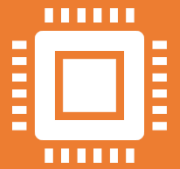
Class 3

R – Variables and Data types

Variables



It’s a named storage used for **manipulation** and **reference** in R program.

R variable can store atomic vector, group of atomic vectors or combination of many R objects.

In every programming language, users/programmers need to store various information for data analysis.

Variables

It’s a reserved memory location.

Every variable occupies space based on the data type in the physical memory.

Based on the data type of variable, the operating system allocates memory.

Variables

- The variable names starts with letters or not starts with number.
- Variable name consists of

letters (Aa – Zz)

numbers (0-9)

dot (.)

underline (_)

Rules in variables

- Variable name cannot start with underscore (_)

_varname

“Error: unexpected input in "_"”

_

Rules in variables

- Special characters (Ex. %,@) not allowed.

  Underscore (_) and dot (.) only allowed

varname@

“Error: unexpected input in “varname@"”

Rules in variables

- Variable cannot start with numerical digits

1varname

“Error: unexpected input in “1varname"”

Rules in variables

- Variable name cannot start with a dot which is followed by a digit

.1varname

“Error: unexpected input in “.1varname"”

Rules in variables

- Variable name should starts with letter.
- It can contains number, underscore and dot.

var_name **var_name1**

var.name1

Variable assignment

- Variables can be assigned vales using leftward, rightward and equal operators
- Equal operator

  var_name = 123

- Leftward operator

  var_name <- 123

- Rightward operator

  123 -> var_name

Finding/Deleting variable

ls() function used to list all variables in the workspace

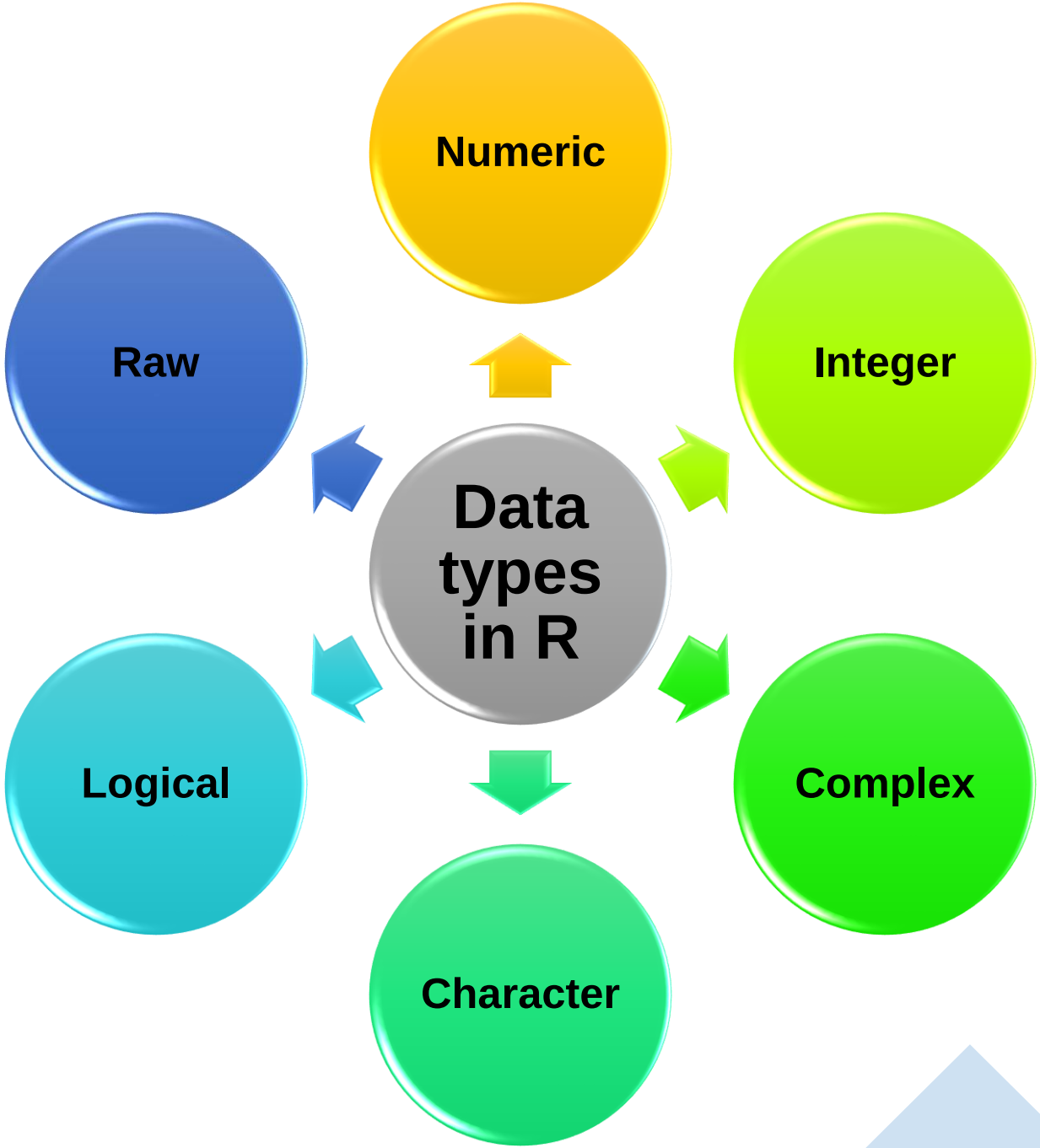
ls()

rm() function used to delete variables in the workspace

rm(var_name)

Data types in R

- Data type is an attribute of data which informs the interpreter how the programmers wants to use the data.
- Several data types are available in R like integer, string, etc.
- R provides the class() and typeof() function to find out what is the class and type of any variable.


Numeric
Raw
Integer
Data types in R
Logical
Complex
Character

Logical

- Logical data type stores logical or Boolean values of TRUE or FALSE.

```
> var_name <- TRUE

> class(var_name)

> typeof(var_name)
```

Numeric

- It stores the numeric values
- Default data type for numbers in R
- Example: 1, -1, 1.01, etc

```
> var_name <- 10

> class(var_name)

> typeof(var_name)
```

Integer

- Used for integer values
- Integer data types used for distinct values
- as.integer() function used to store values
- Example: 1, 2, etc

```
> var_name <- as.integer(10)

> class(var_name)

> typeof(var_name)
```

Complex

- Store numbers with imaginary component
- Example: 1+4i, 10i, etc

```
> var_name <- 6+3i

> class(var_name)

> typeof(var_name)
```

Character

- Stores strings or character values
- It can contain alphabet, symbols and numbers
- Stored in the variable with single or double inverted commas

```
> var_name <- “ATGCT1234@”

> class(var_name)

> typeof(var_name)
```

Raw

- Used to hold raw bytes
- charToRaw() function helps to store raw values

```
> var_name <- charToRaw(“ATGCT”)

> class(var_name)

> typeof(var_name)
```

Converting Data types in R

- Conversion into numeric — as.numerical()
- Conversion into integer — as.integer()
- Conversion into complex — as.complex()
- Conversion into logical — as.logical()
- Conversion into character — as.character()

Conversion into numeric

- as.numeric() function used for convert other data types into numeric values
- Integer value to numeric
- Complex value to numeric. (Imaginary part will be removed)
- Logical value to numeric (True → 1, False → 0)
- Character to numeric. Symbols, alphabets converted into NA.

Conversion into integer

- as.integer() function used for convert other data types into integer values
- Numeric value to integer. Removes decimal part in the number.
- Complex value to integer. (Imaginary part will be removed)
- Logical value to integer (True → 1, False → 0)
- Character to integer. Symbols, alphabets converted into NA.

Conversion into Complex

- as.complex() function used for convert other data types into complex values
- Numeric value to complex by adding imaginary part. Removes decimal part in the number.
- Integer value to complex value
- Logical value to complex (True → 1+0i, False → 0+0i)
- Character to complex. Symbols, alphabets converted into NA.

Conversion into Logical

- as.logical() function used for convert other data types into logical values
- Numeric, integer and complex value converted into logical. Any number except 0 returns FALSE and others TRUE.
- Character always returns NA

Conversion into Character

- as.character() function used for convert other data types into character values
- Any data type into character