apply()，lapply()，sapply()，tapply()的区别

2-2 minutes

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1.apply（）函数

apply的输入为data.frame或matrix，输出为 vector, list or array。

> apply(X, MARGIN, FUN)
> Here:
> -x: an array or matrix
> -MARGIN: take a value or range between 1 and 2 to define where to apply the function:
> -MARGIN=1: the manipulation is performed on rows -MARGIN=2: the manipulation is performed on columns
> -MARGIN=c(1,2)` the manipulation is performed on rows and columns
> -FUN: tells which function to apply. Built functions like mean, median, sum, min, max and even user-defined functions can be applied

```
> m<-matrix(1:20,nrow=4)
> m
     [,1] [,2] [,3] [,4] [,5]
[1,]    1    5    9   13   17
[2,]    2    6   10   14   18
[3,]    3    7   11   15   19
[4,]    4    8   12   16   20
> apply.m<-apply(m,1,sum)
> apply.m
[1] 45 50 55 60
```

2.lapply() function

lapply（）函数输入为 list, vector or data.frame,输出为list。

lapply(X, FUN)

Arguments:

-X: A vector or an object

-FUN: Function applied to each element of x

```
> movies <- c("SPYDERMAN","BATMAN","VERTIGO","CHINATOWN")
> movies_lower <-lapply(movies, tolower)
> str(movies_lower)
List of 4
 $ : chr "spyderman"
 $ : chr "batman"
 $ : chr "vertigo"
 $ : chr "chinatown"
```

3.sapply() function

sapply() 输入为 list, vector or data.frame， 输出为 vector or matrix. sapply()与 lapply() 可以完成相同的工作，但是输出的格式不一样。

sapply(X, FUN)

Arguments:

-X: A vector or an object

-FUN: Function applied to each element of x

```
> dt <- cars
> lmn_cars <- lapply(dt, min)
> smn_cars <- sapply(dt, min)
> lmn_cars
$speed
[1] 4

$dist
[1] 2

> smn_cars
speed  dist
    4     2
```

image.png

一张总结的图：

Function	Arguments	Objective	Input	Output
apply	apply(x, MARGIN, FUN)	Apply a function to the rows or columns or both	Data frame or matrix	vector, list, array
lapply	lapply(X, FUN)	Apply a function to all the elements of the input	List, vector or data frame	list
sapply	sappy(X FUN)	Apply a function to all the elements of the input	List, vector or data frame	vector or matrix

4.tapply() function

tapply() 用于对一个vector做一个函数运算 (如：mean, median, min, max, etc..) 。

tapply(X, INDEX, FUN = NULL)
Arguments:
-X: An object, usually a vector
-INDEX: A list containing factor
-FUN: Function applied to each element of x

```
> data(iris)
> tapply(iris$Sepal.Width, iris$Species, median)
    setosa versicolor  virginica
       3.4        2.8        3.0
```

参考：
https://www.guru99.com/r-apply-sapply-tapply.html#2

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