

# Computations by groups

DATA MANIPULATION WITH DATA.TABLE IN R



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# The by argument

The `by` argument allows computations for each unique value of the (grouping) columns specified in `by`

```
# How many trips happened from each start_station?  
ans <- batrips[, .N, by = "start_station"]  
head(ans, 3)
```

start_station	N
San Francisco City Hall	2145
Embarcadero at Sansome	12879
Steuart at Market	11579

# The by argument

`by` argument accepts both `character` vector of column names as well as a `list` of variables/expressions

```
# Same as batrips[, .N, by = "start_station"]
ans <- batrips[, .N, by = .(start_station)]
head(ans, 3)
```

start_station	N
San Francisco City Hall	2145
Embarcadero at Sansome	12879
Steuart at Market	11579

# The by argument

Allows renaming grouping columns on the fly

```
ans <- batrips[, .(no_trips = .N), by = .(start = start_station)]  
head(ans, 3)
```

start	no_trips
San Francisco City Hall	2145
Embarcadero at Sansome	12879
Steuart at Market	11579

# Expressions in by

The `list()` or `.()` expression in `by` allows for grouping variables to be computed on the fly

```
# Get number of trips for each start_station for each month
ans <- batrips[ , .N, by = .(start_station, mon = month(start_date))]
head(ans, 3)
```

start_station	mon	N
San Francisco City Hall	1	193
Embarcadero at Sansome	1	985
Steuart at Market	1	813

# Let's practice!

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# Chaining data.table expressions

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# Chaining expressions

data.table expressions can be chained together, i.e., `x[...][...][...]`

```
step_1 <- batrips[duration > 3600]
step_2 <- step_1[duration > 3600][order(duration)]
step_2[1:3]
```

```
# Same as
batrips[duration > 3600]
batrips[duration > 3600][order(duration)]
batrips[duration > 3600][order(duration)][1:3]
```

```
trip_id duration
295912 3601
347471 3602
536050 3602
```



# Chaining expressions

```
# Three start stations with the lowest mean duration
step_1 <- batrips[, .(mn_dur = mean(duration)), by = "start_station"]
step_2 <- step_1[order(mn_dur)]
step_2[1:3]
```

```
# Three start stations with the lowest mean duration
batrips[, .(mn_dur = mean(duration)),
  by = "start_station"][order(mn_dur)][1:3]
```

```
      start_station  mn_dur
      2nd at Folsom 551.0807
Temporary Transbay Terminal (Howard at Beale) 655.8563
      2nd at South Park 697.7034
```

# uniqueN()

- `uniqueN()` is a helper function that returns an integer value containing the number of unique values in the input object
- It accepts vectors as well as `data.frames` and `data.tables`.

```
id <- c(1, 2, 2, 1)
uniqueN(id)
```

```
2
```

```
x <- data.table(id, val = 1:4)
```

id	val
1	1
2	2
2	3
1	4

```
uniqueN(x)
```

```
4
```

```
uniqueN(x, by = "id")
```

```
2
```

# uniqueN() together with by

Calculate the total number of *unique* bike ids for every month

```
ans <- batrips[, uniqueN(bike_id), by = month(start_date)]  
head(ans, 3)
```

```
month    V1    ## <~~ auto naming of cols  
    1    605  
    2    608  
    3    631
```

# Let's practice!

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# Computations in j using .SD

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# Subset of Data, .SD

- `.SD` is a special symbol which stands for **S**ubset of **D**ata
- Contains subset of data corresponding to each group; which itself is a `data.table`
- By default, the grouping columns are excluded for convenience

```
x <- data.table(id = c(1, 1, 2, 2, 1, 1),  
                val1 = 1:6, val2 = letters[6:1])
```

id	val1	val2
1	1	f
1	2	e
2	3	d
2	4	c
1	5	b
1	6	a

# Subset of Data, .SD

```
x[, print(.SD), by = id]
```

```
val1 val2
```

```
1    f
```

```
2    e
```

```
5    b
```

```
6    a
```

```
val1 val2
```

```
3    d
```

```
4    c
```

```
Empty data.table (0 rows) of 1 col: id
```

# Subset of Data, .SD

```
x[, .SD[1], by = id]
```

```
id val1 val2  
1    1    f  
2    3    d
```



# Subset of Data, .SD

```
x[, .SD[.N], by = id]
```

```
id val1 val2  
1    6    a  
2    4    c
```

# .SDcols

`.SDcols` holds the columns that should be included in `.SD`

```
batrips[, .SD[1], by = start_station]
```

start_station	trip_id	duration	start_date
San Francisco City Hall	139545	435	2014-01-01 00:14:00
Embarcadero at Sansome	139547	1523	2014-01-01 00:17:00

```
# .SDcols controls the columns .SD contains  
batrips[, .SD[1], by = start_station, .SDcols = c("trip_id", "duration")]
```

start_station	trip_id	duration
San Francisco City Hall	139545	435
Embarcadero at Sansome	139547	1523

# .SDcols

```
batrips[, .SD[1], by = start_station, .SDcols = - c("trip_id", "duration")]
```

start_station	start_date
San Francisco City Hall	2014-01-01 00:14:00
Embarcadero at Sansome	2014-01-01 00:17:00

# Let's practice!

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