datacamp

R for Data Science

Getting started with R Cheat Sheet

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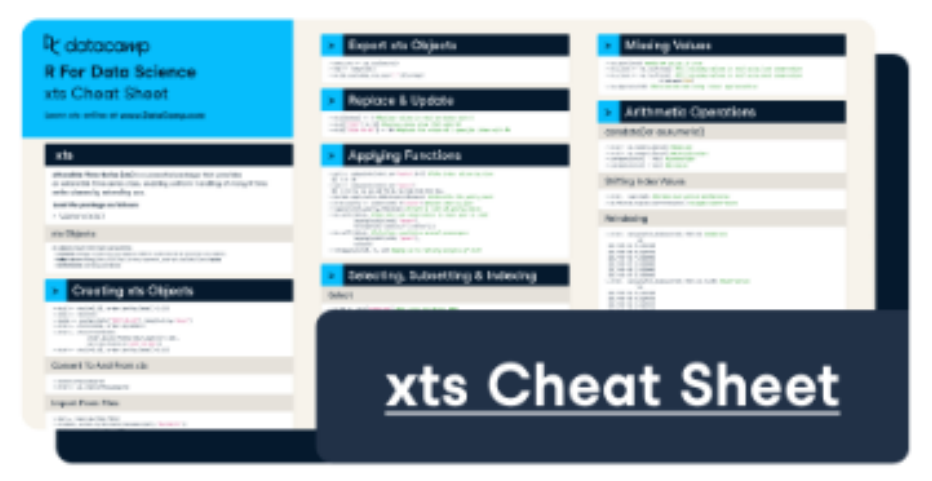
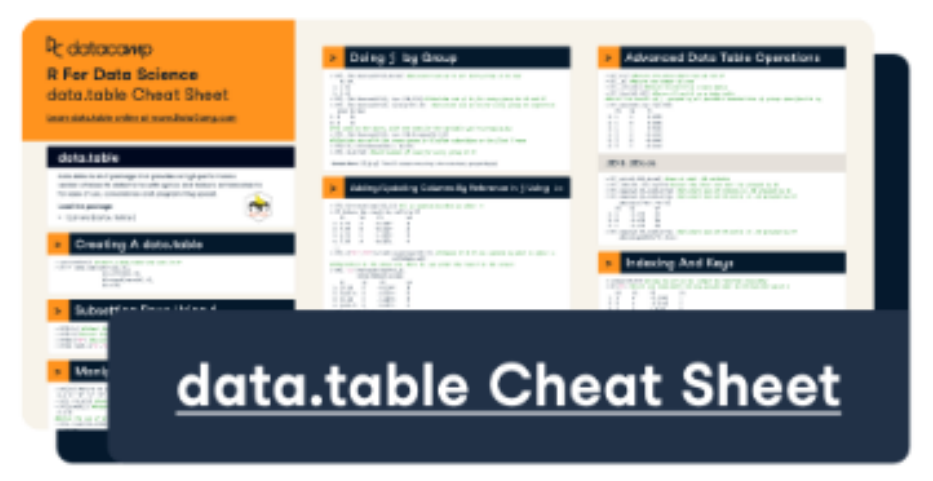
> How to use this cheat sheet

R is one of the most popular programming languages in data science and is widely used across various industries and in academia. Given that it's open-source, easy to learn, and capable of handling complex data and statistical manipulations, R has become the preferred computing environment for many data scientists today.

This cheat sheet will cover an overview of getting started with R. Use it as a handy, high-level reference for a quick start with R. For more detailed R Cheat Sheets, follow the highlighted cheat sheets below.


xts Cheat Sheet


data.table Cheat Sheet

> Accessing help

Accessing help files and documentation

```
?max #Shows the help documentation for the max function
?tidyverse #Shows the documentation for the tidyverse package
??"max" #Returns documentation associated with a given input
```

Information about objects

```
str(my_df) #Returns the structure and information of a given object
class(my_df) #Returns the class of a given object
```

> Using packages

R packages are collections of functions and tools developed by the R community. They increase the power of R by improving existing base R functionalities, or by adding new ones.

```
install.packages("tidyverse") #Lets you install new packages (e.g., tidyverse package)
library(tidyverse) #Lets you load and use packages  (e.g., tidyverse package)
```

> The working directory

The working directory is a file path that R will use as the starting point for relative file paths. That is, it's the default location for importing and exporting files. An example of a working directory looks like "C://file/path"

```
getwd() #Returns your current working directory
setwd("C://file/path") - #Changes your current working directory to a desired filepath
```

> Operators

R has multiple operators that allow you to perform a variety of tasks. Arithmetic operators let you perform arithmetic such as addition and multiplication. Relational operators are used to compare between values. Logical operators are used for Boolean operators.

Arithmetic Operators

```
a + b #Sums two variables
a - b #Subtracts two variables
a * b #Multiply two variables
a / b #Divide two variables
a ^ b #Exponentiation of a variable
a%%b  #Remainder of a variable
a%/%b #Integer division of variables
```

Relational Operators

```
a == b #Tests for equality
a != b #Tests for inequality
a > b #Tests for greater than
a < b #Tests for lower than
a >= b #Tests for greater than or equal to
a <= b #Tests for less than or equal to
```

Logical Operators

```
!  #Logical NOT
&  #Element-wise logical AND
&& #Logical AND
|  #Element-wise logical OR
|| #Logical OR
```

Assignment Operators

```
x <- 1 # Assigns a variable to x
x = 1 #Assigns a variable to x
```

Other Operators

```
%in% #Identifies whether an element belongs to a vector
$ #Allows you to access objects stored within an object
%>% #Part of magrittr package, it's used to pass objects to functions
```

> Getting started with vectors

Vectors are one-dimension arrays that can hold numeric data, character data, or logical data. In other words, a vector is a simple tool to store data.

Creating vectors

Input	Output	Description
`c(1,3,5)`	1 3 5	Creates a vector using elements separated by commas
`1:7`	1 2 3 4 5 6 7	Creates a vector of integers between two numbers
`seq(2,8,by = 2)`	2 4 6 8	Creates a vector between two numbers, with a specified interval between each element.
`rep(2,8,times = 4)`	2 8 2 8 2 8 2 8	Creates a vector of given elements repeated a number of times.
`rep(2,8,each = 3)`	2 2 2 8 8 8	Creates a vector of given elements repeating each element a number of times.

Vector functions

These functions perform operations over a whole vector.

```
sort(my_vector) #Returns my_vector sorted
rev(my_vector) #Reverses order of my_vector
table(my_vector) #Count of the values in a vector
unique(my_vector) #Distinct elements in a vector
```

Selecting vector elements

These functions allow us to refer to particular parts of a vector.

```
my_vector[6] #Returns the sixth element of my_vector
my_vector[-6] #Returns all but the sixth element
my_vector[2:6] #Returns elements two to six
my_vector[-(2:6)] #Returns all elements except
those between the second and the sixth
my_vector[c(2,6)] #Returns the second and sixth
elements
my_vector[x == 5] #Returns elements equal to 5
my_vector[x < 5 ]#Returns elements less than 5
my_vector[x %in% c(2, 5 ,8 )] #Returns elements
in the set {2, 5, 8}
```

> Math functions

These functions enable us to perform basic mathematical operations within R

```
log(x) #Returns the logarithm of a variable
exp(x) #Returns exponential of a variable
max(x) #Returns maximum value of a vector
min(x) #Returns minimum value of a vector
mean(x) #Returns mean of a vector
sum(x) #Returns sum of a vector
median(x) #Returns median of a vector
```

```
quantile(x) #Percentage quantiles of a vector
round(x, n) #Round to n decimal places
rank(x) #Rank of elements in a vector
signif(x, n) #Round off n significant figures
var(x) #Variance of a vector
cor(x, y)  #Correlation between two vectors
sd(x) #Standard deviation of a vector
```

> Getting started with strings

The "stringr" package makes it easier to work with strings in R - you should install and load this package to use the following functions.

Find Matches

```
#Detects the presence of a pattern match in a string
str_detect(string, pattern, negate = FALSE)
#Detects the presence of a pattern match at the
beginning of a string
str_starts(string, pattern, negate = FALSE)
#Finds the index of strings that contain pattern match
str_which(string, pattern, negate = FALSE)
#Locates the positions of pattern matches in a string
str_locate(string, pattern)
#Counts the number of pattern matches in a string
str_count(string, pattern)
```

Subset

```
#Extracts substrings from a character vector
str_sub(string, start = 1L, end = -1L)
#Returns strings that contain a pattern match
str_subset(string, pattern, negate = FALSE)
#Returns first pattern match in each string as a vector
str_extract(string, pattern)
#Returns first pattern match in each string as a matrix
with a column for each group in the pattern
str_match(string, pattern)
```

Mutate

```
#Replaces substrings by identifying the substrings
with str_sub() and assigning them to the results.
str_sub() <- value
#Replaces the first matched pattern in each string.
str_replace(string, pattern, replacement)
#Replaces all matched patterns in each string
str_replace_all(string, pattern, replacement)
#Converts strings to lowercase
str_to_lower(string)
#Converts strings to uppercase
str_to_upper(string)
#Converts strings to title case
str_to_title(string)
```

Join and Split

```
#Repeats strings n times
str_dup(string, n)
#Splits a vector of strings into a matrix of substrings
str_split_fixed(string, pattern, n)
```

Order

```
#Returns the vector of indexes that sorts a character
vector
str_order(x)
#Sorts a character vector
str_sort(x)
```

> Getting started with Data Frames in R

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

```
#This creates the data frame df, seen on
the right
df <- data.frame(x = 1:3, y =
c("h", "i", "j"), z = 12:14)
```

x	y	z
1	h	12
2	i	13
3	j	14

```
#This selects all columns of the third row
df[3, ]
```

x	y	z
1	h	12
2	i	13
3	j	14

```
#This selects the column z
df$z
```

x	y	z
1	h	12
2	i	13
3	j	14

```
#This selects all rows of the second
column
df[ ,2]
```

x	y	z
1	h	12
2	i	13
3	j	14

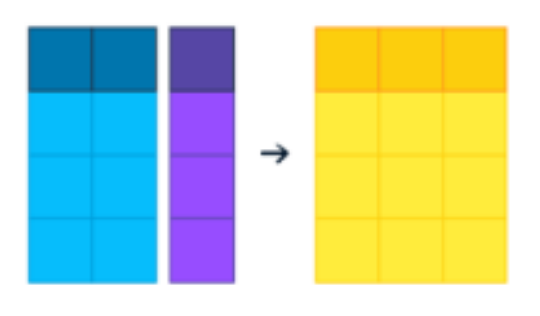
```
#This selects the third column of the
second row
df[2,3]
```

x	y	z
1	h	12
2	i	13
3	j	14

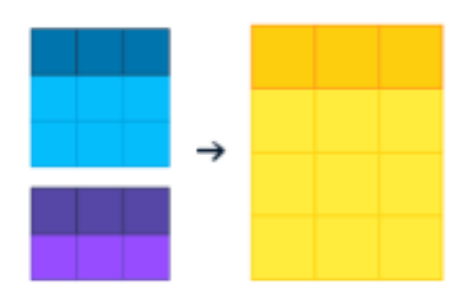
> Manipulating Data Frames in R

dplyr allows us to easily and precisely manipulate data frames. To use the following functions, you should install and load dplyr using install.packages("dplyr")

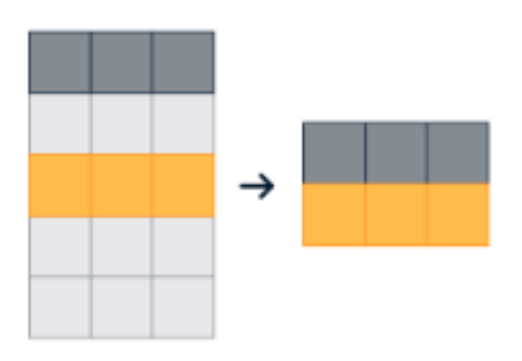
```
#Takes a sequence of vector,
matrix or data-frame arguments
and combines them by columns
bind_cols(df1, df2)
```



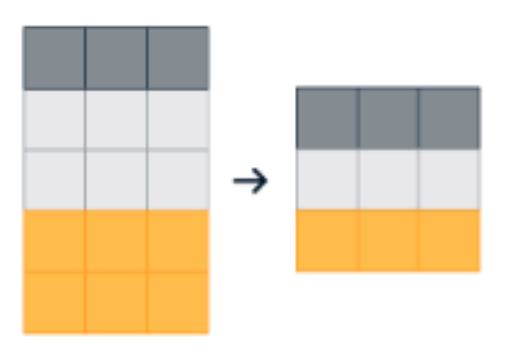
```
#Takes a sequence of vector,
matrix or data frame arguments
and combines them by rows
bind_rows(df1, df2)
```



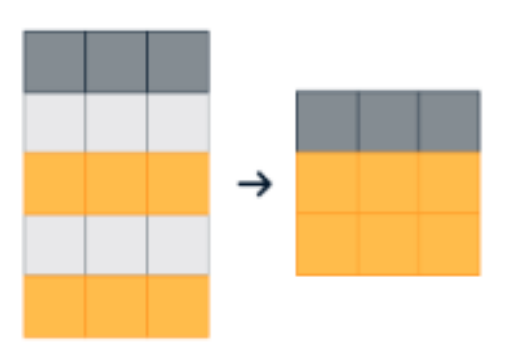
```
#Extracts rows that meet logical
criteria
filter(df, x == 2)
```



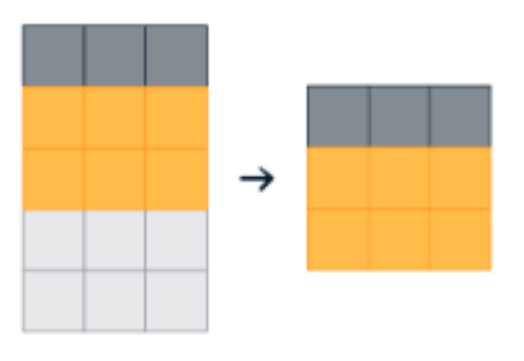
```
#Removes rows with duplicate
values
distinct(df, z)
```



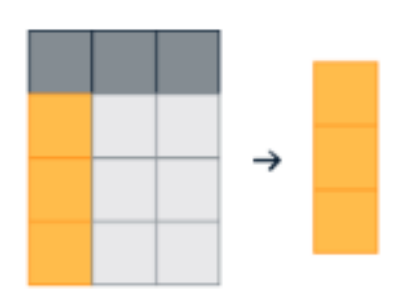
```
#Selects rows by position
slice(df, 10:15)
```



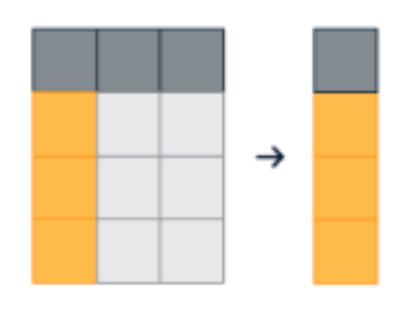
```
#Selects rows with the highest
values
slice_max(df, z, prop =
0.25)
```



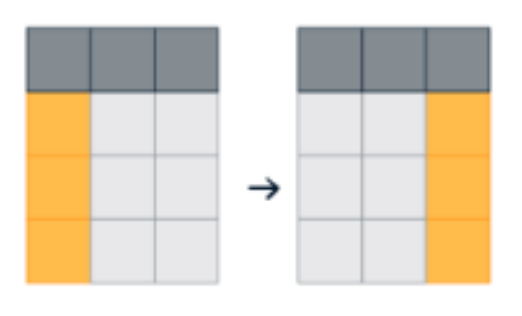
```
#Extracts column values as a
vector, by name or index
pull(df, y)
```



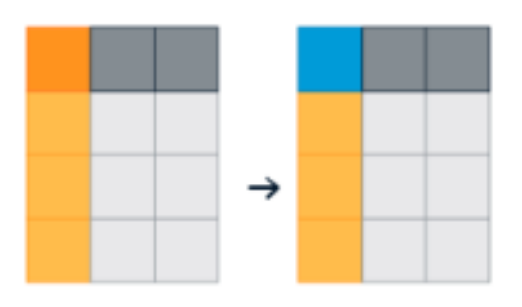
```
#Extracts columns as a table
select(df, x, y)
```



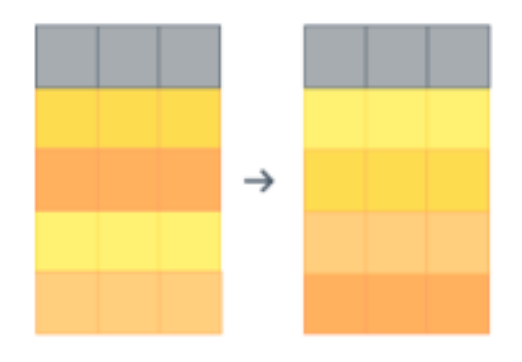
```
#Moves columns to a new position
relocate(df, x, .after =
last_col())
```



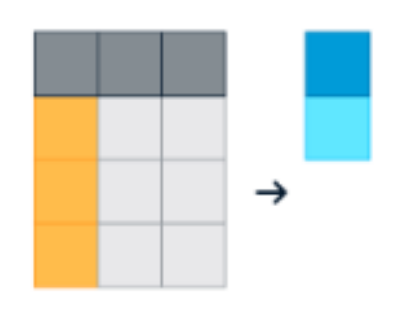
```
#Renames columns
rename(df, "age" = z)
```



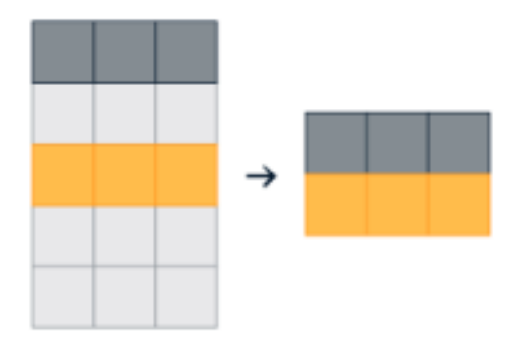
```
#Orders rows by values of a
column from high to low
arrange(df, desc(x))
```



```
#Computes table of summaries
summarise(df, total =
sum(x))
```

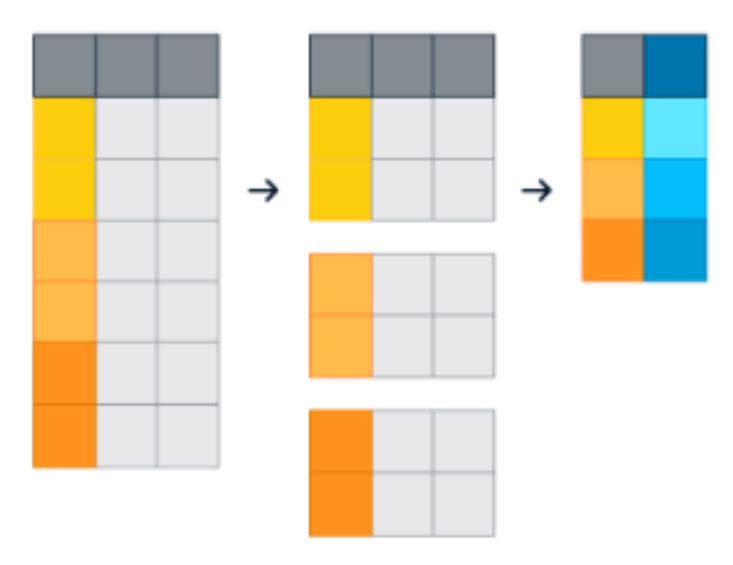


```
#Computes table of summaries.
summarise(df, total =
sum(x))
```



```
#Use group_by() to create a "grouped" copy of a table
grouped by columns (similarly to a pivot table in
spreadsheets). dplyr functions will then manipulate
each "group" separately and combine the results

df %>%
    group_by(z) %>%
    summarise(total = sum(x))
```



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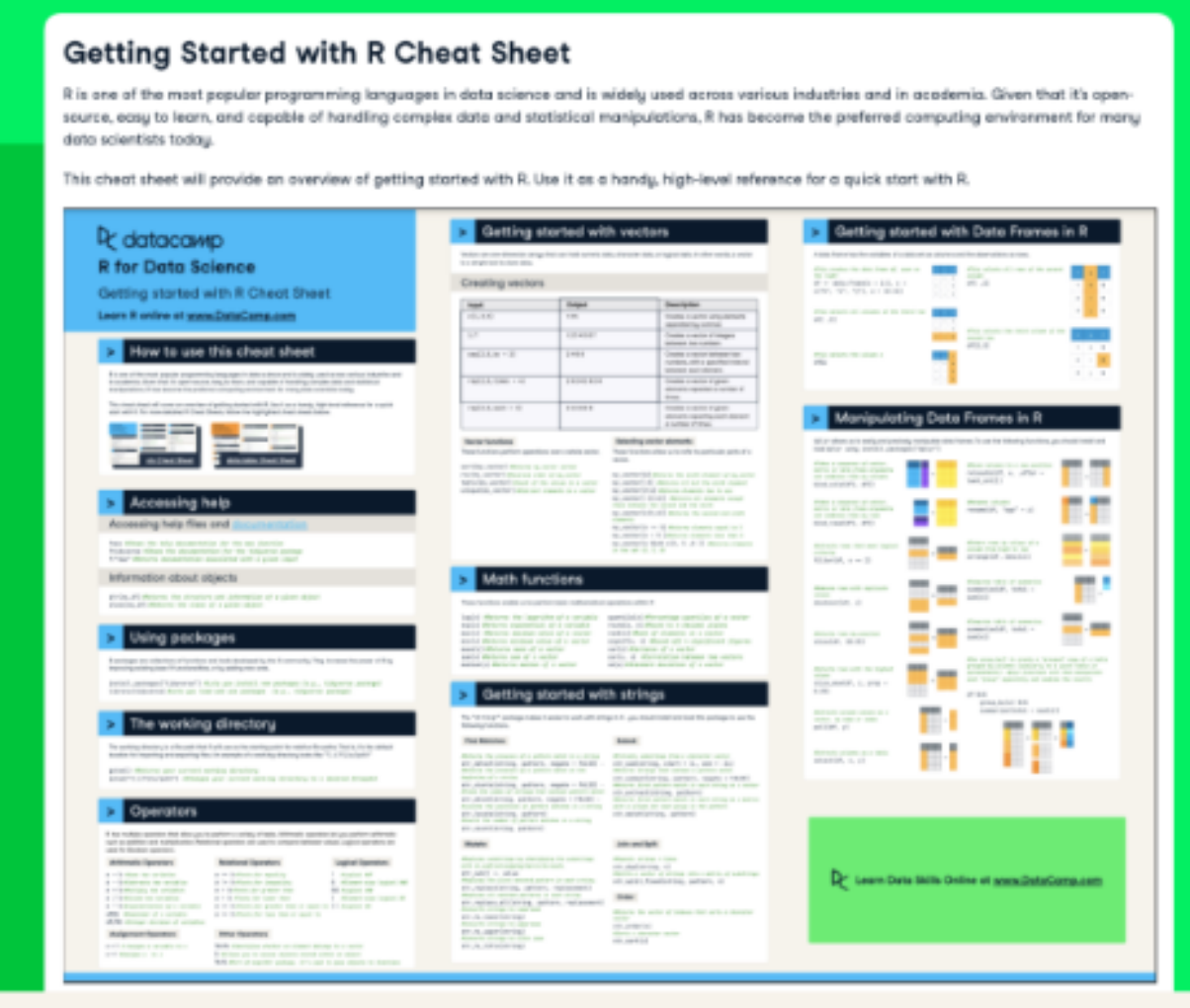
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