data.table is an extremely fast and memory efficient package for transforming data in R. It works by converting R's native data frame objects into data.tables with new and enhanced functionality. The basics of working with data.tables are:

dt[i, j, by]

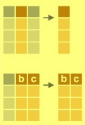
Take data.table **dt**,
subset rows using **i**
and manipulate columns with **j**,
grouped according to **by**.

data.tables are also data frames – functions that work with data frames therefore also work with data.tables.

dt[i, j, by]

Manipulate columns with j

EXTRACT



dt[, **c(2)**] – extract columns by number. Prefix column numbers with "-" to drop.

dt[, **.(b, c)**] – extract columns by name.

SUMMARIZE

dt[, **.(x = sum(a))**] – create a data.table with new columns based on the summarized values of rows.

Summary functions like mean(), median(), min(), max(), etc. can be used to summarize rows.

操作columns

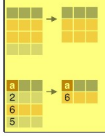
Create a data.table

data.table(a = c(1, 2), b = c("a", "b")) – create a data.table from scratch. Analogous to data.frame().

setDT(df)* or **as.data.table**(df) – convert a data frame or a list to a data.table.

创建data.table

Subset rows using i

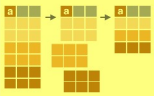


dt[**1:2,**] – subset rows based on row numbers.

dt[**a > 5,**] – subset rows based on values in one or more columns.

subset:
- dt[1:2,]
- dt[a>5,]

Group according to by



dt[, j, **by = .(a)**] – group rows by values in specified columns.

dt[, j, **keyby = .(a)**] – group *and simultaneously sort* rows by values in specified columns.

COMMON GROUPED OPERATIONS

dt[, **.(c = sum(b)), by = a**] – summarize rows within groups.

dt[, **c := sum(b), by = a**] – create a new column and compute rows within groups.

dt[, **.SD[1], by = a**] – extract first row of groups.

dt[, **.SD[.N], by = a**] – extract last row of groups.

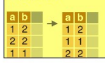
Groupby（分组）

Chaining

dt[…][…] – perform a sequence of data.table operations by *chaining* multiple "[]".

链接：相当于管道

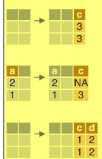
REORDER



setorder(dt, a, -b) – reorder a data.table according to specified columns. Prefix column names with "-" for descending order.

排序：setorder

COMPUTE COLUMNS*



dt[, **c := 1 + 2**] – compute a column based on an expression.

dt[**a == 1, c := 1 + 2**] – compute a column based on an expression but only for a subset of rows.

dt[, **`:=`(c = 1 , d = 2)**] – compute multiple columns based on separate expressions.

DELETE COLUMN

dt[, **c := NULL**] – delete a column.

列计算

LOGICAL OPERATORS TO USE IN i

<	<=	is.na()	%in%	|	**%like%**
>	>=	!is.na()	!	&	**%between%**

logical operators: %in%, %like%, %between%

CONVERT COLUMN TYPE

dt[, **b := as.integer(b)**] – convert the type of a column using as.integer(), as.numeric(), as.character(), as.Date(), etc..

类型变换

UNIQUE ROWS

unique(dt, by = c("a", "b")) – extract unique rows based on columns specified in "by". Leave out "by" to use all columns.

uniqueN(dt, by = c("a", "b")) – count the number of unique rows based on columns specified in "by".

unique 函数

bind函数

BIND

rbind(dt_a, dt_b) – combine rows of two data.tables.

cbind(dt_a, dt_b) – combine columns of two data.tables.

重命名列名称

RENAME COLUMNS

setnames(dt, c("a", "b"), c("x", "y")) – rename columns.

key设置

SET KEYS

setkey(dt, a, b) – set keys to enable fast repeated lookup in specified columns using "dt[.(value),]" or for merging without specifying merging columns using "dt_a[dt_b]".

Apply函数

APPLY A FUNCTION TO MULTIPLE COLUMNS

dt[, **lapply(.SD, mean), .SDcols = c("a", "b")**] – apply a function – e.g. mean(), as.character(), which.max() – to columns specified in .SDcols with lapply() and the .SD symbol. Also works with groups.

cols <- c("a")
dt[, **paste0(cols, "_m") := lapply(.SD, mean), .SDcols = cols**] – apply a function to specified columns and assign the result with suffixed variable names to the original data.

长表变为宽表：dcast

RESHAPE TO WIDE FORMAT

dcast(dt,
id ~ y,
value.var = c("a", "b"))

Reshape a data.table from long to wide format.

dt	A data.table.
id ~ y	Formula with a LHS: ID columns containing IDs for multiple entries. And a RHS: columns with values to spread in column headers.
value.var	Columns containing values to fill into cells.

行操作：lag，lead

Sequential rows

ROW IDS

dt[, **c := 1:.N, by = b**] – within groups, compute a column with sequential row IDs.

LAG & LEAD

dt[, **c := shift(a, 1), by = b**] – within groups, duplicate a column with rows *lagged* by specified amount.

dt[, **c := shift(a, 1, type = "lead"), by = b**] – within groups, duplicate a column with rows *leading* by specified amount.

宽表变为长表:melt

RESHAPE TO LONG FORMAT

melt(dt,
id.vars = c("id"),
measure.vars = patterns("^a", "^b
variable.name = "y",
value.name = c("a", "b"))

Reshape a data.table from wide to long format.

dt	A data.table.
id.vars	ID columns with IDs for multiple entries.
measure.vars	Columns containing values to fill into cells (often in pattern form).
variable.name, value.name	Names of new columns for variables and values derived from old headers.

Join

Combine data.tables

JOIN

dt_a[dt_b, **on = .(b = y)**] – join data.tables on rows with equal values.

dt_a[dt_b, **on = .(b = y, c > z)**] – join data.tables on rows with equal *and unequal* values.

ROLLING JOIN

dt_a[dt_b, **on = .(id = id, date = date), roll = TRUE**] – join data.tables on matching rows in id columns but only keep the most recent preceding match with the left data.table according to date columns. "roll = -Inf" reverses direction.

读写数据

read & write files

IMPORT

fread("file.csv") – read data from a flat file such as .csv or .tsv into R.

fread("file.csv", select = c("a", "b")) – read specified columns from a flat file into R.

EXPORT

fwrite(dt, "file.csv") – write data to a flat file from R.