Data Transformation with data.table : : CHEAT SHEET

Basics

data.table is an extremely fast and memory efficient package for transforming data in R with a concise syntax. 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**.

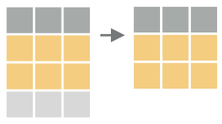
data.tables are also data frames – functions that work with data frames also work with data.tables.

Create a data.table

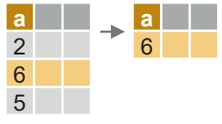
data.table(a = c(1, 2), b = c("a", "b")**)**
create a data.table from scratch. Analogous to data.frame().

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

Subset rows using i



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



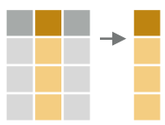
dt[**a > 5**]
subset rows based on values in one or more columns.

LOGICAL OPERATORS TO USE IN i

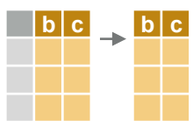
<	<=	is.na()	%in%	|	**%like%**
>	>=	!is.na()	!	&	**%between%**

Manipulate columns with j

EXTRACT



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



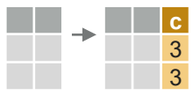
dt[, **.(b, c)**]
extract columns by name.

SUMMARIZE

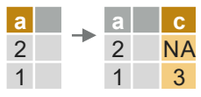
dt[, **.(x = sum(a))**]
create a data.table with new columns based on the summarized values of rows.

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

COMPUTE COLUMNS*



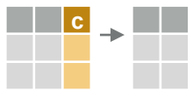
dt[, **c := 1 + 2**]
compute a column based on an expression.



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

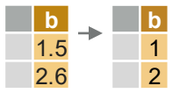
dt[, **`:=`(c = 1 , d = 2)**]
compute multiple columns based on separate expressions.

DELETE COLUMN



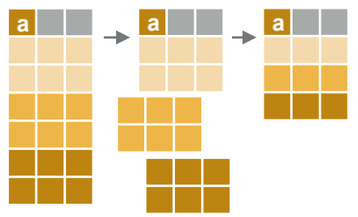
dt[, **c := NULL**]
delete a column.

CONVERT COLUMN TYPE



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

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.

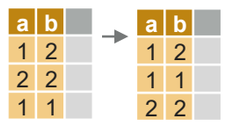
dt[, **.SD[.N]**, **by = a**] – extract last row of groups.

Chaining

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

Functions for data.tables

REORDER

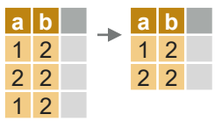


setorder(dt, a, **-**b**)**
reorder a data.table according to specified columns. Prefix column names with "**-**" for descending order.

*** SET FUNCTIONS AND :=**

data.table's functions prefixed with "set" and the operator ":=" work without "<-" to alter data without making copies in memory. E.g., the more efficient "setDT(df)" is analogous to "df <- as.data.table(df)".

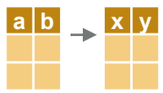
UNIQUE ROWS



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".

RENAME COLUMNS



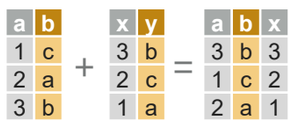
setnames(dt, c("a", "b"), c("x", "y")**)**
rename columns from old names (a, b) to new names (x, y).

SET KEYS

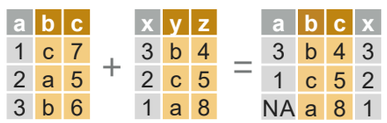
setkey(dt, a, b**)**
set keys to enable fast repeated lookup in specified columns using "dt[.(value),]" or for merging without specifying merging columns using "dt_a[dt_b]".

Combine data.tables

JOIN

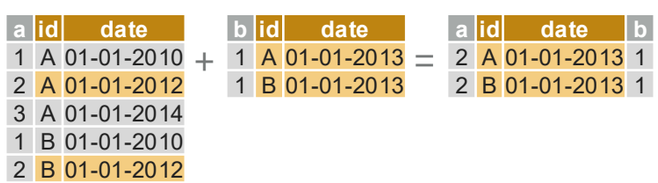


dt_a[dt_b, **on = .(b = y)**]
join data.tables on rows with equal values.



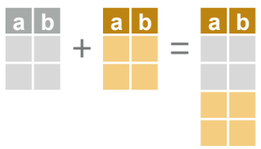
dt_a[dt_b,
on = .(b = y, c > z)]
join data.tables on rows with equal *and unequal* values.

ROLLING JOIN

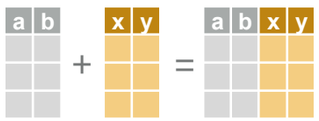


dt_a[dt_b, **on = .(id = id, date = date), roll=TRUE**]
join data.tables on matching rows in id columns but only keep the most recent preceding match with the left data.table according to date columns. "roll = -Inf" reverses direction.

BIND



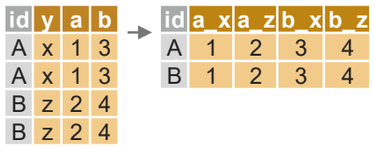
rbind(dt_a, dt_b**)**
combine rows of two data.tables.



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

Reshape a data.table

RESHAPE TO WIDE FORMAT

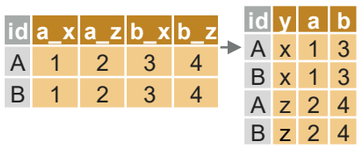


```
dcast(
  dt,
  id ~ y,
  value.var = c("a", "b")
)
```

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.

RESHAPE TO LONG FORMAT



```
melt(
  dt,
  measure.vars = measure(
    value.name, y, sep="_"
  )
)
```

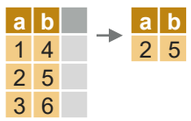
Reshape a data.table from wide to long format.

dt	A data.table.
measure.vars	Columns containing values to fill into cells, often using measure() or patterns ().
id.vars	Character vector of ID column names (optional).
variable.name, value.name	Names for output columns (optional).

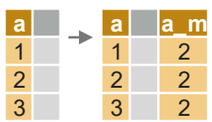
measure(out_name1, out_name2, sep="_", pattern="([ab])_(.*)"**)**
sep(separator) or pattern (regular expression) are used to specify columns to melt, and to parse input column names.
out_name1, out_name2: names for output columns (creates single value column), or value.name (creates a value columns for each unique part of the melted column name).

Apply function to cols.

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.

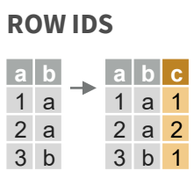


```
cols <- c("a")
dt[, paste0(cols, "_m") :=
lapply(.SD, mean), .SDcols = cols]
```

apply a function to specified columns and assign the result with suffixed variable names to the original data.

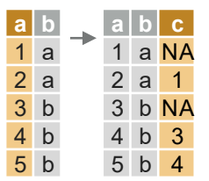
Sequential rows

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.

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.