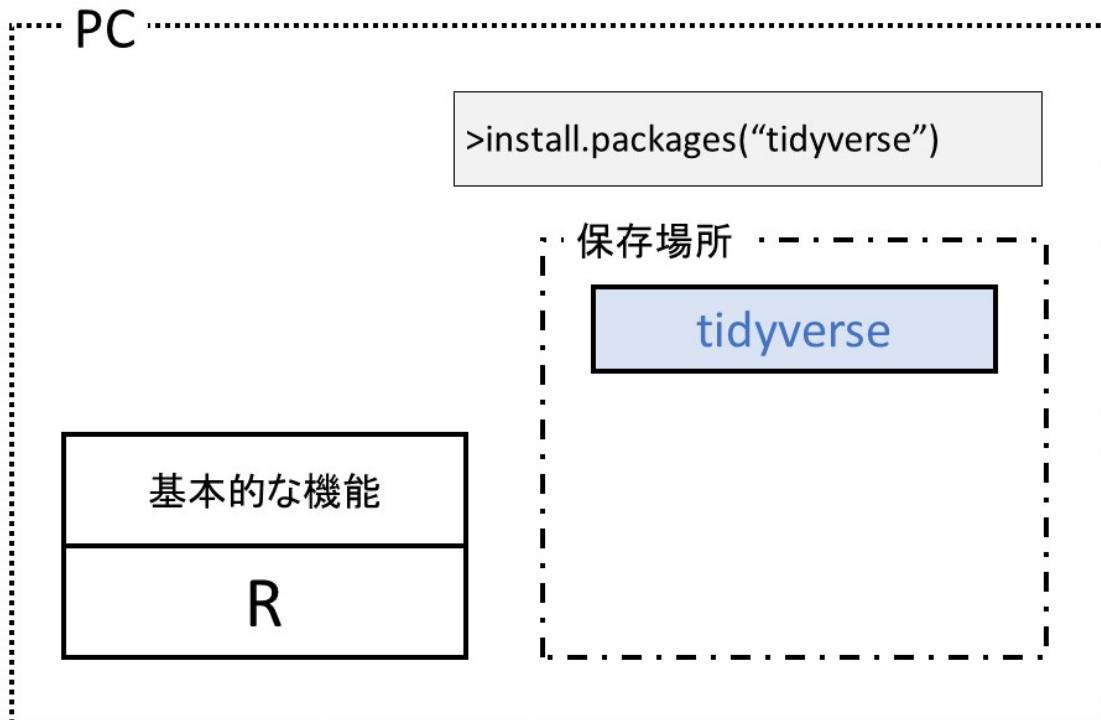
パッケージの使い方のイメージ



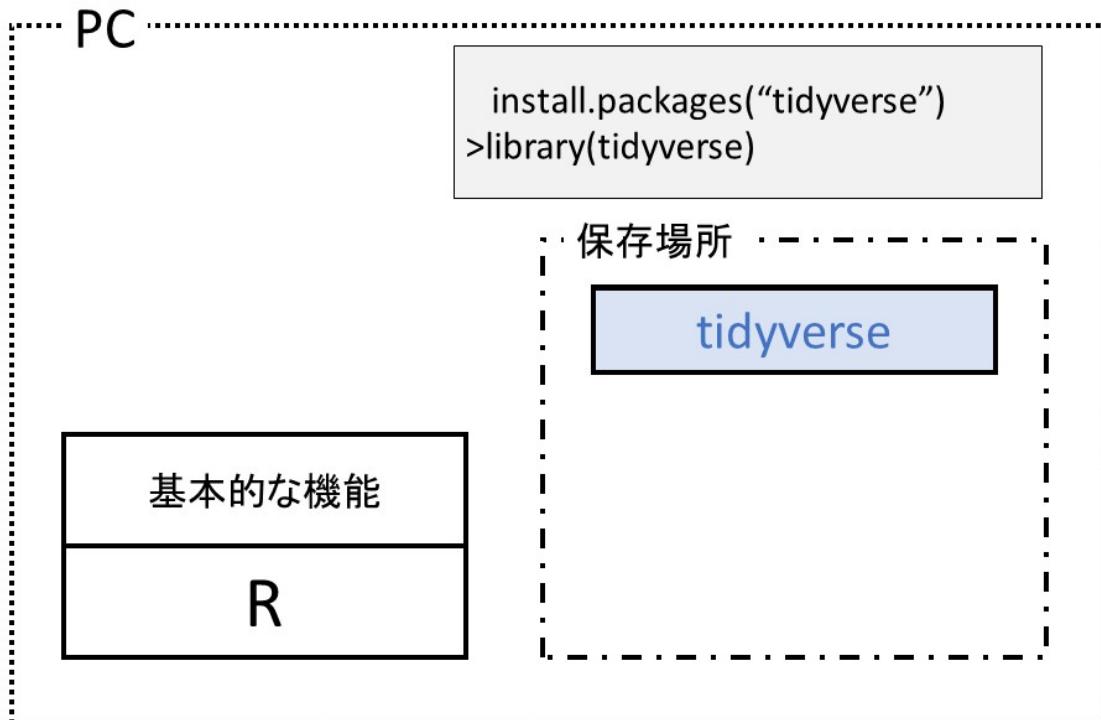
パッケージの使い方のイメージ



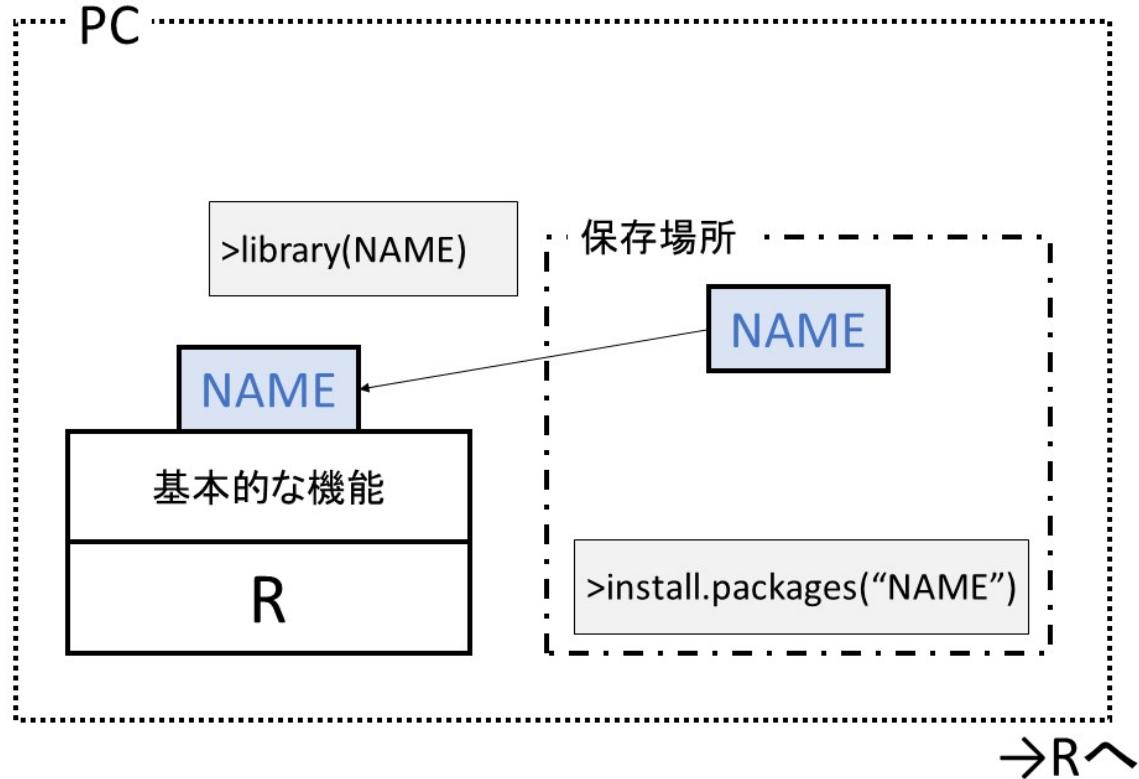
パッケージの使い方のイメージ



パッケージの使い方のイメージ



パッケージの使い方のイメージ



28 ()(L30)

```
tidyverse
```

```
tidyverse      R      R
```

```
install.packages("tidyverse")
```

```
tidyverse
```

```
Environment  Global Environment
```

```
library(tidyverse)
```

```
-- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
v dplyr     1.1.2     v readr     2.1.4
vforcats   1.0.0     v stringr   1.5.0
v ggplot2   3.4.2     v tibble    3.2.1
v lubridate 1.9.2     v tidyr    1.3.0
v purrr    1.0.1
-- Conflicts ----- tidyverse_conflicts() --
x dplyr::filter() masks stats::filter()
x dplyr::lag()    masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to beco
```

```
Packages  Tidyverse      Environment
```

```
tidyverse
```

```

vec_id <- c(1:7)
vec_namae <- c("A", "B", "C", "D", "E", "F", "G")
vec_by <- c(1987, 1930, 1940, 1972, 1954, 1987, 1930)
vec_gender <- c("", "", "", "", "", "", "")
vec_admission <- c("2018-1-23", "2018-1-27",
                    "2018-2-4", "2018-3-2", "2018-3-10",
                    "2018-3-12", "2018-3-15")
vec_discharge <- c("2018-1-30", "2018-2-1",
                    "2018-2-9", "2018-3-3", "2018-3-13",
                    "2018-3-13", "2018-4-1")
vec_is_dead <- c(0,0,0,0,0,1,0)

hyou <- data.frame(
  id = vec_id,
  name = vec_namae,
  seinen = vec_by,
  seibetu = vec_gender,
  admission_date = vec_admission,
  discharge_date= vec_discharge,
  is_dead = vec_is_dead
)

```

1

```

library(tidyverse)
library(lubridate)

hyou <- hyou %>%
  mutate(
    age_admission =
      year(as.Date(admission_date)) -
      as.numeric(seinen))

ggplot(data = hyou,
       mapping = aes(x = seibetu,
                     y = age_admission)) +
  geom_boxplot()

```

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x\$label), x\$x, x\$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>
```

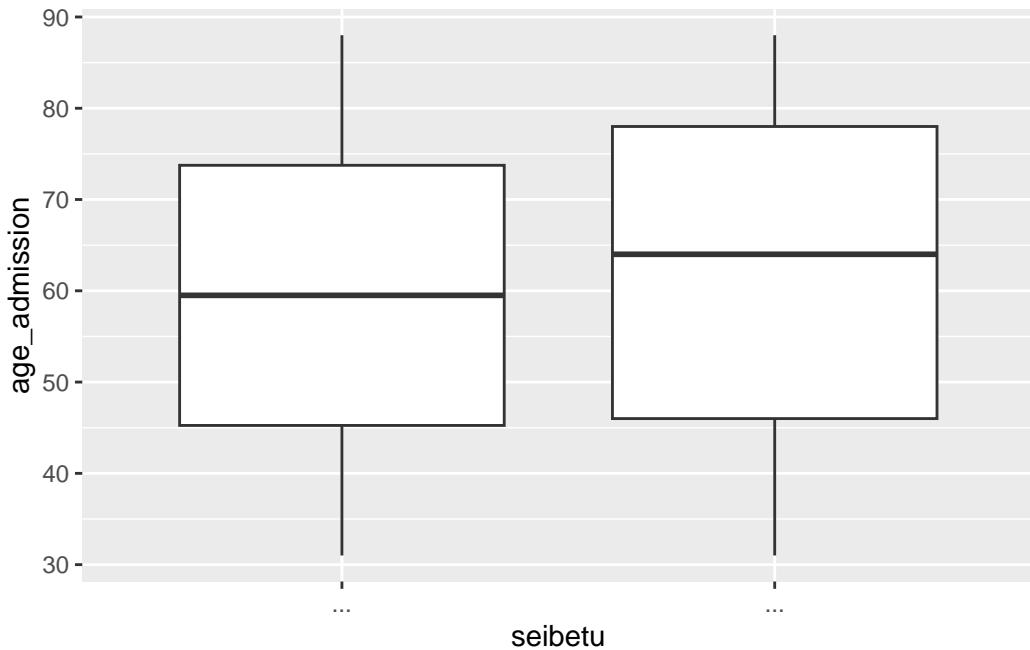
```
Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>
```

```
Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>
```

```
Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>
```

```
Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>
```

```
Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>
```



2

```
hyou <- hyou %>%
  mutate(nyuin_duration =
    as.Date(discharge_date) -
```

```

    as.Date(admission_date)) %>%
mutate(nyuin_duration = as.numeric(nyuin_duration))

ggplot(data = hyou,
       mapping = aes(x = nyuin_duration)) +
  geom_histogram(aes(fill = seibetu), binwidth = 1) +
  theme_classic()

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e5>

Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <a5>

Warning in grid.Call.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b3>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>
```

```
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

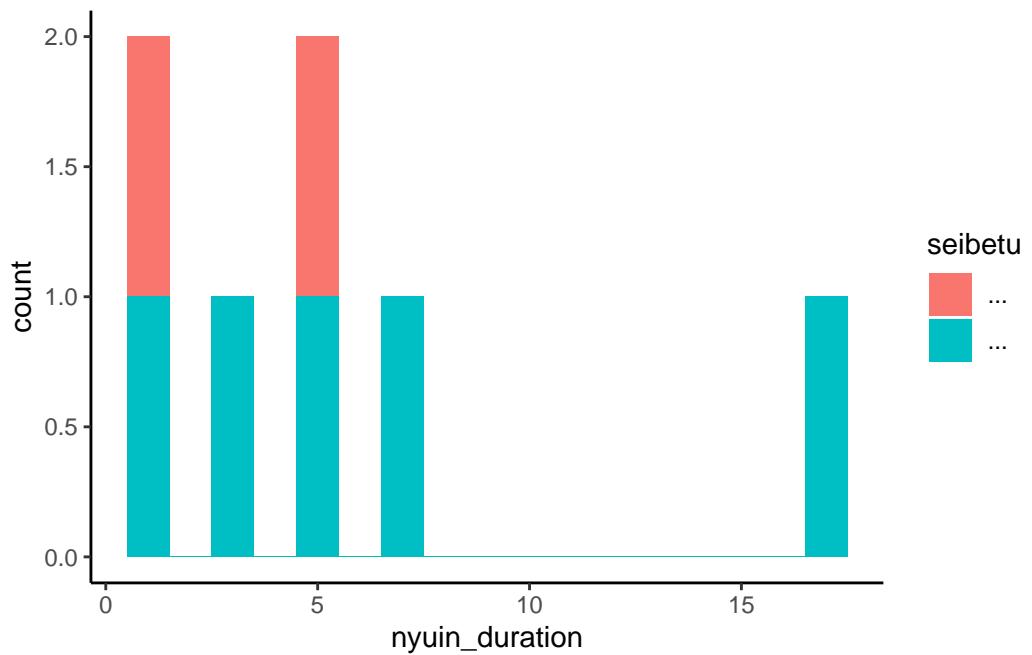
Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.Call(C_textBounds, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>

Warning in grid.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <e7>

Warning in grid.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <94>

Warning in grid.graphics(C_text, as.graphicsAnnot(x$label), x$x, x$y, :
conversion failure on ' ' in 'mbcsToSbcs': dot substituted for <b7>
```



29 (tidyverse)(L31)

29.0.1 1 R

```
.libPaths()
```

```
[1] "C:/Users/Nori/AppData/Local/R/win-library/4.3"  
[2] "C:/Program Files/R/R-4.3.1/library"
```

R ()

29.0.2 2

RStdudio

R Studio Windows10

RStudio

29.0.3 3

RStudio

/

30

関数(function)とは？

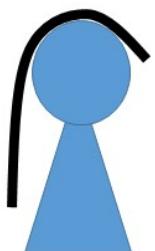
関数

関数(function)とは？

関数

=「機能」

例1：千円カット関数



千円カット

入力：髪の長い人
20cm

例1: 千円カット関数



入力→髪の長さ:20cm

例1: 千円カット関数



入力→髪の長さ:20cm

出力→髪の長さ:5cm

Rだったら、こう書きます。

千円カット(“髪の長さ:20cm”)

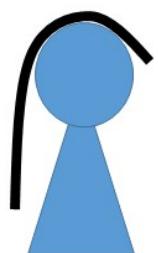
を実行すると、コンソールに、

[1] “髪の長さ:5cm”

が出力される！

(注:イメージです。こんな関数ありません。)

例：美容院関数

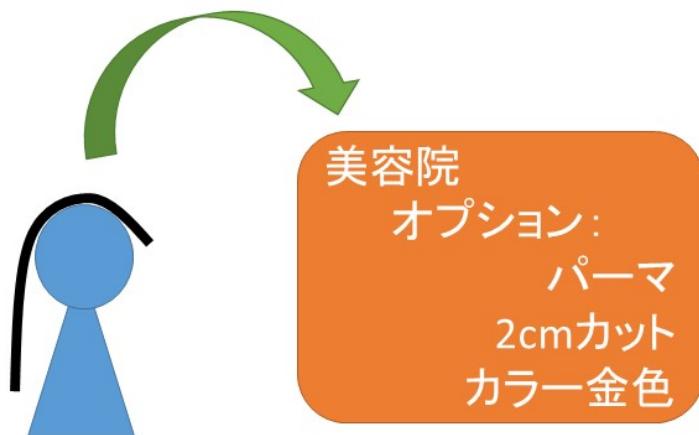


入力→髪の長さ20cm

例1：美容院関数

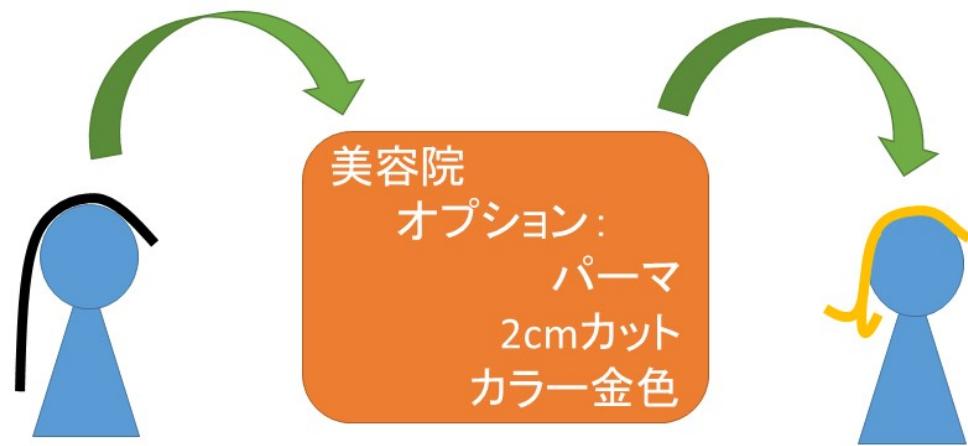


例1：美容院関数



入力→髪の長さ20cm

例1：美容院関数



入力→髪の長さ20cm

出力→髪の長さ:18cm
(パーマ:あり、色:金)

Rならこう書きます

美容室("髪の長さ:20cm", paama=TRUE, color="gold", length = 2)

入力

オプション

Rならこう書きます

美容室(髪の長さ:20cm, paama=TRUE, color="gold", length = 2)

入力

オプション

実行すると、

[1] “髪の長さ:18cm(パーマ:あり、色:金)”

→Rへ

31 (1)(L33)

```
("  :20cm",paama=TRUE,color="gold",length=2)  
“  :20cm”  paama=TRUE,color="gold",length=2
```

- ()
- Argument

Argument

```
sum
```

```
?sum
```

```
starting httpd help server ... done
```

?

- Description
- Usage
- Arguments
- Details
- Examples 4

31.0.1 Description

`sum` returns the sum of all the values present in its arguments.

sum argument

31.0.2 Usage

```
sum(..., na.rm = FALSE)
```

31.0.3 Arguments

Usage `sum`

- ... : numeric or complex or logical vectors.
- na.rm: logical. Should missing values (including NaN) be removed?

31.0.4 Details

Arguments

31.0.5 Examples

Examples

| | | |
|----------|------------------|-----------|
| Examples | <code>sum</code> | Arguments |
|----------|------------------|-----------|

32 (2)(L34)

A Pass a vector to sum, and it will add the elements together.

```
sum(1:5)
```

```
[1] 15
```

B Pass several numbers to sum, and it also adds the elements.

```
sum(1, 2, 3, 4, 5)
```

```
[1] 15
```

C In fact, you can pass vectors into several arguments, and everything gets added.

```
sum(1:2, 3:5)
```

```
[1] 15
```

D If there are missing values, the sum is unknown, i.e., also missing,

```
sum(1:5, NA)
```

```
[1] NA
```

E ... unless we exclude missing values explicitly:

```
sum(1:5, NA, na.rm = TRUE)
```

```
[1] 15
```

A-E

A

1:5

```
[1] 1 2 3 4 5
```

5

c(1,2,3,4,5)

```
[1] 1 2 3 4 5
```

```
sum(1:5) #A sum(1,2,3,4,5) #B
```

Usage: sum(..., na.rm = FALSE)

Arguments:

... : numeric or complex or logical vectors.

| ... 1 argument | ... Argument | |
|----------------|-------------------------------|---------|
| sum ... vector | * numeric * complex * logical | numeric |

```
sum(1:5) #A  
sum(1,2,3,4,5) #B
```

sum(c(1,2,3,4,5))

```
[1] 15
```

```
a <- c(1,2,3,4,5)
sum(a)
```

[1] 15

```
C      sum(1:2, 3:5) #C
sum(c(1,2),c(3,4,5))
```

[1] 15

```
v1 <- c(1,2)
v2 <- c(3,4,5)
sum(v1,v2)
```

[1] 15

D

```
sum(1,2,3,4,5,NA)
```

[1] NA

NA

E

```
sum(1,2,3,4,5,NA, na.rm=TRUE)
```

[1] 15

na.rm argument TRUE NA
TRUE Logical (Boolean)

TRUE

[1] TRUE

FALSE

[1] FALSE

na.rm Argument

Usage: sum(..., na.rm = FALSE)

Arguments:

na.rm: logical. Should missing values (including NaN) be removed?

Usage na.rm=FALSE

A,B,C,D na.rm

1

Usage

argument

Usage Arguments Examples

sum

33 () (L35)

—
—
as.numeric()
as.character()
c()
data.frame()
View()
install.packages()
library()
sum()

8

sum(), summary(), unique(), sort() summary unique sort

?summary

Examples

Examples

head(attenu)

| | event | mag | station | dist | accel |
|---|-------|-----|---------|------|-------|
| 1 | 1 | 7.0 | 117 | 12 | 0.359 |
| 2 | 2 | 7.4 | 1083 | 148 | 0.014 |
| 3 | 2 | 7.4 | 1095 | 42 | 0.196 |
| 4 | 2 | 7.4 | 283 | 85 | 0.135 |
| 5 | 2 | 7.4 | 135 | 107 | 0.062 |
| 6 | 2 | 7.4 | 475 | 109 | 0.054 |

```
# R  
summary(attenu, digits = 4) #-> summary.data.frame(...), default precision
```

| event | mag | station | dist |
|---------------|---------------|-------------|----------------|
| Min. : 1.00 | Min. :5.000 | 117 : 5 | Min. : 0.50 |
| 1st Qu.: 9.00 | 1st Qu.:5.300 | 1028 : 4 | 1st Qu.: 11.32 |
| Median :18.00 | Median :6.100 | 113 : 4 | Median : 23.40 |
| Mean :14.74 | Mean :6.084 | 112 : 3 | Mean : 45.60 |
| 3rd Qu.:20.00 | 3rd Qu.:6.600 | 135 : 3 | 3rd Qu.: 47.55 |
| Max. :23.00 | Max. :7.700 | (Other):147 | Max. :370.00 |
| | | NA's : 16 | |

| accel |
|-----------------|
| Min. :0.00300 |
| 1st Qu.:0.04425 |
| Median :0.11300 |
| Mean :0.15422 |
| 3rd Qu.:0.21925 |
| Max. :0.81000 |

```
summary(attenu $ station, maxsum = 20) #-> summary.factor(...)
```

| | | | | | | | | | |
|-----|------|------|------|-----|------|------|------|---------|------|
| 117 | 1028 | 113 | 112 | 135 | 475 | 1030 | 1083 | 1093 | 1095 |
| 5 | 4 | 4 | 3 | 3 | 3 | 2 | 2 | 2 | 2 |
| 111 | 116 | 1219 | 1299 | 130 | 1308 | 1377 | 1383 | (Other) | NA's |
| 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 120 | 16 |

```
lst <- unclass(attenu$station) > 20 # logical with NAs  
## summary.default() for logicals -- different from *.factor:  
summary(lst)
```

| Mode | FALSE | TRUE | NA's |
|---------|-------|------|------|
| logical | 28 | 138 | 16 |

```
summary(as.factor(lst))
```

| FALSE | TRUE | NA's |
|-------|------|------|
| 28 | 138 | 16 |

Examples

```
summary(attenu)
```

```
  event          mag         station        dist
Min.   : 1.00   Min.   :5.000   117   : 5   Min.   : 0.50
1st Qu.: 9.00   1st Qu.:5.300   1028  : 4   1st Qu.: 11.32
Median :18.00   Median :6.100   113   : 4   Median : 23.40
Mean    :14.74   Mean    :6.084   112   : 3   Mean    : 45.60
3rd Qu.:20.00   3rd Qu.:6.600   135   : 3   3rd Qu.: 47.55
Max.   :23.00   Max.   :7.700   (Other):147  Max.   :370.00
                  NA's    : 16

  accel
Min.   :0.00300
1st Qu.:0.04425
Median :0.11300
Mean   :0.15422
3rd Qu.:0.21925
Max.   :0.81000
```

```
unique
```

```
?unique
```

```
x <- c(3:5, 11:8, 8 + 0:5)
x
```

```
[1] 3 4 5 11 10 9 8 8 9 10 11 12 13
```

```
(ux <- unique(x))
```

```
[1] 3 4 5 11 10 9 8 12 13
```

```
(u2 <- unique(x, fromLast = TRUE)) # different order
```

```
[1] 3 4 5 8 9 10 11 12 13

stopifnot(identical(sort(ux), sort(u2)))

length(unique(sample(100, 100, replace = TRUE)))

[1] 60

## approximately 100(1 - 1/e) = 63.21

head(unique(iris))

Sepal.Length Sepal.Width Petal.Length Petal.Width Species
1          5.1         3.5         1.4         0.2  setosa
2          4.9         3.0         1.4         0.2  setosa
3          4.7         3.2         1.3         0.2  setosa
4          4.6         3.1         1.5         0.2  setosa
5          5.0         3.6         1.4         0.2  setosa
6          5.4         3.9         1.7         0.4  setosa

unique

vec <- c(1,1,1,1,1,3,3,3,3,3,2,2,2,2,2)
unique(vec)

[1] 1 3 2

?sort

vec

[1] 1 1 1 1 1 3 3 3 3 2 2 2 2 2
```

```
unique(vec)
```

```
[1] 1 3 2
```

```
sort(unique(vec))
```

```
[1] 1 2 3
```

vec

```
?sort
```

Usage sort(x, decreasing = FALSE, ...) decreasing argument
decreasing logical. Should the sort be increasing or decreasing? logi-
cal TRUE FALSE

FALSE

```
sort(unique(vec), decreasing=FALSE)
```

```
[1] 1 2 3
```

```
sort(unique(vec), decreasing=TRUE)
```

```
[1] 3 2 1
```

OK

34 2 (L36)

!

R

- R studio
-
-
-
-
-
-
-
-

| Col1 | Col2 |
|--------------------|------|
| as.numeric() | |
| as.character() | |
| c() | |
| data.frame() | |
| View() | |
| install.packages() | |
| library() | |
| sum() | |
| summary() | |
| unique() | |
| sort() | |

11

126

1

/ R

R

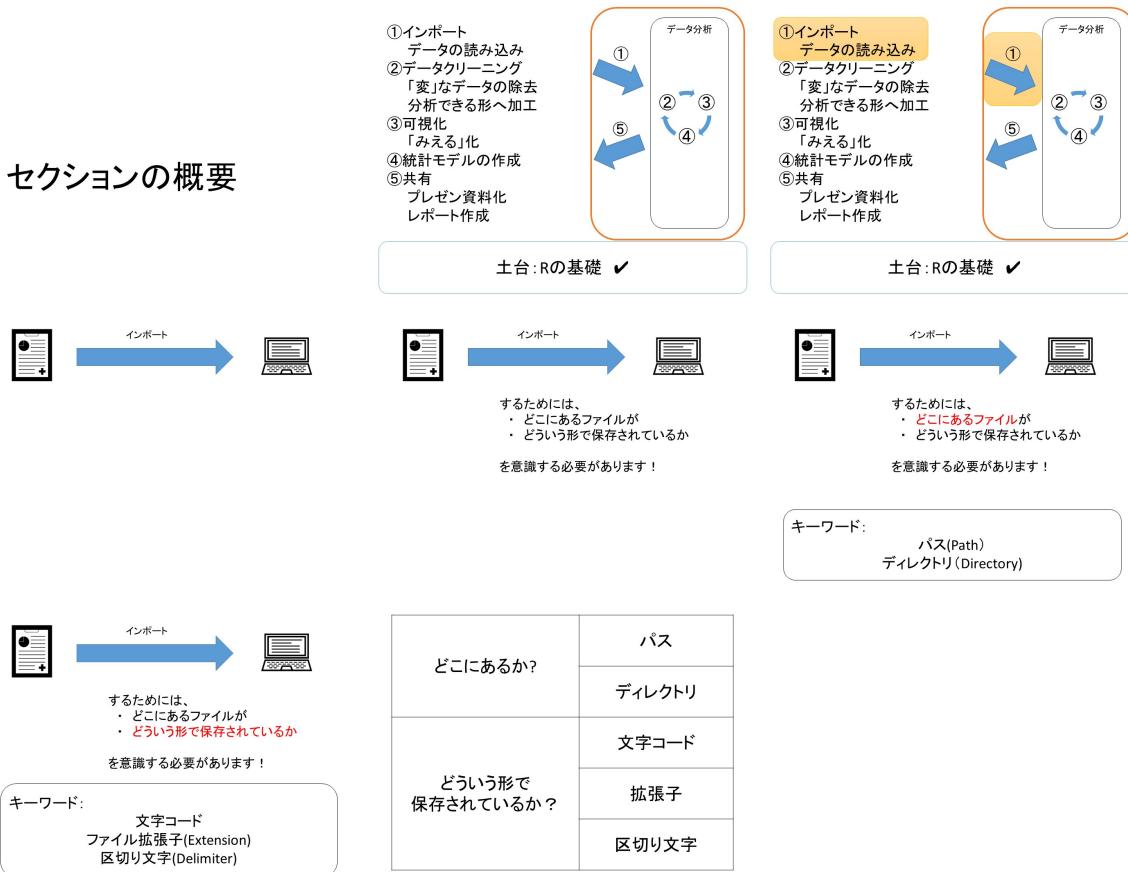
Part III

3:

R

35 (L37)

セクションの概要



36 (L38)

インポート: パス、ディレクトリ

注:

- この動画はWindowsの画面で説明をしていますが、MacでもLinuxでも考え方は同じです。
- 講師は、PCのプロではないので、「ファイルシステム」等の突っ込んだ話題はお答えできかねます。
- 本コースは、あくまで、「医療職・非エンジニアが前回のデータを何とか分析するようになる」ことを目的としています。



- するためには、
 • どこにあるファイルが
 • どういう形で保存されているか
 を意識する必要があります！

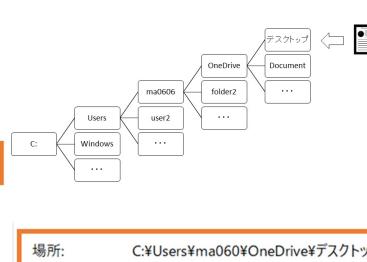
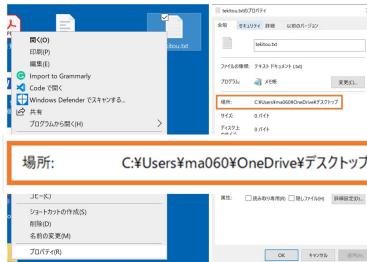
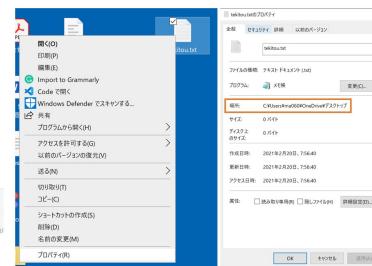
キーワード:
 パス(Path)
 ディレクトリ(Directory)

コンピューターはファイルを どのように区別しているか？

- 同じ場所に同じ名前のファイルを保存しようと怒られますよね？
- それは、コンピューターにとっては、ファイルを識別するのを「名前」に頼っているからです。

「名前」

- デスクトップに、「tekitou.txt」を保存します
- このとき、.txtが表示されない場合は、エクスプローラーを開いて「ファイル名拡張子」にチェックを入れてください。



¥バックスラッシュ(¥)

¥(MacやLinuxでは/)は、フォルダを分ける場合に使われる記号です。

C:\Users\ma060\OneDrive\Desktop\tekitou.txt

C ドライブの
 Users フォルダの中にある、
 ma060 フォルダの中にある、
 OneDrive フォルダの中にある、
 デスクトップ フォルダの中にある、
 tekitou という名前のテキストファイル

ディレクトリ=ファイルの場所

C:\Users\ma060\OneDrive\Desktop\tekitou.txt

C ドライブの
 Users フォルダの中にある、
 <ユーザー名> フォルダの中にある、
 Desktop フォルダの中にある、
 tekitou という名前のテキストファイル

フルパス=ファイルを特定

C:\Users\ma060\OneDrive\Desktop\tekitou.txt

C ドライブの
 Users フォルダの中にある、
 <ユーザー名> フォルダの中にある、
 Desktop フォルダの中にある、
 tekitou という名前のテキストファイル

毎回、フルパス書くのは面倒だ！

C:\Users\ma060\OneDrive\Desktop\tekitou.txt

37 (L39)

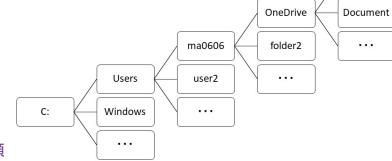
インポート 相対パスを理解しよう

C:\Users\ma060\OneDrive\デスクトップ\tekitou.txt
(フル)パス=ファイルを特定

C:\Users\ma060\OneDrive\デスクトップ\tekitou.txt

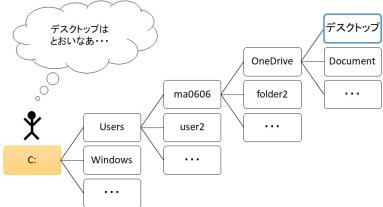
C ドライブの
Users フォルダの中にある、
<ユーザー名> フォルダの中にある、
Desktop フォルダの中にある、
tekitou という名前のテキストファイル

ディレクトリ + ファイル名
ファイル種類



C:\Users\ma060\OneDrive\デスクトップ\tekitou.txt

フルパス



Usersフォルダに行って、ma060フォルダに行って、OneDriveフォルダに行って、その中のDesktopフォルダに入ったら、tekitou.txtを見つかる！！！
次！

C:\Users\ma060\OneDrive\デスクトップ\tekitou1.txt
C:\Users\ma060\OneDrive\デスクトップ\tekitou2.txt
C:\Users\ma060\OneDrive\デスクトップ\tekitou3.txt

フルパス

Usersフォルダに行って、ma060フォルダに行って、OneDriveフォルダに行って、その中のDesktopフォルダに入ったら、tekitou2.txtを見つかる！！！
次！

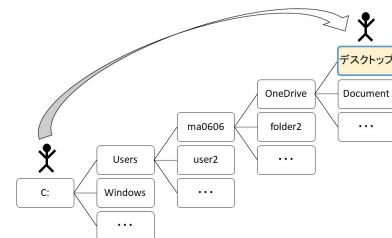
C:\Users\ma060\OneDrive\デスクトップ\tekitou1.txt
C:\Users\ma060\OneDrive\デスクトップ\tekitou2.txt
C:\Users\ma060\OneDrive\デスクトップ\tekitou3.txt

フルパス

Usersフォルダに行って、ma060フォルダに行って、OneDriveフォルダに行って、その中のDesktopフォルダに入ったら、tekitou3.txtを見つかる！！！
次！

C:\Users\ma060\OneDrive\デスクトップ\tekitou1.txt
C:\Users\ma060\OneDrive\デスクトップ\tekitou2.txt
C:\Users\ma060\OneDrive\デスクトップ\tekitou3.txt

C:\Users\ma060\OneDrive\デスクトップ\tekitou.txt



相対パス

ここまで移動したぞ…

C:\Users\ma060\OneDrive\デスクトップ\tekitou1.txt
C:\Users\ma060\OneDrive\デスクトップ\tekitou2.txt
C:\Users\ma060\OneDrive\デスクトップ\tekitou3.txt

相対パス

ファイルがすぐに見つかる！！

C:\Users\ma060\OneDrive\デスクトップ\tekitou1.txt
C:\Users\ma060\OneDrive\デスクトップ\tekitou2.txt
C:\Users\ma060\OneDrive\デスクトップ\tekitou3.txt

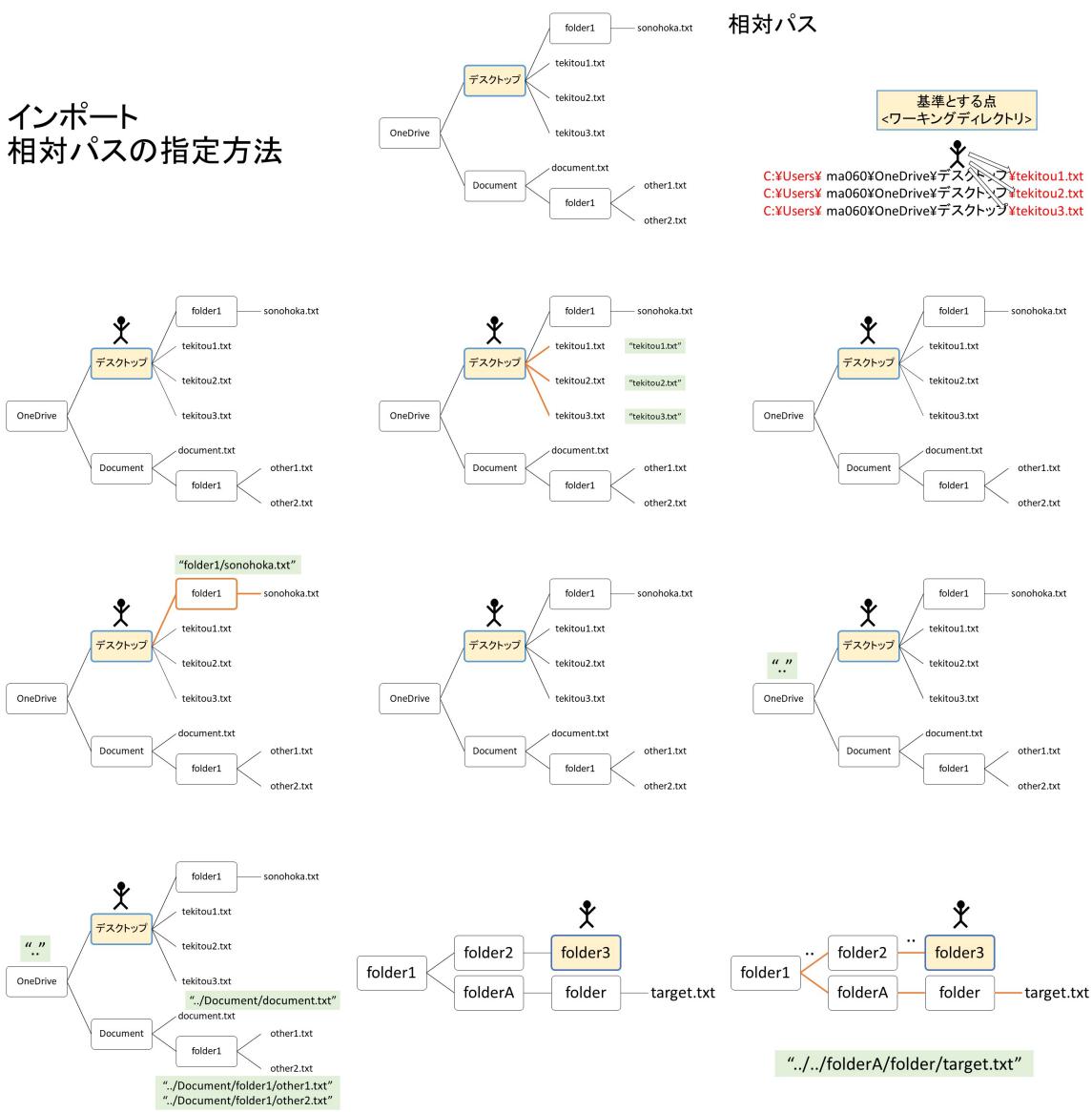
相対パス

ファイルがすぐに見つかる！！

C:\Users\ma060\OneDrive\デスクトップ\tekitou1.txt
C:\Users\ma060\OneDrive\デスクトップ\tekitou2.txt
C:\Users\ma060\OneDrive\デスクトップ\tekitou3.txt

38 (L40)

インポート 相対パスの指定方法



39 (L41)

?

RStudio

```
getwd()
```

```
[1] "C:/Users/Nori/Documents/ronlinecours-basiccourse/rintro2022/s3"
```

getwd R .Rproj
Files More -> Show folder in new window Windows Mac

40 (L42)

:

```
1           ichiji          tekitou.txt  
tekitou.txt
```

```
readr      read_file   readr     tidyverse
```

```
library(tidyverse)
```

```
read_f
```

```
?read_file
```

```
Usage      file locale  Argument          fileargument
```

```
file argument
```

Either a path to a file, a connection, or literal data (either a single string or a raw vector).

```
tekitou.txt
```

```
getwd()
```

```
ichiji      tekitou.txt
```

```
full_path <- "D:/R_Course_2021/Section3_ /ichiji/tekitou.txt"
```

```
full_path
```

```
read_file(full_path)
```

```
read_file("D:/R_Course_2021/Section3_ /ichiji/tekitou.txt")
```

```
new_hensu <- read_file(full_path)  
new_hensu
```

?

```
get_wd()#  
full_path#  
  
read_file("ichiji/tekitou.txt")
```

RStudio ctrl+space ““

```
read_file("") #  
  
ctrl+space
```

41 : (L43)

R

R

```
1 "ichiji/tekitou.txt"  
2 suuji.txt 100 4  
  
1 "ichiji/tekitou.txt"  
  
hensu <- readr::read_file("ichiji/tekitou.txt")  
  
library(readr)  
hensu <- read_file("ichiji/tekitou.txt")  
  
library(tidyverse)  
  
-- Attaching core tidyverse packages ----- tidyverse 2.0.0 --  
v dplyr     1.1.2     v purrr     1.0.1  
vforcats    1.0.0     v stringr    1.5.0  
v ggplot2   3.4.2     v tibble    3.2.1  
v lubridate 1.9.2     v tidyr    1.3.0  
-- Conflicts ----- tidyverse_conflicts() --  
x dplyr::filter() masks stats::filter()  
x dplyr::lag()   masks stats::lag()  
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to becom  
  
file_path <- "ichiji/tekitou.txt"  
hensu <- read_file(file_path)
```

```
2 suuji.txt 100 4
```

```
library(tidyverse)
suuji <- read_file("ichiji/suuji.txt")
suuji

[1] "100"

suuji * 4
```

Error in suuji * 4: non-numeric argument to binary operator

```
str(suuji) #
chr "100"

as.numeric(suuji) * 4
```

[1] 400

OK
as.numeric

42 (L44)

インポートの事前知識: 文字コード



- するためには、
- ・どこにあるファイルが
- ・どういう形で保存されているか

を意識する必要があります！

キーワード:
文字コード
ファイル拡張子(Extension)
区切り文字(Delimiter)

文字コードのイメージ

```
0100010101010101  
0101010101011111  
0101010110100101  
0101011010101111  
0100010101010101  
1000101010101011  
0101010101010101  
0101010101010101  
10101...
```

文字コードのイメージ

010001010...
ビット(bit)
8 bit = 1 Byte

文字コードのイメージ

010001010...
ビット(bit)
8 bit = 1 Byte

$$2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 2^8 = 256\text{通り}$$

0100 0101

4ビット(bit)

| | 1 | 2 | 3 | 4 | 2進数 | 16進数 |
|---|---|---|---|---|------|------|
| 0 | 0 | 0 | 0 | 0 | 0000 | 0 |
| 0 | 0 | 0 | 1 | 0 | 0001 | 1 |
| 0 | 0 | 1 | 0 | 0 | 0010 | 2 |
| 0 | 0 | 1 | 1 | 0 | 0011 | 3 |
| 0 | 1 | 0 | 0 | 0 | 0100 | 4 |
| 0 | 1 | 0 | 1 | 0 | 0101 | 5 |
| 0 | 1 | 1 | 0 | 0 | 0110 | 6 |
| 0 | 1 | 1 | 1 | 0 | 0111 | 7 |
| 1 | 0 | 0 | 0 | 0 | 1000 | 8 |
| 1 | 0 | 0 | 1 | 0 | 1001 | 9 |
| 1 | 0 | 1 | 0 | 0 | 1010 | A |
| 1 | 0 | 1 | 1 | 0 | 1011 | B |
| 1 | 1 | 0 | 0 | 0 | 1100 | C |
| 1 | 1 | 0 | 1 | 0 | 1101 | D |
| 1 | 1 | 1 | 0 | 0 | 1110 | E |
| 1 | 1 | 1 | 1 | 0 | 1111 | F |

文字コードのイメージ

8F 43 89 03 AB D3
E5 8F BB AF 36 94
21...

| | 上位4bit | | | | | | | |
|---|--------|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 0 | a | q | G | W | ! | { | | |
| 1 | b | r | H | X | @ | | | |
| 2 | c | s | I | Y | # | | | |
| 3 | d | t | J | Z | S | X | | |
| 4 | e | u | K | 0 | % | ~ | | |
| 5 | f | v | L | 1 | ^ | . | | |
| 6 | g | w | M | 2 | & | < | | |
| 7 | h | x | N | 3 | * | > | | |
| 8 | i | y | O | 4 | (| | | |
| 9 | j | z | P | 5 |) | | | |
| A | k | A | Q | 6 | - | | | |
| B | l | B | R | 7 | . | | | |
| C | m | C | S | 8 | + | | | |
| D | n | D | T | 9 | = | | | |
| E | o | E | U | , | { | | | |
| F | p | F | V | . | } | | | |

文字コードのイメージ

8F 43 89 03 AB D3
E5 8F BB AF 36 94
21...

Good Morning!

文字コードのイメージ

8F 43 89 03 AB D3
E5 8F BB AF 36 94
21...

Good Morning!

43 (L45)

tekitou2.txt R

File->New File->Text File

File->Save with Encoding

CP932

CP932 Windows

```
library(readr)
read_file("ichiji/tekitou2.txt")
```

?

R utf-8

CP932 UTF-8

CP932 UTF-8 Windows

read_file

```
locale()
```

Encoding locale()

(R)

```
initial_locale <- locale()
initial_locale
```

```
initial_locale read_file locale Argument
|   read_file("ichiji/tekitou2.txt",
|             locale = initial_locale)
|
|   tekitou2.txt cp932           read_file locale Argument      CP932
|
|?locale
|
|encoding Argument      UTF-8 cp932
|
|  locale_with_cp932 <- locale(encoding = "cp932")
|  locale_with_cp932
|
|    read_file
|
|    read_file("ichiji/tekitou2.txt",
|              locale = locale_with_cp932)
|
|locale
|
|read_file("ichiji/tekitou2.txt", locale(encoding="cp932"))
|
|?read_file
|
|Usage          readr          locale(encoding="cp932")
|
| (      )
```

44 () (L46)

```
“cp932” “shift-jis” locale  
guess_encoding
```

```
read_file("ichiji/tekitou2.txt")
```

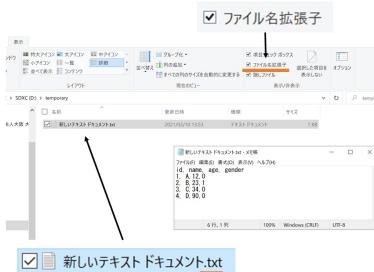
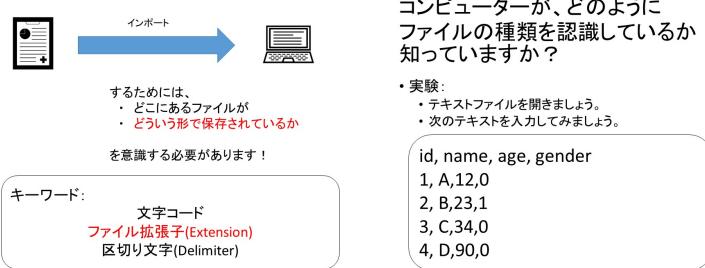
```
guess_encoding("ichiji/tekitou2.txt")
```

```
( cp932 Shift-jis )
```

```
read_file("ichiji/tekitou2.txt",locale(encoding="shift-jis"))  
read_file("ichiji/tekitou2.txt",locale(encoding="cp932"))
```

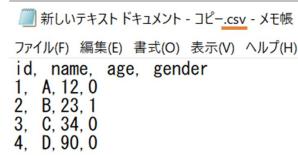
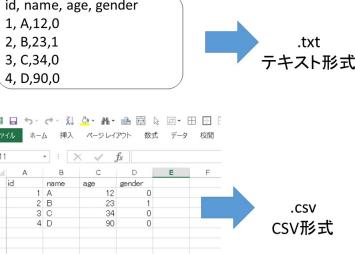
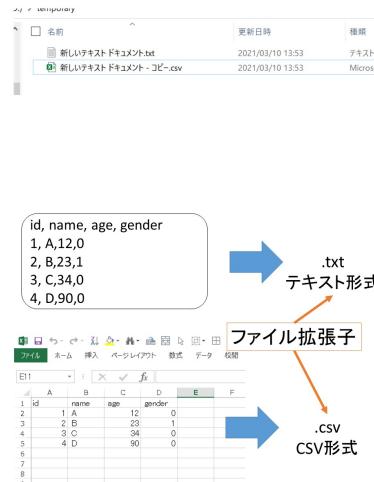
45 (L47)

インポートの事前知識： 拡張子



- Macでの拡張子の表示は
- Finderで環境設定→詳細
- すべてのファイル名拡張子を表示を選択

- Macでの拡張子の表示は
- Finderで環境設定→詳細
- すべてのファイル名拡張子を表示を選択



拡張子の例

| | 拡張子 | パッケージ |
|--------|----------|--------|
| テキスト形式 | csv | readr |
| | tsv | |
| エクセル | xlsx | readxl |
| | xls (古い) | |
| STATA | dta | haven |
| SPSS | sav | |
| SAS | sas7bdat | |

拡張子の例

| | 拡張子 | パッケージ |
|--------|----------|--------|
| テキスト形式 | csv | readr |
| | tsv | |
| エクセル | xlsx | readxl |
| | xls (古い) | |
| STATA | dta | haven |
| SPSS | sav | |
| SAS | sas7bdat | |

拡張子の例

| | 拡張子 | パッケージ |
|--------|----------|--------|
| テキスト形式 | csv | readr |
| | tsv | |
| エクセル | xlsx | readxl |
| | xls (古い) | |
| STATA | dta | haven |
| SPSS | sav | |
| SAS | sas7bdat | |

46 (L48)

インポートの事前知識：
区切り文字

区切り文字 Delimiter

CSV: Comma Separated Value

- カンマ[,]で区切られた 値（直訳）
- テキストファイルの1行が行に対応。
- 「,」で縦の棒をあらわして列に対応します。

| | A | B | C | D |
|-----------|------|-----|--------|---|
| id | name | age | gender | |
| 1, A,12,0 | 1 A | 12 | 0 | |
| 2, B,23,1 | 2 B | 23 | 1 | |
| 3, C,34,0 | 3 C | 34 | 0 | |
| 4, D,90,0 | 4 D | 90 | 0 | |

これらは、デリミターが違うだけで全て同じです

id, name, age, gender
1, A,12,0
2, B,23,1
3, C,34,0
4, D,90,0

id; name; age; gender
1; A; 12; 0
2; B; 23; 1
3; C; 34; 0
4; D; 90; 0

Id name age gender
1 A 12 0
2 B 23 1
3 C 34 0
4 D 90 0

tab

id, name, age, gender
1, A,12,0
2, B,23,1
3, C,34,0
4, D,90,0

id; name; age; gender
1; A; 12; 0
2; B; 23; 1
3; C; 34; 0
4; D; 90; 0

Id name age gender
1 A 12 0
2 B 23 1
3 C 34 0
4 D 90 0

tab

CSV

tsv

拡張子の例

| | 拡張子 | パッケージ |
|--------|----------|--------|
| テキスト形式 | csv | readr |
| | tsv | |
| エクセル | xlsx | readxl |
| | xls (古い) | |
| STATA | dta | haven |
| SPSS | sav | |
| SAS | sas7bdat | |