Introduction to R Software

Lists

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Lists

Vectors, matrices, and arrays is that each of these types of objects may only contain one type of data.

For example, a vector may contain all numeric data or all character data.

A list is a special type of object that can contain data of multiple types.

Lists are characterized by the fact that their elements do not need to be of the same object type.

Lists

❖ **Lists can contain elements of different types so that the list elements may have different modes.**

❖ **Lists can even contain other structured objects, such as lists and data frames which allows to create recursive data structures.**

❖ **Lists can be indexed by position.**

So `x[[5]]` refers to the fifth element of `x`.

Lists

❖ **Lists can extract sublists.**

So `x[c(2,5)]` is a sublist of `x` that consists of the second and fifth elements.

❖ **List elements can have names.**

Both `x[["Students"]]` and `x$Students` refer to the element named `"Students"`.

❖ **Difference between a vector and a list :**

- In a vector, all elements must have the same mode.

- In a list, the elements can have different modes.

Lists

Mode:

Every object has a mode.

The mode indicates how the object is stored in memory: as a

- ✓ **number,**

- ✓ **character string,**

- ✓ **list of pointers to other objects,**

- ✓ **function etc.**

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Mode:

Object	Example	Mode
Number	`1.234`	numeric
Vector of numbers	`c(5, 6, 7, 8)`	numeric
Character string	`"India"`	character
Vector of character strings	`c("India", "USA")`	character
Factor	`factor(c("UP", "MP"))`	numeric
List	`list("India", "USA")`	list
Data frame	`data.frame(x=1:2, y=c("India", "USA"))`	list
Function	`print`	function

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Mode:

`mode` **function gives us such information.**

Syntax

`mode()`

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Mode:

Example

```
> mode(1.234)
[1] "numeric"

> mode(c(5,6,7,8))
[1] "numeric"

> mode("India")
[1] "character"

> mode(c("India", "USA"))
[1] "character"
```

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Mode:

```
> mode(1.234)
[1] "numeric"
> mode(c(5,6,7,8))
[1] "numeric"
> mode("India")
[1] "character"
> mode(c("India", "USA"))
[1] "character"
> mode(factor(c("UP", "MP")) )
[1] "numeric"
> mode(list("India", "USA"))
[1] "list"
```

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Mode:

Example

```
> mode(factor(c("UP", "MP")) )
[1] "numeric"

> mode(list("India", "USA"))
[1] "list"

> mode(data.frame(x=1:2, y=c("India", "USA")))
[1] "list"

> mode(print)
[1] "function"
```

Lists

```
R Console

> mode(factor(c("UP", "MP")) )
[1] "numeric"
> mode(list("India", "USA"))
[1] "list"
> mode(data.frame(x=1:2, y=c("India", "USA")))
[1] "list"
> mode(print)
[1] "function"
```