

```
library(dplyr)  
library(magrittr)
```

```
Curso_R %>% filter(city == 'Corrientes')
```

BIENVENIDOS AL TALLER

APRENDER R DESDE CERO

Lunes 12 de agosto de 2019.

PARTE 1

REPASO

IMPORTACIÓN
DE
DATOS



Breve Repaso

¿Cómo instalamos un paquete?

- **install.packages** ("*nombre_del_paquete*")
- **library** (*nombre_del_paquete*)



Importación de datos en R

#Por medio de read.csv()

- Iris <- **read.csv**("E:/DATASETS/iris.csv")
- View(iris)

#Por medio de read.table()

- mtcars <- **read.table**("E:/DATASETS/mtcars.txt")
- mtcars <- **read.table**("E:/DATASETS/mtcars.txt",
header=TRUE)
- View(mtcars)



Importación de datos en R

#También podemos importar otro tipo de datos mediante el paquete **readxl**. Permite leer archivos con formato (.xls and .xlsx) into R

Ejemplo:

- `install.packages ("readxl")`
- `library (readxl)`
- `estadis <- read_xl ("estadistica2009.xlsx")`



Hoy hablamos sobre...

PARTE 1: DATOS ORDENADOS CON TIDYR

Funciones más importantes

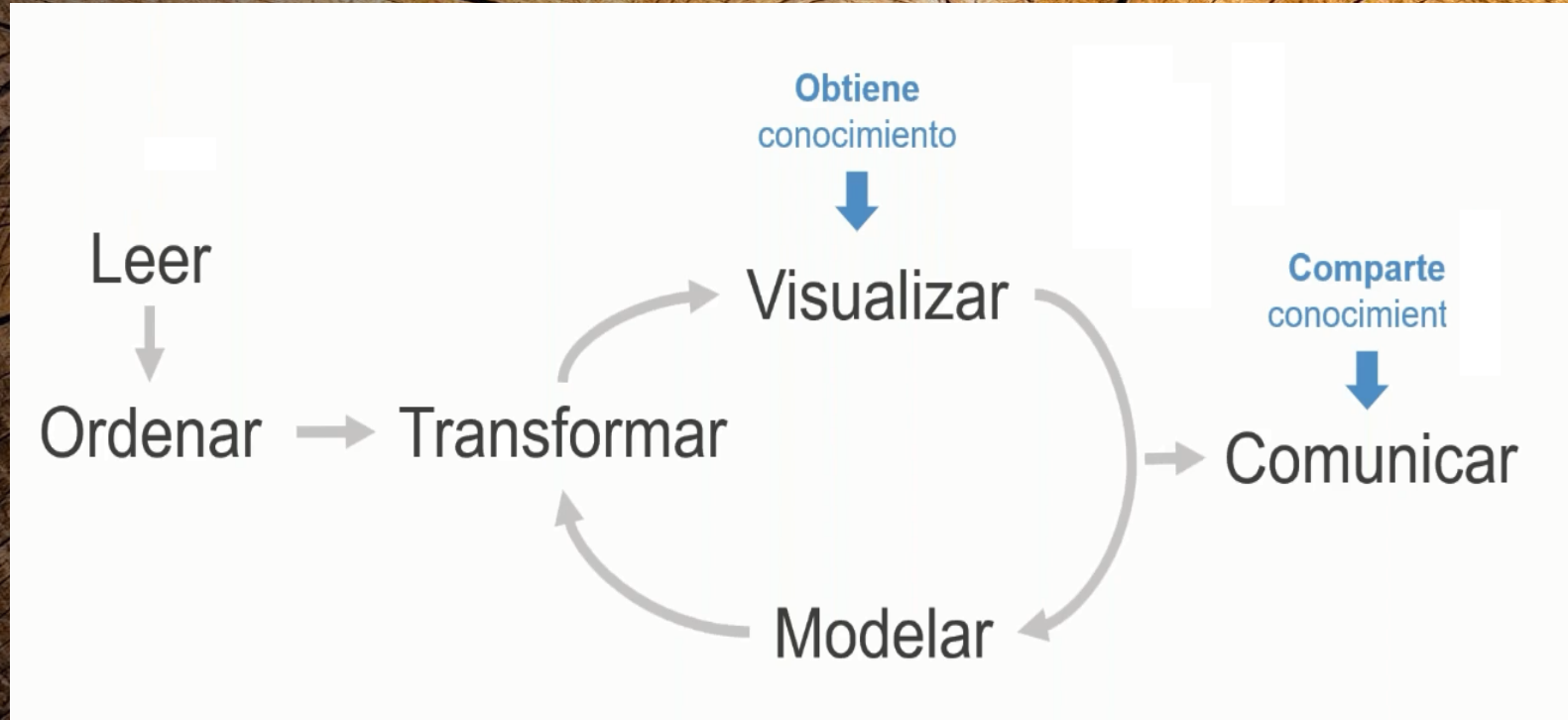
PARTE 2: MANIPULACIÓN DE DATOS CON DPLYR

Funciones más importantes

Operador `%>%`



DATA SCIENCE WORKFLOW



PARTE 2

ORDENAR

DATOS CON

tidyr

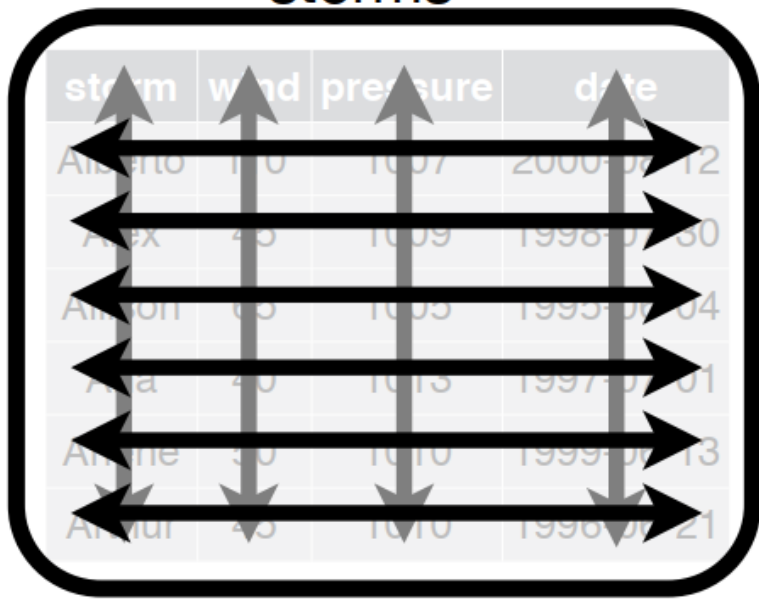
M	T	W	T	F	S
		1	2	3	4
6	7	8	9	10	11
13	14	15	16	17	18
20	21	22	23	24	25
27	28				



TIDY DATA



storms

A diagram illustrating a tidy data table for storms. The table has four columns: storm, wind, pressure, and date. Each column has a vertical double-headed arrow indicating that each variable is in its own column. Each row has a horizontal double-headed arrow indicating that each observation is in its own row. The table is enclosed in a rounded rectangle with a thick black border.

storm	wind	pressure	date
Alberto	110	1007	2000-07-12
Alex	40	1009	1998-07-30
Almon	65	1005	1995-07-04
Ana	40	1013	1997-07-01
Annie	30	1010	1999-07-13
Arnul	45	1010	1998-07-21

1. Cada **variable** está en su **columna**
2. Cada **observación** está en una **fila**
3. Cada tipo de observación está en una tabla aparte



LAS BASES DE DATOS PARA NUESTRO TRABAJO

```
install.packages("devtools")
```

```
devtools::install_github("rstudio/EDAWR")
```

storms

storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Alex	45	1009	1998-07-30
Allison	65	1005	1995-06-04
Ana	40	1013	1997-07-01
Arlene	50	1010	1999-06-13
Arthur	45	1010	1996-06-21

cases

Country	2011	2012	2013
FR	7000	6900	7000
DE	5800	6000	6200
US	15000	14000	13000

pollution

city	particle size	amount ($\mu\text{g}/\text{m}^3$)
New York	large	23
New York	small	14
London	large	22
London	small	16
Beijing	large	121
Beijing	small	56

TIDY DATA



storms

storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Alex	45	1009	1998-07-30
Allison	65	1005	1995-06-04
Ava	40	1013	1997-07-01
Arlene	50	1010	1999-06-13
Arthur	35	1010	1996-06-21

- Storm name
- Wind Speed (mph)
- Air Pressure
- Date

cases

Country	2011	2012	2013
FR	7000	6500	7000
DE	800	6000	6200
US	15000	12000	13000

- Country
- Year
- Count

pollution

city	particle size	amount ($\mu\text{g}/\text{m}^3$)
New York	large	23
New York	small	14
London	large	22
London	small	16
Beijing	large	121
Beijing	small	56

- City
- Amount of large particles
- Amount of small particles



TIDY DATA

- Instalamos el paquete tidyr
`install.packages ("tidyr")`
- Cargamos la librería
`library (tidyr)`
- Funciones importantes: `gather()` y `spread()`
`?gather`
`?spread`





NUESTRO TURNO DE ORDENAR LOS DATOS

Ordenamos teniendo en cuenta 3 variables: *country, year, n*.

cases			
Country	2011	2012	2013
FR	7000	6900	7000
DE	5800	6000	6200
US	15000	14000	13000

A diagram illustrating data transformation. It shows a vertical double-headed arrow on the left of a table, and a horizontal double-headed arrow at the top of the same table. A circular arrow is drawn around the data cells of the table, indicating a cycle or transformation of the data.



FUNCIÓN GATHER()

Colapsar varias columnas en una sola columna

1. Una columna key que contiene los nombres de las columnas
2. Un valor que contiene los valores de las columnas.

`gather (cases, "year", "n", 2:4)`

set de datos

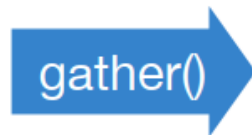
columna clave

valor de la columna

número de columnas
que colapsan



Country	2011	2012	2013
FR	7000	6900	7000
DE	5800	6000	6200
US	15000	14000	13000



Country	Year	n
FR	2011	7000
DE	2011	5800
US	2011	15000
FR	2012	6900
DE	2012	6000
US	2012	14000
FR	2013	7000
DE	2013	6200
US	2013	13000

Country	Year	n
FR	2011	7000
DE	2011	5800
US	2011	15000
FR	2012	6900
DE	2012	6000
US	2012	14000
FR	2013	7000
DE	2013	6200
US	2013	13000

gather (cases, "year", "n", 2:4)

set de datos

columna clave

valor de la columna

número de columnas
que colapsan



NUESTRO TURNO DE ORDENAR LOS DATOS

Ordenamos teniendo en cuenta 3 variables: *city*, *large*, *small*.

pollution

city	size	amount
New York	large	23
New York	small	14
London	large	22
London	small	16
Beijing	large	121
Beijing	small	56

city	particle size	amount ($\mu\text{g}/\text{m}^3$)
New York	large	23
New York	small	14
London	large	22
London	small	16
Beijing	large	121
Beijing	small	56



FUNCIÓN SPREAD()

Genera varias columnas a partir de dos columnas.

1. Un único valor en la columna *key* se convierte en una columna única.
2. Cada valor *value* se convierte en una fila en una nueva columna

spread (pollution, size, amount)

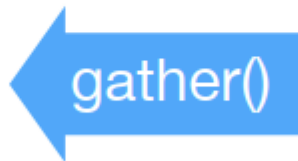
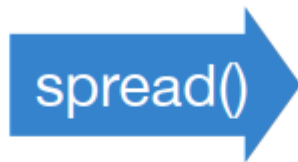
set de datos

nueva columna

nueva fila



city	size	amount
New York	large	23
New York	small	14
London	large	22
London	small	16
Beijing	large	121
Beijing	small	56



city	large	small
New York	23	14
London	22	16
Beijing	121	56

city	large	small
New York	23	14
London	22	16
Beijing	121	56

spread (pollution, size, amount)

set de datos

nueva columna

nueva fila



FUNCIÓN SEPARATE()

Permite separar una columna en varias con un separador

```
separate(storms, date, c("year", "month", "day"), sep = "-")
```

storms			
storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Alex	45	1009	1998-07-30
Allison	65	1005	1995-06-04
Ana	40	1013	1997-07-01
Arlene	50	1010	1999-06-13
Arthur	45	1010	1996-06-21



storms2					
storm	wind	pressure	year	month	day
Alberto	110	1007	2000	08	12
Alex	45	1009	1998	07	30
Allison	65	1005	1995	06	04
Ana	40	1013	1997	07	1
Arlene	50	1010	1999	06	13
Arthur	45	1010	1996	06	21



FUNCIÓN UNITE()

Permite unir columnas en una sola

```
unite(storms2, "date", year, month, day, sep = "-")
```

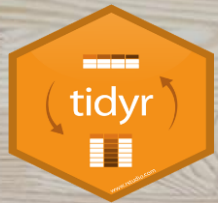
storms2

storm	wind	pressure	year	month	day
Alberto	110	1007	2000	08	12
Alex	45	1009	1998	07	30
Allison	65	1005	1995	06	04
Ana	40	1013	1997	07	1
Arlene	50	1010	1999	06	13
Arthur	45	1010	1996	06	21



storms

storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Alex	45	1009	1998-07-30
Allison	65	1005	1995-06-04
Ana	40	1013	1997-07-01
Arlene	50	1010	1999-06-13
Arthur	45	1010	1996-06-21



RECAPITULEMOS

- * **gather()**: realizar observaciones a partir de variables
- * **spread()**: realizar variables de observaciones
- * Unir y separar columnas con **unite()** y **separate()**

PARTE 3

MANIPULAR

DATOS CON

dplyr





DPLYR

- Paquete que nos ayuda a transformar datos tabulares.
- El paquete dplyr fue desarrollado por Hadley Wickham y es un versión optimizada de su paquete plyr.
- Proporciona una "gramática" (particularmente verbos) para la manipulación y operaciones con data frames.
- Instalación:

```
install.packages("dplyr")  
library(dplyr)  
install.packages("nycflights13")  
library(nycflights13)
```


Extraer **variables** existentes: **select()**

Extraer **observaciones** existentes: **filter()**

Derivar nuevas **variables**: **mutate()**

Cambiar la unidad de análisis: **summarise()**

Organizar **filas** por variables: **arrange()**



Función **SELECT()**



select()

storms

storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Alex	45	1009	1998-07-30
Allison	65	1005	1995-06-04
Ana	40	1013	1997-07-01
Arlene	50	1010	1999-06-13
Arthur	45	1010	1996-06-21



storm	pressure
Alberto	1007
Alex	1009
Allison	1005
Ana	1013
Arlene	1010
Arthur	1010

```
select(storms, storm, pressure)
```

Función **SELECT()**



select()

storms

storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Alex	45	1009	1998-07-30
Allison	65	1005	1995-06-04
Ana	40	1013	1997-07-01
Arlene	50	1010	1999-06-13
Arthur	45	1010	1996-06-21



wind	pressure	date
110	1007	2000-08-12
45	1009	1998-07-30
65	1005	1995-06-04
40	1013	1997-07-01
50	1010	1999-06-13
45	1010	1996-06-21

`select(storms, -storm)`



Función **SELECT()**

select()

storms

storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Alex	45	1009	1998-07-30
Allison	65	1005	1995-06-04
Ana	40	1013	1997-07-01
Arlene	50	1010	1999-06-13
Arthur	45	1010	1996-06-21



wind	pressure	date
110	1007	2000-08-12
45	1009	1998-07-30
65	1005	1995-06-04
40	1013	1997-07-01
50	1010	1999-06-13
45	1010	1996-06-21

```
select(storms, wind:date)
```

Función **FILTER()**



filter()

storms

storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Alex	45	1009	1998-07-30
Allison	65	1005	1995-06-04
Ana	40	1013	1997-07-01
Arlene	50	1010	1999-06-13
Arthur	45	1010	1996-06-21



storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Allison	65	1005	1995-06-04
Arlene	50	1010	1999-06-13

```
filter(storms, wind >= 50)
```


Función **FILTER()**



filter()

storms

storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Alex	45	1009	1998-07-30
Allison	65	1005	1995-06-04
Ana	40	1013	1997-07-01
Arlene	50	1010	1999-06-13
Arthur	45	1010	1996-06-21



storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Allison	65	1005	1995-06-04

```
filter(storms, wind >= 50,  
       storm %in% c("Alberto", "Alex", "Allison"))
```

Función **MUTATE()**



mutate()

storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Alex	45	1009	1998-07-30
Allison	65	1005	1995-06-04
Ana	40	1013	1997-07-01
Arlene	50	1010	1999-06-13
Arthur	45	1010	1996-06-21



storm	wind	pressure	date	ratio
Alberto	110	1007	2000-08-12	9.15
Alex	45	1009	1998-07-30	22.42
Allison	65	1005	1995-06-04	15.46
Ana	40	1013	1997-07-01	25.32
Arlene	50	1010	1999-06-13	20.20
Arthur	45	1010	1996-06-21	22.44

```
mutate(storms, ratio = pressure / wind)
```

Función **MUTATE()**



mutate()

storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Alex	45	1009	1998-07-30
Allison	65	1005	1995-06-04
Ana	40	1013	1997-07-01
Arlene	50	1010	1999-06-13
Arthur	45	1010	1996-06-21



storm	wind	pressure	date	ratio	inverse
Alberto	110	1007	2000-08-12	9.15	0.11
Alex	45	1009	1998-07-30	22.42	0.04
Allison	65	1005	1995-06-04	15.46	0.06
Ana	40	1013	1997-07-01	25.32	0.04
Arlene	50	1010	1999-06-13	20.20	0.05
Arthur	45	1010	1996-06-21	22.44	0.04

```
mutate(storms, ratio = pressure / wind, inverse = ratio^-1)
```

Función **SUMMARISE()**



summarise()

city	particle size	amount ($\mu\text{g}/\text{m}^3$)
New York	large	23
New York	small	14
London	large	22
London	small	16
Beijing	large	121
Beijing	small	56



mean	sum	n
42	252	6

```
pollution %>% summarise(mean = mean(amount), sum = sum(amount), n = n())
```

Función **ARRANGE()**



arrange()

storms

storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Alex	45	1009	1998-07-30
Allison	65	1005	1995-06-04
Ana	40	1013	1997-07-01
Arlene	50	1010	1999-06-13
Arthur	45	1010	1996-06-21



storm	wind	pressure	date
Ana	40	1013	1997-07-01
Alex	45	1009	1998-07-30
Arthur	45	1010	1996-06-21
Arlene	50	1010	1999-06-13
Allison	65	1005	1995-06-04
Alberto	110	1007	2000-08-12

`arrange(storms, wind)`



Función **ARRANGE()**

arrange()

storms

storm	wind	pressure	date
Alberto	110	1007	2000-08-12
Alex	45	1009	1998-07-30
Allison	65	1005	1995-06-04
Ana	40	1013	1997-07-01
Arlene	50	1010	1999-06-13
Arthur	45	1010	1996-06-21



storm	wind	pressure	date
Ana	40	1013	1997-07-01
Arthur	45	1010	1996-06-21
Alex	45	1009	1998-07-30
Arlene	50	1010	1999-06-13
Allison	65	1005	1995-06-04
Alberto	110	1007	2000-08-12



`arrange(storms, wind, date)`



%>%

Ceci n'est pas un pipe.

El operador pipe
%>% nos permite conectar
múltiples acciones en una
única “pipeline”

Con %>% podemos reescribir los comandos anteriores



```
select(storms, storm, pressure)
```

```
storms %>% select(storm, pressure)
```

```
storms %>% filter(wind >= 50)
```

```
storms %>%  
  filter(wind >= 50) %>%  
  select(storm, pressure)
```


El operador pipe nos permite una sintaxis clara y entendible



Empieza con un verbo

Empieza con un sustantivo (dataset) y luego la operación se indica con un verbo

```
slice(filter(babynames,  
            sex == "M"), 1)
```

```
# A tibble: 1 x 5  
  year sex   name     n  prop  
  <dbl> <chr> <chr> <int> <dbl>  
1  1880 M     John  9655 0.0815
```

```
babynames %>%  
  filter(sex == "M") %>%  
  slice(1)
```

```
# A tibble: 1 x 5  
  year sex   name     n  prop  
  <dbl> <chr> <chr> <int> <dbl>  
1  1880 M     John  9655 0.0815
```



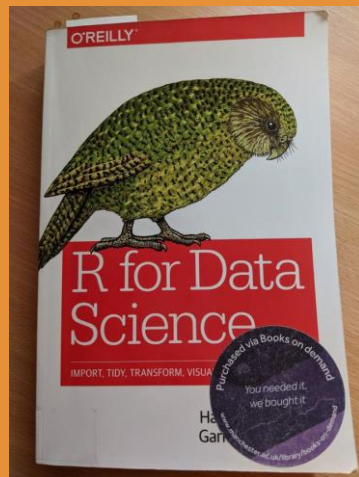
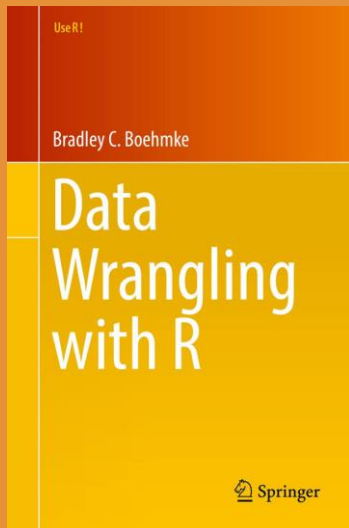
PARTE 4:

MANIPULAR

DATOS CON

data.table

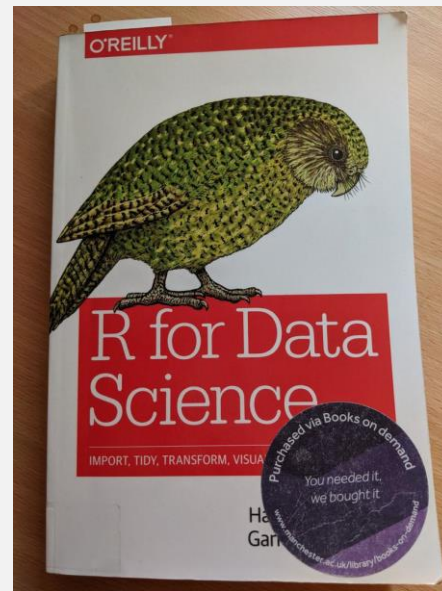
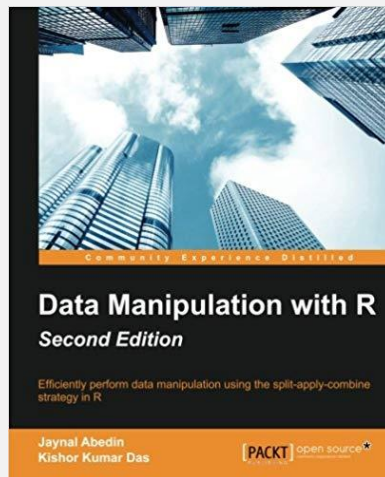
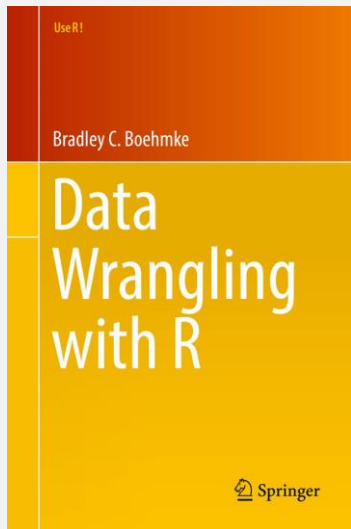
Fuentes de Consulta



- Learning R (Github) <http://bit.ly/2Aaq6d3>
- R studio cheatsheets (dplyr, data.table)
- Documentación del CRAN

FUENTES DE CONSULTA

- Libros



Package 'dplyr'

June 29, 2018

Type Package

Title A Grammar of Data Manipulation

Version 0.7.6

Description A fast, consistent tool for working with data frame like objects, both in memory and out of memory

License MIT + file LICENSE

URL <http://dplyr.tidyverse.org>, <https://github.com/tidyverse/dplyr>

BugReports <https://github.com/tidyverse/dplyr/issues>

Depends R (>= 3.1.2)

Imports isortthat (>= 0.2.0), bindrcpp (>= 0.2.0.9000), glue (>= 1.1.1), magrittr (>= 1.5), methods, pkgconfig (>= 2.0.1), R6 (>= 2.2.2), Rcpp (>= 0.12.15), rlang (>= 0.2.0), tibble (>= 1.3.1), tidyselect (>= 0.2.3), utils

Suggests bit64 (>= 0.9.7), callr, covr (>= 3.0.1), DBI (>= 0.7.14), dplyr (>= 1.2.0), dplyr (>= 0.0.2), ggplot2 (>= 2.2.1), hms (>= 0.4.1), knitr (>= 1.19), Lahman (>= 3.0.1), lubridate, MASS, mgeyr (>= 1.8.23), microbenchmark (>= 1.4.4), nycflights13 (>= 0.2.2), rmarkdown (>= 1.8), RMySQL (>= 0.10.13), RPostgreSQL (>= 0.6.2), RSQLite (>= 2.0), testthat (>= 2.0.0), withr (>= 2.1.1)

LinkingTo BH (>= 1.58.0-1), bindrcpp (>= 0.2.0.9000), pligg (>= 0.1.10), Rcpp (>= 0.12.15)

VignetteBuilder knitr

Encoding UTF-8

LazyData yes

RoxygenNote 6.0.1.9000

NeedsCompilation yes

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Muchas gracias!!!