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Special symbols: .N + .SD + .I

Special operator: :=

Introduction

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Since 2006 on CRAN, > 35 releases so far

678 packages import/depend/suggest **data.table** (543 CRAN + 135 Bioconductor)

Homepage: http://r-datatable.com

Introduction

Why use data.table?

Pros:

- speed
- memory efficiency
- coding flexibility
- non-equi joins

Cons:

- ‘different’ syntax

Fast read & write

50 million rows / 10 columns / ± 4GB

fread("datafile.csv")

expr	time
data.table_fread	15.6
readr_read_csv	92.6
base_read.csv	559.9

fwrite(DT, "datafile.csv")

expr	time
data.table_fread	32.6
readr_read_csv	102.2
base_read.csv	201.9

times in seconds

Syntax: data.table == enhanced data.frame

Three main enhancements:

1. Column names can be used as variables inside [….]
2. Because they are variables, we can use column names to calculate stuff inside [….]
3. An additional grouping argument: by

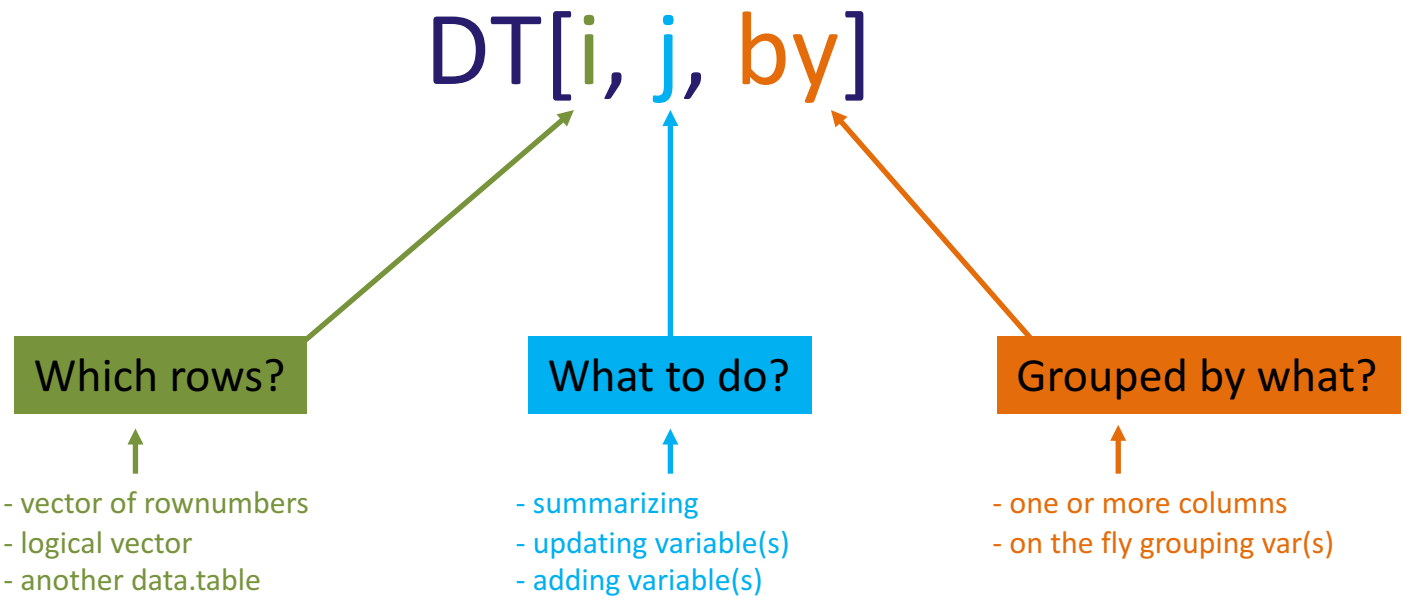
Syntax: dataframe refresher

Columnar data structure: 2D – rows and columns

- subset rows — `df[df$id == "01", ]`
- select columns — `df[, "val1"]`
- subset rows & select columns — `df[df$id == "01", "val1"]`

- that's about it ….

Syntax: general form



Syntax: general form

DT[i, j, by]

```
data.table:      i                  j          by
       SQL: where   select | update   group by
```

Example data

build in **iris** dataset:

irisDT <- as.data.table(iris)

Filtering rows & selecting columns

syntax: DT[**i**, **j**, **by**]

subset rows

```
irisDT[Species == "setosa", ]
```

select columns

```
irisDT[, Petal.Width]
irisDT[, .(Petal.Width)]
```

subset rows & select columns

```
irisDT[Species == "setosa", Petal.Width]
irisDT[Species == "setosa", .(Petal.Width)]
```

Filtering rows & selecting columns

subset rows

```
irisDT[between(Petal.Width, 1, 1)]
```

```
irisDT[Petal.Width %between% c(1, 2)]
```

select columns

```
irisDT[, .(Species, Sepal.Length)]
```

Summarizing

1. Counts
2. Aggregating
3. Group by

Counts

syntax: DT[**i**, **j**, **by**]

count

```
irisDT[Species == "setosa", .N]
```

count distinct

```
irisDT[, .uniqueN(Species)]

irisDT[Petal.Width < 0.9, uniqueN(Species)]

uniqueN(irisDT, by = "Species")
```

Aggregating

syntax: DT[**i**, **j**, **by**]

Simple aggregation: irisDT[, .(count = .N, average = mean(Petal.Width))]

Including filtering: irisDT[Petal.Width < 0.9, .(count = .N, average = mean(Petal.Width))]

Group by

syntax: DT[**i**, **j**, **by**]

```
irisDT[, .N, by = Species]
```

```
irisDT[, .(average = mean(Petal.Width)), by = Species]
```

```
irisDT[Sepal.Length < 5.3, .(average = mean(Petal.Width)), by = Species]
```

```
irisDT[, .(average = mean(Petal.Width)), by = .(Species, logi = Sepal.Length < 5.3)]
```

Group by

special symbol: **.SD**

SD = **S**ubset of **D**ata

- a data.table by itself
- holds data of current goup as defined in by
- when no by, .SD applies to whole data.table
- allows for calculations on multiple columns

Group by

special symbol: **.SD**

```
irisDT[, lapply(.SD, mean), by = Species]
```

```
irisDT[Sepal.Length < 5.3, lapply(.SD, mean), by = Species]
```

Group by

special symbol: **.SD**

special symbol: **.SDcols**

```
irisDT[, lapply(.SD, mean), by = Species, .SDcols = 1:2]

irisDT[, lapply(.SD, mean), by = Species, .SDcols = grep("Length", names(irisDT))]
```

Order of execution

DT[i, j, by]

DT[1, 3, 2]

Updating, adding & deleting variables

special operator: **:=**

- updates a data.table in place (by reference)
- can be used to:
  - update existing column(s)
  - add new column(s)
  - delete column(s)

Updating variables

special operator: **:=**

```
irisDT[, Sepal.Length := Sepal.Length * 2]
```

```
irisDT[, `:=` (Sepal.Length = Sepal.Length * 2,
               Petal.Width = Petal.Width / 2)]
```

Updating variables by group

special operator: **:=**

```
irisDT[, Sepal.Length := Sepal.Length * uniqueN(Sepal.Width) / .N, by = Species]
```

```
irisDT[, `:=` (Sepal.Length = Sepal.Length * uniqueN(Sepal.Width),
               Petal.Width = Petal.Width / .N)
       , by = Species]
```

Adding variables

special operator: **:=**

special symbol: **.I**

```
irisDT[, rownumber := .I]
```

```
irisDT[, Sepal.Area := Sepal.Length * Sepal.Width]
```

```
irisDT[, `:=` (Sepal.Area = Sepal.Length * Sepal.Width,
               Petal.Area = Petal.Length * Petal.Width)]
```

Adding variables by group

special operator: **:=**

```
irisDT[, Total.Sepal.Area := sum(Sepal.Area), by = Species]
```

```
irisDT[, `:=` (Total.Sepal.Area = sum(Sepal.Area),
               Total.Petal.Area = sum(Petal.Area))
       , by = Species]
```

Deleting variables

special operator: **:=**

```
irisDT[, Sepal.Length := NULL]

irisDT[, (1:4) := NULL]

irisDT[, grep("Length", names(irisDT)) := NULL]
```