

# Package ‘tidyfst’

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**Title** Tidy Verbs for Fast Data Manipulation

**Version** 1.7.5

**Depends** R (>= 3.3.0)

**Description** A toolkit of tidy data manipulation verbs with 'data.table' as the backend. Combining the merits of syntax elegance from 'dplyr' and computing performance from 'data.table', 'tidyfst' intends to provide users with state-of-the-art data manipulation tools with least pain. This package is an extension of 'data.table'. While enjoying a tidy syntax, it also wraps combinations of efficient functions to facilitate frequently-used data operations.

**URL** <https://github.com/hope-data-science/tidyfst>,  
<https://hope-data-science.github.io/tidyfst/>

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|            |                                      |
|------------|--------------------------------------|
| arrange_dt | <i>Arrange entries in data.frame</i> |
|------------|--------------------------------------|

---

**Description**

Order the rows of a data frame rows by the values of selected columns.

**Usage**

```
arrange_dt(.data, ...)
```

**Arguments**

|       |                                                                        |
|-------|------------------------------------------------------------------------|
| .data | data.frame                                                             |
| ...   | Arrange by what group? Minus symbol means arrange by descending order. |

**Value**

data.table

**See Also**

[arrange](#)

**Examples**

```
iris %>% arrange_dt(Sepal.Length)

# minus for decreasing order
iris %>% arrange_dt(~Sepal.Length)

# arrange by multiple variables
iris %>% arrange_dt(Sepal.Length,Petal.Length)
```

---

|        |                                         |
|--------|-----------------------------------------|
| as_fst | <i>Save a data.frame as a fst table</i> |
|--------|-----------------------------------------|

---

**Description**

This function first export the data.frame to a temporal file, and then parse it back as a fst table (class name is "fst\_table").

**Usage**

```
as_fst(.data)
```

**Arguments**

.data            A data.frame

**Value**

An object of class fst\_table

**Examples**

```
## Not run:  
iris %>%  
  as_fst() -> iris_fst  
iris_fst  
  
## End(Not run)
```

---

col\_max

*Get the column name of the max/min number each row*

---

**Description**

For a data.frame with numeric values, add a new column specifying the column name of the first max/min value each row.

**Usage**

```
col_max(.data, .name = "max_col")
```

```
col_min(.data, .name = "min_col")
```

**Arguments**

.data            A data.frame with numeric column(s)

.name            The column name of the new added column

**Value**

A data.table

**References**

<https://stackoverflow.com/questions/17735859/for-each-row-return-the-column-name-of-the-largest-value>

**Examples**

```

set.seed(199057)
DT <- data.table(matrix(sample(10, 100, TRUE), ncol=10))
DT
col_max(DT)
col_max(DT,.name = "max_col_name")
col_min(DT)

col_max(iris)

```

complete\_dt

*Complete a data frame with missing combinations of data***Description**

Turns implicit missing values into explicit missing values. All the combinations of column values (should be unique) will be constructed. Other columns will be filled with NAs or constant value.

**Usage**

```
complete_dt(.data, ..., fill = NA)
```

**Arguments**

|                    |                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>.data</code> | data.frame                                                                                                                                                                                                                                                                                                                                                                              |
| <code>...</code>   | Specification of columns to expand. The selection of columns is supported by the flexible <a href="#">select_dt</a> . To find all unique combinations of provided columns, including those not found in the data, supply each variable as a separate argument. But the two modes (select the needed columns and fill outside values) could not be mixed, find more details in examples. |
| <code>fill</code>  | Atomic value to fill into the missing cell, default uses NA.                                                                                                                                                                                                                                                                                                                            |

**Details**

When the provided columns with addition data are of different length, all the unique combinations would be returned. This operation should be used only on unique entries, and it will always returned the unique entries.

If you supply fill parameter, these values will also replace existing explicit missing values in the data set.

**Value**

data.table

**See Also**[complete](#)

**Examples**

```
df <- data.table(
  group = c(1:2, 1),
  item_id = c(1:2, 2),
  item_name = c("a", "b", "b"),
  value1 = 1:3,
  value2 = 4:6
)

df %>% complete_dt(item_id,item_name)
df %>% complete_dt(item_id,item_name,fill = 0)
df %>% complete_dt("item")
df %>% complete_dt(item_id=1:3)
df %>% complete_dt(item_id=1:3,group=1:2)
df %>% complete_dt(item_id=1:3,group=1:3,item_name=c("a","b","c"))
```

---

|          |                                    |
|----------|------------------------------------|
| count_dt | <i>Count observations by group</i> |
|----------|------------------------------------|

---

**Description**

Count the unique values of one or more variables.

**Usage**

```
count_dt(.data, ..., sort = TRUE, .name = "n")
```

```
add_count_dt(.data, ..., .name = "n")
```

**Arguments**

|       |                                                                                   |
|-------|-----------------------------------------------------------------------------------|
| .data | data.table/data.frame data.frame will be automatically converted to data.table.   |
| ...   | Variables to group by, could receive what 'select_dt' receives.                   |
| sort  | logical. If TRUE result will be sorted in descending order by resulting variable. |
| .name | character. Name of resulting variable. Default uses "n".                          |

**Value**

data.table

**See Also**

[count](#)

**Examples**

```
iris %>% count_dt(Species)
iris %>% count_dt(Species, .name = "count")
iris %>% add_count_dt(Species)
iris %>% add_count_dt(Species, .name = "N")

mtcars %>% count_dt(cyl, vs)
mtcars %>% count_dt("cyl|vs")
mtcars %>% count_dt(cyl, vs, .name = "N", sort = FALSE)
mtcars %>% add_count_dt(cyl, vs)
mtcars %>% add_count_dt("cyl|vs")
```

---

cummean

*Cumulative mean*


---

**Description**

Returns a vector whose elements are the cumulative mean of the elements of the argument.

**Usage**

```
cummean(x)
```

**Arguments**

`x` a numeric or complex object, or an object that can be coerced to one of these.

**Examples**

```
cummean(1:10)
```

---

distinct\_dt

*Select distinct/unique rows in data.frame*


---

**Description**

Select only unique/distinct rows from a data frame.

**Usage**

```
distinct_dt(.data, ..., .keep_all = FALSE, fromLast = FALSE)
```

**Arguments**

|                        |                                                                                                                                                                                                |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>.data</code>     | <code>data.frame</code>                                                                                                                                                                        |
| <code>...</code>       | Optional variables to use when determining uniqueness. If there are multiple rows for a given combination of inputs, only the first row will be preserved. If omitted, will use all variables. |
| <code>.keep_all</code> | If TRUE, keep all variables in <code>data.frame</code> . If a combination of <code>...</code> is not distinct, this keeps the first row of values.                                             |
| <code>fromLast</code>  | Logical indicating if duplication should be considered from the reverse side. Defaults to FALSE.                                                                                               |

**Value**

`data.table`

**See Also**

[distinct](#)

**Examples**

```
iris %>% distinct_dt()
iris %>% distinct_dt(Species)
iris %>% distinct_dt(Species, .keep_all = TRUE)
mtcars %>% distinct_dt(cyl, vs)
mtcars %>% distinct_dt(cyl, vs, .keep_all = TRUE)
mtcars %>% distinct_dt(cyl, vs, .keep_all = TRUE, fromLast = TRUE)
```

---

drop\_na\_dt

*Dump, replace and fill missing values in data.frame*

---

**Description**

A set of tools to deal with missing values in `data.frames`. It can dump, replace, fill (with next or previous observation) or delete entries according to their missing values.

**Usage**

```
drop_na_dt(.data, ...)

replace_na_dt(.data, ..., to)

delete_na_cols(.data, prop = NULL, n = NULL)

delete_na_rows(.data, prop = NULL, n = NULL)
```



```
fill_na_dt(.data, ..., direction = "down")
```

```
shift_fill(x, direction = "down")
```

### Arguments

|           |                                                                                           |
|-----------|-------------------------------------------------------------------------------------------|
| .data     | data.frame                                                                                |
| ...       | Columns to be replaced or filled. If not specified, use all columns.                      |
| to        | What value should NA replace by?                                                          |
| prop      | If proportion of NAs is larger than or equal to "prop", would be deleted.                 |
| n         | If number of NAs is larger than or equal to "n", would be deleted.                        |
| direction | Direction in which to fill missing values. Currently either "down" (the default) or "up". |
| x         | A vector with missing values to be filled.                                                |

### Details

drop\_na\_dt drops the entries with NAs in specific columns. fill\_na\_dt fill NAs with observations ahead ("down") or below ("up"), which is also known as last observation carried forward (LOCF) and next observation carried backward(NOCB).

delete\_na\_cols could drop the columns with NA proportion larger than or equal to "prop" or NA number larger than or equal to "n", delete\_na\_rows works alike but deals with rows.

shift\_fill could fill a vector with missing values.

### Value

data.table

### References

<https://stackoverflow.com/questions/23597140/how-to-find-the-percentage-of-nas-in-a-data-frame>

<https://stackoverflow.com/questions/2643939/remove-columns-from-dataframe-where-all-values-are-na>

<https://stackoverflow.com/questions/7235657/fastest-way-to-replace-nas-in-a-large-data-table>

### See Also

[drop\\_na,replace\\_na, fill](#)

### Examples

```
df <- data.table(x = c(1, 2, NA), y = c("a", NA, "b"))
df %>% drop_na_dt()
df %>% drop_na_dt(x)
df %>% drop_na_dt(y)
df %>% drop_na_dt(x,y)
```

```

df %>% replace_na_dt(to = 0)
df %>% replace_na_dt(x,to = 0)
df %>% replace_na_dt(y,to = 0)
df %>% replace_na_dt(x,y,to = 0)

df %>% fill_na_dt(x)
df %>% fill_na_dt() # not specified, fill all columns
df %>% fill_na_dt(y,direction = "up")

x = data.frame(x = c(1, 2, NA, 3), y = c(NA, NA, 4, 5),z = rep(NA,4))
x
x %>% delete_na_cols()
x %>% delete_na_cols(prop = 0.75)
x %>% delete_na_cols(prop = 0.5)
x %>% delete_na_cols(prop = 0.24)
x %>% delete_na_cols(n = 2)

x %>% delete_na_rows(prop = 0.6)
x %>% delete_na_rows(n = 2)

# shift_fill
y = c("a",NA,"b",NA,"c")

shift_fill(y) # equals to
shift_fill(y,"down")

shift_fill(y,"up")

```

---

dummy\_dt

*Fast creation of dummy variables*


---

## Description

Quickly create dummy (binary) columns from character and factor type columns in the inputted data (and numeric columns if specified.) This function is useful for statistical analysis when you want binary columns rather than character columns.

## Usage

```
dummy_dt(.data, ..., longname = TRUE)
```

## Arguments

|          |                                                                                             |
|----------|---------------------------------------------------------------------------------------------|
| .data    | data.frame                                                                                  |
| ...      | Columns you want to create dummy variables from. Very flexible, find in the examples.       |
| longname | logical. Should the output column labeled with the original column name? Default uses TRUE. |

## Details

If no columns provided, will return the original data frame. When NA exist in the input column, they would also be considered. If the input character column contains both NA and string "NA", they would be merged.

This function is inspired by **fastDummies** package, but provides simple and precise usage, whereas `fastDummies::dummy_cols` provides more features for statistical usage.

## Value

data.table

## References

<https://stackoverflow.com/questions/18881073/creating-dummy-variables-in-r-data-table>

## See Also

[dummy\\_cols](#)

## Examples

```
iris %>% dummy_dt(Species)
iris %>% dummy_dt(Species,longname = FALSE)

mtcars %>% head() %>% dummy_dt(vs,am)
mtcars %>% head() %>% dummy_dt("cyl|gear")

# when there are NAs in the column
df <- data.table(x = c("a", "b", NA, NA),y = 1:4)
df %>%
  dummy_dt(x)

# when NA and "NA" both exist, they would be merged
df <- data.table(x = c("a", "b", NA, "NA"),y = 1:4)
df %>%
  dummy_dt(x)
```

---

export\_fst

*Read and write fst files*

---

## Description

Wrapper for [read\\_fst](#) and [write\\_fst](#) from **fst**, but use a different default. For data import, always return a data.table. For data export, always compress the data to the smallest size.

**Usage**

```
export_fst(x, path, compress = 100, uniform_encoding = TRUE)
```

```
import_fst(
  path,
  columns = NULL,
  from = 1,
  to = NULL,
  as.data.table = TRUE,
  old_format = FALSE
)
```

**Arguments**

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>x</code>                | a data frame to write to disk                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <code>path</code>             | path to fst file                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <code>compress</code>         | value in the range 0 to 100, indicating the amount of compression to use. Lower values mean larger file sizes. The default compression is set to 50.                                                                                                                                                                                                                                                                                                                                                    |
| <code>uniform_encoding</code> | If 'TRUE', all character vectors will be assumed to have elements with equal encoding. The encoding (latin1, UTF8 or native) of the first non-NA element will be used as encoding for the whole column. This will be a correct assumption for most use cases. If 'uniform.encoding' is set to 'FALSE', no such assumption will be made and all elements will be converted to the same encoding. The latter is a relatively expensive operation and will reduce write performance for character columns. |
| <code>columns</code>          | Column names to read. The default is to read all columns.                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <code>from</code>             | Read data starting from this row number.                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <code>to</code>               | Read data up until this row number. The default is to read to the last row of the stored dataset.                                                                                                                                                                                                                                                                                                                                                                                                       |
| <code>as.data.table</code>    | If TRUE, the result will be returned as a <code>data.table</code> object. Any keys set on dataset <code>x</code> before writing will be retained. This allows for storage of sorted datasets. This option requires <code>data.table</code> package to be installed.                                                                                                                                                                                                                                     |
| <code>old_format</code>       | must be FALSE, the old fst file format is deprecated and can only be read and converted with fst package versions 0.8.0 to 0.8.10.                                                                                                                                                                                                                                                                                                                                                                      |

**Value**

'import\_fst' returns a `data.table` with the selected columns and rows. 'export\_fst' writes 'x' to a 'fst' file and invisibly returns 'x' (so you can use this function in a pipeline).

**See Also**

[read\\_fst](#)

**Examples**

```
## Not run:
export_fst(iris,"iris_fst_test.fst")
iris_dt = import_fst("iris_fst_test.fst")
iris_dt
unlink("iris_fst_test.fst")

## End(Not run)
```

---

|           |                                     |
|-----------|-------------------------------------|
| filter_dt | <i>Filter entries in data.frame</i> |
|-----------|-------------------------------------|

---

**Description**

Choose rows where conditions are true.

**Usage**

```
filter_dt(.data, ...)
```

**Arguments**

|       |                                                                           |
|-------|---------------------------------------------------------------------------|
| .data | data.frame                                                                |
| ...   | List of variables or name-value pairs of summary/modifications functions. |

**Value**

data.table

**See Also**

[filter](#)

**Examples**

```
iris %>% filter_dt(Sepal.Length > 7)
iris %>% filter_dt(Sepal.Length == max(Sepal.Length))

# comma is not supported in tidyfst after v0.9.8
# which means you can't use:
## Not run:
iris %>% filter_dt(Sepal.Length > 7, Sepal.Width > 3)

## End(Not run)
# use following code instead
iris %>% filter_dt(Sepal.Length > 7 & Sepal.Width > 3)
```

---

`fst`*Parse, inspect and extract data.table from fst file*

---

### Description

A toolkit of APIs for reading fst file as `data.table`, could select by column, row and conditional filtering.

### Usage

```
parse_fst(path)

slice_fst(ft, row_no)

select_fst(ft, ...)

filter_fst(ft, ...)

summary_fst(ft)
```

### Arguments

|                     |                                                                                |
|---------------------|--------------------------------------------------------------------------------|
| <code>path</code>   | path to fst file                                                               |
| <code>ft</code>     | An object of class <code>fst_table</code> , returned by <code>parse_fst</code> |
| <code>row_no</code> | An integer vector (Positive)                                                   |
| <code>...</code>    | The filter conditions                                                          |

### Details

`summary_fst` could provide some basic information about the fst table.

### Value

`parse_fst` returns a `fst_table` class.  
`select_fst` and `filter_fst` returns a `data.table`.

### See Also

[fst](#), [metadata\\_fst](#)

### Examples

```
## Not run:
fst::write_fst(iris, "iris_test.fst")
# parse the file but not reading it
parse_fst("iris_test.fst") -> ft
```

```

ft

class(ft)
lapply(ft,class)
names(ft)
dim(ft)
summary_fst(ft)

# get the data by query
ft %>% slice_fst(1:3)
ft %>% slice_fst(c(1,3))

ft %>% select_fst(Sepal.Length)
ft %>% select_fst(Sepal.Length,Sepal.Width)
ft %>% select_fst("Sepal.Length")
ft %>% select_fst(1:3)
ft %>% select_fst(1,3)
ft %>% select_fst("Se")
ft %>% select_fst("nothing")
ft %>% select_fst("Se|Sp")
ft %>% select_fst(cols = names(iris)[2:3])

ft %>% filter_fst(Sepal.Width > 3)
ft %>% filter_fst(Sepal.Length > 6 , Species == "virginica")
ft %>% filter_fst(Sepal.Length > 6 & Species == "virginica" & Sepal.Width < 3)

unlink("iris_test.fst")

## End(Not run)

```

---

group\_by\_dt

*Group by variable(s) and implement operations*


---

## Description

Carry out data manipulation within specified groups. Different from `group_dt`, the implementation is split into two operations, namely grouping and implementation.

Using `setkey` and `setkeyv` in **data.table** to carry out `group_by`-like functionalities in **dplyr**. This is not only convenient but also efficient in computation.

## Usage

```
group_by_dt(.data, ..., cols = NULL)
```

```
group_exe_dt(.data, ...)
```

**Arguments**

|                    |                                                                                                                                                                                                                                                                                                |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>.data</code> | A data frame                                                                                                                                                                                                                                                                                   |
| <code>...</code>   | Variables to group by for <code>group_by_dt</code> , namely the columns to sort by. Do not quote the column names. Any data manipulation arguments that could be implemented on a <code>data.frame</code> for <code>group_exe_dt</code> . It can receive what <code>select_dt</code> receives. |
| <code>cols</code>  | A character vector of column names to group by.                                                                                                                                                                                                                                                |

**Details**

`group_by_dt` and `group_exe_dt` are a pair of functions to be used in combination. It utilizes the feature of key setting in `data.table`, which provides high performance for group operations, especially when you have to operate by specific groups frequently.

**Value**

A `data.table` with keys

**Examples**

```
# aggregation after grouping using group_exe_dt
as.data.table(iris) -> a
a %>%
  group_by_dt(Species) %>%
  group_exe_dt(head(1))

a %>%
  group_by_dt(Species) %>%
  group_exe_dt(
    head(3) %>%
    summarise_dt(sum = sum(Sepal.Length))
  )

mtcars %>%
  group_by_dt("cyl|am") %>%
  group_exe_dt(
    summarise_dt(mpg_sum = sum(mpg))
  )

# equals to
mtcars %>%
  group_by_dt(cols = c("cyl", "am")) %>%
  group_exe_dt(
    summarise_dt(mpg_sum = sum(mpg))
  )
```



---

|          |                                        |
|----------|----------------------------------------|
| group_dt | <i>Data manipulation within groups</i> |
|----------|----------------------------------------|

---

**Description**

Carry out data manipulation within specified groups.

**Usage**

```
group_dt(.data, by = NULL, ...)
```

```
rowwise_dt(.data, ...)
```

**Arguments**

|       |                                                                                                            |
|-------|------------------------------------------------------------------------------------------------------------|
| .data | A data.frame                                                                                               |
| by    | Variables to group by, unquoted name of grouping variable or list of unquoted names of grouping variables. |
| ...   | Any data manipulation arguments that could be implemented on a data.frame.                                 |

**Details**

If you want to use `summarise_dt` and `mutate_dt` in `group_dt`, it is better to use the "by" parameter in those functions, that would be much faster because you don't have to use `.SD` (which takes extra time to copy).

**Value**

data.table

**References**

<https://stackoverflow.com/questions/36802385/use-by-each-row-for-data-table>

**Examples**

```
iris %>% group_dt(by = Species, slice_dt(1:2))
iris %>% group_dt(Species, filter_dt(Sepal.Length == max(Sepal.Length)))
iris %>% group_dt(Species, summarise_dt(new = max(Sepal.Length)))

# you can pipe in the `group_dt`
iris %>% group_dt(Species,
  mutate_dt(max = max(Sepal.Length)) %>%
  summarise_dt(sum = sum(Sepal.Length)))

# for users familiar with data.table, you can work on .SD directly
# following codes get the first and last row from each group
iris %>%
```

```

group_dt(
  by = Species,
  rbind(.SD[1],.SD[.N])
)

#' # for summarise_dt, you can use "by" to calculate within the group
mtcars %>%
  summarise_dt(
    disp = mean(disp),
    hp = mean(hp),
    by = cyl
  )

# but you could also, of course, use group_dt
mtcars %>%
  group_dt(by =.(vs,am),
    summarise_dt(avg = mean(mpg)))

# and list of variables could also be used
mtcars %>%
  group_dt(by =list(vs,am),
    summarise_dt(avg = mean(mpg)))

# examples for `rowwise_dt`
df <- data.table(x = 1:2, y = 3:4, z = 4:5)

df %>% mutate_dt(m = mean(c(x, y, z)))

df %>% rowwise_dt(
  mutate_dt(m = mean(c(x, y, z)))
)

```

---

impute\_dt

*Impute missing values with mean, median or mode*


---

## Description

Impute the columns of data.frame with its mean, median or mode.

## Usage

```
impute_dt(.data, ..., .func = "mode")
```

## Arguments

|       |                                                                                    |
|-------|------------------------------------------------------------------------------------|
| .data | A data.frame                                                                       |
| ...   | Columns to select                                                                  |
| .func | Character, "mode" (default), "mean" or "median". Could also define it by one-self. |

**Value**

A data.table

**Examples**

```
Pclass <- c(3, 1, 3, 1, 3, 2, 2, 3, NA, NA)
Sex <- c('male', 'male', 'female', 'female', 'female',
        'female', NA, 'male', 'female', NA)
Age <- c(22, 38, 26, 35, NA,
        45, 25, 39, 28, 40)
SibSp <- c(0, 1, 3, 1, 2, 3, 2, 2, NA, 0)
Fare <- c(7.25, 71.3, 7.92, NA, 8.05, 8.46, 51.9, 60, 32, 15)
Embarked <- c('S', NA, 'S', 'Q', 'Q', 'S', 'C', 'S', 'C', 'S')
data <- data.frame('Pclass' = Pclass,
                  'Sex' = Sex, 'Age' = Age, 'SibSp' = SibSp,
                  'Fare' = Fare, 'Embarked' = Embarked)

data
data %>% impute_dt() # default uses "mode" as `.func`
data %>% impute_dt(is.numeric, .func = "mean")
data %>% impute_dt(is.numeric, .func = "median")

my_fun = function(x){
  x[is.na(x)] = (max(x, na.rm = TRUE) - min(x, na.rm = TRUE))/2
  x
}
data %>% impute_dt(is.numeric, .func = my_fun)
```

---

intersect\_dt

*Set operations for data frames*

---

**Description**

Wrappers of set operations in **data.table**. Only difference is it could be applied to non-data.table data frames by recognizing and coercing them to data.table automatically.

**Usage**

```
intersect_dt(x, y, all = FALSE)
```

```
union_dt(x, y, all = FALSE)
```

```
setdiff_dt(x, y, all = FALSE)
```

```
setequal_dt(x, y, all = TRUE)
```

**Arguments**

|     |                                                                      |
|-----|----------------------------------------------------------------------|
| x   | A data.frame                                                         |
| y   | A data.frame                                                         |
| all | Logical. When FALSE (default), removes duplicate rows on the result. |

**Value**

A data.table

**See Also**

[setops](#)

**Examples**

```
x = iris[c(2,3,3,4),]
x2 = iris[2:4,]
y = iris[c(3:5),]

intersect_dt(x, y)           # intersect
intersect_dt(x, y, all=TRUE) # intersect all
setdiff_dt(x, y)           # except
setdiff_dt(x, y, all=TRUE) # except all
union_dt(x, y)             # union
union_dt(x, y, all=TRUE)  # union all
setequal_dt(x, x2, all=FALSE) # setequal
setequal_dt(x, x2)        # setequal all
```

---

in\_dt

*Short cut to data.table*


---

**Description**

To use facilities provided by **data.table**, but do not have to load **data.table** package.

**Usage**

```
in_dt(.data, ...)
```

```
as_dt(.data)
```

**Arguments**

|       |                                        |
|-------|----------------------------------------|
| .data | A data.frame                           |
| ...   | Recieve B in data.table's A[B] syntax. |

## Details

The `as_dt` could turn any data frame to `data.table` class. If the data is not a data frame, return error.

The `in_dt` function creates a virtual environment in `data.table`, it could be piped well because it still follows the principals of **tidyfst**, which are: (1) Never use in place replacement and (2) Always receives a data frame (`data.frame/tibble/data.table`) and returns a `data.table`. Therefore, the in place functions like `:=` will still return the results.

## See Also

[data.table](#)

## Examples

```
iris %>% as_dt()
iris %>% in_dt(order(-Sepal.Length), .SD[.N], by=Species)
```

---

join

*Join tables*

---

## Description

The mutating joins add columns from 'y' to 'x', matching rows based on the keys:

\* `'inner_join_dt()'`: includes all rows in 'x' and 'y'. \* `'left_join_dt()'`: includes all rows in 'x'. \* `'right_join_dt()'`: includes all rows in 'y'. \* `'full_join_dt()'`: includes all rows in 'x' or 'y'.

Filtering joins filter rows from 'x' based on the presence or absence of matches in 'y':

\* `'semi_join_dt()'` return all rows from 'x' with a match in 'y'. \* `'anti_join_dt()'` return all rows from 'x' without a match in 'y'.

## Usage

```
inner_join_dt(x, y, by = NULL, on = NULL, suffix = c(".x", ".y"))
```

```
left_join_dt(x, y, by = NULL, on = NULL, suffix = c(".x", ".y"))
```

```
right_join_dt(x, y, by = NULL, on = NULL, suffix = c(".x", ".y"))
```

```
full_join_dt(x, y, by = NULL, on = NULL, suffix = c(".x", ".y"))
```

```
anti_join_dt(x, y, by = NULL, on = NULL)
```

```
semi_join_dt(x, y, by = NULL, on = NULL)
```

**Arguments**

|        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| x      | A data.table                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| y      | A data.table                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| by     | (Optional) A character vector of variables to join by.<br>If 'NULL', the default, '*_join_dt()' will perform a natural join, using all variables in common across 'x' and 'y'. A message lists the variables so that you can check they're correct; suppress the message by supplying 'by' explicitly.<br>To join by different variables on 'x' and 'y', use a named vector. For example, 'by = c("a" = "b")' will match 'x\$a' to 'y\$b'.<br>To join by multiple variables, use a vector with length > 1. For example, 'by = c("a", "b")' will match 'x\$a' to 'y\$a' and 'x\$b' to 'y\$b'. Use a named vector to match different variables in 'x' and 'y'. For example, 'by = c("a" = "b", "c" = "d")' will match 'x\$a' to 'y\$b' and 'x\$c' to 'y\$d'. |
| on     | (Optional) Indicate which columns in x should be joined with which columns in y. Examples included: 1..by = c("a", "b") (this is a must for set_full_join_dt); 2..by = c(x1="y1", x2="y2"); 3..by = c("x1==y1", "x2==y2"); 4..by = c("a", "V2="b"); 5..by = .(a, b); 6..by = c("x>=a", "y<=b") or .by = .(x>=a, y<=b).                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| suffix | If there are non-joined duplicate variables in x and y, these suffixes will be added to the output to disambiguate them. Should be a character vector of length 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

**Value**

A data.table

**Examples**

```
workers = fread("
  name company
  Nick Acme
  John Ajax
  Daniela Ajax
")

positions = fread("
  name position
  John designer
  Daniela engineer
  Cathie manager
")

workers %>% inner_join_dt(positions)
workers %>% left_join_dt(positions)
workers %>% right_join_dt(positions)
workers %>% full_join_dt(positions)

# filtering joins
workers %>% anti_join_dt(positions)
workers %>% semi_join_dt(positions)
```

```
# To suppress the message, supply 'by' argument
workers %>% left_join_dt(positions, by = "name")

# Use a named 'by' if the join variables have different names
positions2 = setNames(positions, c("worker", "position")) # rename first column in 'positions'
workers %>% inner_join_dt(positions2, by = c("name" = "worker"))

# the syntax of 'on' could be a bit different
workers %>% inner_join_dt(positions2, on = "name==worker")
```

---

|         |                                  |
|---------|----------------------------------|
| lead_dt | <i>Fast lead/lag for vectors</i> |
|---------|----------------------------------|

---

### Description

Find the "next" or "previous" values in a vector. It has wrapped **data.table**'s shift function.

### Usage

```
lead_dt(x, n = 1L, fill = NA)
```

```
lag_dt(x, n = 1L, fill = NA)
```

### Arguments

|      |                                                                                                  |
|------|--------------------------------------------------------------------------------------------------|
| x    | A vector                                                                                         |
| n    | a positive integer of length 1, giving the number of positions to lead or lag by. Default uses 1 |
| fill | Value to use for padding when the window goes beyond the input length. Default uses NA           |

### Value

A vector

### See Also

[lead,shift](#)

### Examples

```
lead_dt(1:5)
lag_dt(1:5)
lead_dt(1:5,2)
lead_dt(1:5,n = 2,fill = 0)
```

---

longer\_dt                      *Pivot data from wide to long*

---

### Description

Turning a wide table to its longer form. It takes multiple columns and collapses into key-value pairs.

### Usage

```
longer_dt(.data, ..., name = "name", value = "value", na.rm = FALSE)
```

### Arguments

|       |                                                                                                                                                     |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| .data | A data.frame                                                                                                                                        |
| ...   | Pattern for unchanged group or unquoted names. Pattern can accept regular expression to match column names. It can receive what select_dt receives. |
| name  | Name for the measured variable names column. The default name is 'name'.                                                                            |
| value | Name for the molten data values column(s). The default name is 'value'.                                                                             |
| na.rm | If TRUE, NA values will be removed from the molten data.                                                                                            |

### Value

A data.table

### See Also

[wider\\_dt](#), [melt](#), [pivot\\_longer](#)

### Examples

```
## Example 1:
stocks = data.frame(
  time = as.Date('2009-01-01') + 0:9,
  X = rnorm(10, 0, 1),
  Y = rnorm(10, 0, 2),
  Z = rnorm(10, 0, 4)
)

stocks

stocks %>%
  longer_dt(time)

stocks %>%
  longer_dt("ti")

# Example 2:
```



```
library(tidyr)

billboard %>%
  longer_dt(
    -"wk",
    name = "week",
    value = "rank",
    na.rm = TRUE
  )

# or use:
billboard %>%
  longer_dt(
    artist, track, date.entered,
    name = "week",
    value = "rank",
    na.rm = TRUE
  )

# or use:
billboard %>%
  longer_dt(
    1:3,
    name = "week",
    value = "rank",
    na.rm = TRUE
  )
```

---

mat\_df

*Conversion between tidy table and named matrix*

---

### **Description**

Convenient functions to implement conversion between tidy table and named matrix.

### **Usage**

mat\_df(m)

df\_mat(df, row, col, value)

### **Arguments**

m                    A matrix

df                   A data.frame with at least 3 columns, one for row name, one for column name, and one for values. The names for column and row should be unique.

|       |                                               |
|-------|-----------------------------------------------|
| row   | Unquoted expression of column name for row    |
| col   | Unquoted expression of column name for column |
| value | Unquoted expression of column name for values |

**Value**

For `mat_df`, a `data.frame`. For `df_mat`, a named matrix.

**Examples**

```
mm = matrix(c(1:8,NA),ncol = 3,dimnames = list(letters[1:3],LETTERS[1:3]))
mm
tdf = mat_df(mm)
tdf
mat = df_mat(tdf,row,col,value)
setequal(mm,mat)

tdf %>%
  setNames(c("A","B","C")) %>%
  df_mat(A,B,C)
```

---

mutate\_dt

*Mutate columns in data.frame*


---

**Description**

Adds or updates columns in `data.frame`.

**Usage**

```
mutate_dt(.data, ..., by)
```

```
transmute_dt(.data, ..., by)
```

**Arguments**

|                    |                                                                           |
|--------------------|---------------------------------------------------------------------------|
| <code>.data</code> | <code>data.frame</code>                                                   |
| <code>...</code>   | List of variables or name-value pairs of summary/modifications functions. |
| <code>by</code>    | (Optional) Mutate by what group?                                          |

**Value**

`data.table`

**See Also**

[mutate](#)

**Examples**

```
iris %>% mutate_dt(one = 1, Sepal.Length = Sepal.Length + 1)
iris %>% transmute_dt(one = 1, Sepal.Length = Sepal.Length + 1)
# add group number with symbol ` .GRP `
iris %>% mutate_dt(id = 1:.N, grp = .GRP, by = Species)
```

mutate\_when

*Conditional update of columns in data.table***Description**

Update or add columns when the given condition is met.

mutate\_when integrates mutate and case\_when in **dplyr** and make a new tidy verb for data.table. mutate\_vars is a super function to do updates in specific columns according to conditions.

**Usage**

```
mutate_when(.data, when, ..., by)
```

```
mutate_vars(.data, .cols = NULL, .func, ..., by)
```

**Arguments**

|       |                                                                                                                          |
|-------|--------------------------------------------------------------------------------------------------------------------------|
| .data | data.frame                                                                                                               |
| when  | An object which can be coerced to logical mode                                                                           |
| ...   | Name-value pairs of expressions for mutate_when. Additional parameters to be passed to parameter '.func' in mutate_vars. |
| by    | (Optional) Mutate by what group?                                                                                         |
| .cols | Any types that can be accepted by <a href="#">select_dt</a> .                                                            |
| .func | Function to be run within each column, should return a value or vectors with same length.                                |

**Value**

data.table

**See Also**

[select\\_dt](#), [case\\_when](#)

## Examples

```
iris[3:8,]
iris[3:8,] %>%
  mutate_when(Petal.Width == .2,
              one = 1, Sepal.Length=2)

iris %>% mutate_vars("Pe", scale)
iris %>% mutate_vars(is.numeric, scale)
iris %>% mutate_vars(-is.factor, scale)
iris %>% mutate_vars(1:2, scale)
iris %>% mutate_vars(.func = as.character)
```

---

|         |                        |
|---------|------------------------|
| nest_dt | <i>Nest and unnest</i> |
|---------|------------------------|

---

## Description

Create or melt list columns in data.frame.

Analogous function for nest and unnest in **tidyr**. `unnest_dt` will automatically remove other list-columns except for the target list-columns (which would be unnested later). Also, `squeeze_dt` is designed to merge multiple columns into list column.

## Usage

```
nest_dt(.data, ..., mcols = NULL, .name = "ndt")
```

```
unnest_dt(.data, ...)
```

```
squeeze_dt(.data, ..., .name = "ndt")
```

```
chop_dt(.data, ...)
```

```
unchop_dt(.data, ...)
```

## Arguments

|                    |                                                                                                                                                                                                                                                                   |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>.data</code> | data.table, nested or unnested                                                                                                                                                                                                                                    |
| <code>...</code>   | The variables for nest group(for <code>nest_dt</code> ), columns to be nested(for <code>squeeze_dt</code> and <code>chop_dt</code> ), or column(s) to be unnested(for <code>unnest_dt</code> ). Could receive anything that <code>select_dt</code> could receive. |
| <code>mcols</code> | Name-variable pairs in the list, form like                                                                                                                                                                                                                        |
| <code>.name</code> | Character. The nested column name. Defaults to "ndt". <code>list(petal="^Pe", sepal="^Se")</code> , see example.                                                                                                                                                  |

## Details

In the `nest_dt`, the data would be nested to a column named 'ndt', which is short for nested data.table.

The `squeeze_dt` would not remove the original columns.

The `unchop_dt` is the reverse operation of `chop_dt`.

These functions are experiencing the experimental stage, especially the `unnest_dt`. If they don't work on some circumstances, try **tidyr** package.

## Value

data.table, nested or unnested

## References

<https://www.r-bloggers.com/much-faster-unnesting-with-data-table/>

<https://stackoverflow.com/questions/25430986/create-nested-data-tables-by-collapsing-rows-into-new-data-tables>

## See Also

[nest](#), [chop](#)

## Examples

```
# examples for nest_dt
# nest by which columns?
mtcars %>% nest_dt(cyl)
mtcars %>% nest_dt("cyl")
mtcars %>% nest_dt(cyl,vs)
mtcars %>% nest_dt(vs:am)
mtcars %>% nest_dt("cyl|vs")
mtcars %>% nest_dt(c("cyl", "vs"))

# change the nested column name
mtcars %>% nest_dt(cyl, .name = "data")

# nest two columns directly
iris %>% nest_dt(mcols = list(petal="^Pe", sepal="^Se"))

# nest more flexibly
iris %>% nest_dt(mcols = list(ndt1 = 1:3,
  ndt2 = "Pe",
  ndt3 = Sepal.Length:Sepal.Width))

# examples for unnest_dt
# unnest which column?
mtcars %>% nest_dt("cyl|vs") %>%
  unnest_dt(ndt)
mtcars %>% nest_dt("cyl|vs") %>%
```

```

  unnest_dt("ndt")

df <- data.table(
  a = list(c("a", "b"), "c"),
  b = list(c(TRUE,TRUE),FALSE),
  c = list(3,c(1,2)),
  d = c(11, 22)
)

df
df %>% unnest_dt(a)
df %>% unnest_dt(2)
df %>% unnest_dt("c")
df %>% unnest_dt(cols = names(df)[3])

# You can unnest multiple columns simultaneously
df %>% unnest_dt(1:3)
df %>% unnest_dt(a,b,c)
df %>% unnest_dt("a|b|c")

# examples for squeeze_dt
# nest which columns?
iris %>% squeeze_dt(1:2)
iris %>% squeeze_dt("Se")
iris %>% squeeze_dt(Sepal.Length:Petal.Width)
iris %>% squeeze_dt(1:2, .name = "data")

# examples for chop_dt
df <- data.table(x = c(1, 1, 1, 2, 2, 3), y = 1:6, z = 6:1)
df %>% chop_dt(y,z)
df %>% chop_dt(y,z) %>% unchop_dt(y,z)

```

---

 nth

*Extract the nth value from a vector*


---

### Description

Get the value from a vector with its position.

### Usage

```
nth(v, n = 1)
```

### Arguments

|   |                                                                                                                                                                                                             |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| v | A vector                                                                                                                                                                                                    |
| n | A single integer specifying the position. Default uses 1. Negative integers index from the end (i.e. -1L will return the last value in the vector). If a double is supplied, it will be silently truncated. |

**Value**

A single value.

**Examples**

```
x = 1:10
nth(x, 1)
nth(x, 5)
nth(x, -2)
```

---

object\_size

*Nice printing of report the Space Allocated for an Object*

---

**Description**

Provides an estimate of the memory that is being used to store an R object. A wrapper of ‘object.size’, but use a nicer printing unit.

**Usage**

```
object_size(object)
```

**Arguments**

object            an R object.

**Value**

An object of class "object\_size"

**Examples**

```
iris %>% object_size()
```

---

pairwise\_count\_dt      *Count pairs of items within a group*

---

### Description

Count the number of times each pair of items appear together within a group. For example, this could count the number of times two words appear within documents. This function has referred to `pairwise_count` in **widyr** package, but with very different defaults on several parameters.

### Usage

```
pairwise_count_dt(
  .data,
  .group,
  .value,
  upper = FALSE,
  diag = FALSE,
  sort = TRUE
)
```

### Arguments

|                     |                                                                     |
|---------------------|---------------------------------------------------------------------|
| <code>.data</code>  | A data.frame.                                                       |
| <code>.group</code> | Column name of counting group.                                      |
| <code>.value</code> | Item to count pairs, will end up in V1 and V2 columns.              |
| <code>upper</code>  | When FALSE(Default), duplicated combinations would be removed.      |
| <code>diag</code>   | Whether to include diagonal (V1==V2) in output. Default uses FALSE. |
| <code>sort</code>   | Whether to sort rows by counts. Default uses TRUE.                  |

### Value

A data.table with 3 columns (named as "V1","V2" and "n"), containing combinations in "V1" and "V2", and counts in "n".

### See Also

[pairwise\\_count](#)

### Examples

```
dat <- data.table(group = rep(1:5, each = 2),
  letter = c("a", "b",
            "a", "c",
            "a", "c",
            "b", "e",
            "b", "f"))
```



```

pairwise_count_dt(dat,group,letter)
pairwise_count_dt(dat,group,letter,sort = FALSE)
pairwise_count_dt(dat,group,letter,diag = TRUE)
pairwise_count_dt(dat,group,letter,diag = TRUE,upper = TRUE)

# The column name could be specified using character.
pairwise_count_dt(dat,"group","letter")

```

---

|         |                                               |
|---------|-----------------------------------------------|
| percent | <i>Add percentage to counts in data.frame</i> |
|---------|-----------------------------------------------|

---

### Description

Add percentage for counts in the data.frame, both numeric and character with ‘

### Usage

```

percent(x, digits = 1)

add_prop(.data, count_name = last(names(.data)), digits = 1)

```

### Arguments

|            |                                                                                |
|------------|--------------------------------------------------------------------------------|
| x          | A number (numeric).                                                            |
| digits     | How many digits to keep in the percentage. Default uses 1.                     |
| .data      | A data frame.                                                                  |
| count_name | Column name of counts (Character). Default uses the last column of data.frame. |

### References

<https://stackoverflow.com/questions/7145826/how-to-format-a-number-as-percentage-in-r>

### Examples

```

percent(0.9057)
percent(0.9057,3)

iris %>%
  count_dt(Species) %>%
  add_prop()

iris %>%
  count_dt(Species) %>%
  add_prop(count_name = "n",digits = 2)

```

---

|          |                                    |
|----------|------------------------------------|
| pkg_load | <i>Load or unload R package(s)</i> |
|----------|------------------------------------|

---

## Description

This function is a wrapper for [require](#) and [detach](#). `pkg_load` checks to see if a package is installed, if not it attempts to install the package from CRAN. `pkg_unload` can detach one or more loaded packages.

## Usage

```
pkg_load(..., pkg_names = NULL)
```

```
pkg_unload(..., pkg_names = NULL)
```

## Arguments

|           |                                                                                      |
|-----------|--------------------------------------------------------------------------------------|
| ...       | Name(s) of package(s).                                                               |
| pkg_names | (Optional)Character vector containing packages to load or unload. Default uses NULL. |

## See Also

[require](#), [detach](#), [p\\_load](#), [p\\_unload](#)

## Examples

```
## Not run:  
pkg_load(data.table)  
pkg_unload(data.table)  
  
pkg_load(stringr, fst)  
pkg_unload(stringr, fst)  
  
pkg_load(pkg_names = c("data.table", "fst"))  
p_unload(pkg_names = c("data.table", "fst"))  
  
pkg_load(data.table, stringr, fst)  
pkg_unload("all") # shortcut to unload all loaded packages  
  
## End(Not run)
```

---

|               |                                                  |
|---------------|--------------------------------------------------|
| print_options | <i>Set global printing method for data.table</i> |
|---------------|--------------------------------------------------|

---

### Description

This function allow user to define how data.table is printed.

### Usage

```
print_options(  
  topn = 5,  
  nrow = 100,  
  class = TRUE,  
  row.names = TRUE,  
  col.names = "auto",  
  print.keys = TRUE,  
  trunc.cols = FALSE  
)
```

### Arguments

|            |                                                                                                                                                                                                                                                                                                                      |
|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| topn       | The number of rows to be printed from the beginning and end of tables with more than nrow rows.                                                                                                                                                                                                                      |
| nrow       | The number of rows which will be printed before truncation is enforced.                                                                                                                                                                                                                                              |
| class      | If TRUE, the resulting output will include above each column its storage class (or a self-evident abbreviation thereof).                                                                                                                                                                                             |
| row.names  | If TRUE, row indices will be printed.                                                                                                                                                                                                                                                                                |
| col.names  | One of three flavours for controlling the display of column names in output. "auto" includes column names above the data, as well as below the table if nrow(x) > 20. "top" excludes this lower register when applicable, and "none" suppresses column names altogether (as well as column classes if class = TRUE). |
| print.keys | If TRUE, any <a href="#">key</a> and/or <a href="#">index</a> currently assigned to x will be printed prior to the preview of the data.                                                                                                                                                                              |
| trunc.cols | If TRUE, only the columns that can be printed in the console without wrapping the columns to new lines will be printed (similar to tibles).                                                                                                                                                                          |

### Details

Notice that **tidyfst** has a slightly different printing default for data.table, which is it always prints the keys and variable class (not like **data.table**).

### Value

None. This function is used for its side effect of changing options.

**See Also**[print.data.table](#)**Examples**

```
iris %>% as.data.table()
print_options(topn = 3, trunc.cols = TRUE)
iris %>% as.data.table()

# set all settings to default in tidyfst
print_options()
iris %>% as.data.table()
```

---

`pull_dt`*Pull out a single variable*

---

**Description**

Extract vector from data.frame, works likt '['. Analogous function for pull in **dplyr**

**Usage**

```
pull_dt(.data, col)
```

**Arguments**

|                    |                                                 |
|--------------------|-------------------------------------------------|
| <code>.data</code> | data.frame                                      |
| <code>col</code>   | A name of column or index (should be positive). |

**Value**

vector

**See Also**[pull](#)**Examples**

```
mtcars %>% pull_dt(2)
mtcars %>% pull_dt(cyl)
mtcars %>% pull_dt("cyl")
```

---

|     |                                 |
|-----|---------------------------------|
| rec | <i>Recode number or strings</i> |
|-----|---------------------------------|

---

### Description

Recode discrete variables, including numeric and character variable.

### Usage

```
rec_num(x, rec, keep = TRUE)
```

```
rec_char(x, rec, keep = TRUE)
```

### Arguments

|      |                                                                                       |
|------|---------------------------------------------------------------------------------------|
| x    | A numeric or character vector.                                                        |
| rec  | String with recode pairs of old and new values. Find the usage in examples.           |
| keep | Logical. Decide whether to keep the original values if not recoded. Defaults to TRUE. |

### Value

A vector.

### See Also

[rec](#)

### Examples

```
x = 1:10
x
rec_num(x, rec = "1=10; 4=2")
rec_num(x, rec = "1:3=1; 4:6=2")
rec_num(x, rec = "1:3=1; 4:6=2", keep = FALSE)

y = letters[1:5]
y
rec_char(y, rec = "a=A;b=B")
rec_char(y, rec = "a,b=A;c,d=B")
rec_char(y, rec = "a,b=A;c,d=B", keep = FALSE)
```

---

|             |                            |
|-------------|----------------------------|
| relocate_dt | <i>Change column order</i> |
|-------------|----------------------------|

---

### Description

Change the position of columns, using the same syntax as `'select_dt()'`. Check similar function as `'relocate'` in **dplyr**.

### Usage

```
relocate_dt(.data, ..., how = "first", where = NULL)
```

### Arguments

|                    |                                                                                                 |
|--------------------|-------------------------------------------------------------------------------------------------|
| <code>.data</code> | A <code>data.frame</code>                                                                       |
| <code>...</code>   | Columns to move                                                                                 |
| <code>how</code>   | The mode of movement, including "first","last","after","before". Default uses "first".          |
| <code>where</code> | Destination of columns selected by <code>...</code> . Applicable for "after" and "before" mode. |

### Value

A `data.table` with rearranged columns.

### See Also

[relocate](#)

### Examples

```
df <- data.table(a = 1, b = 1, c = 1, d = "a", e = "a", f = "a")
df
df %>% relocate_dt(f)
df %>% relocate_dt(a,how = "last")

df %>% relocate_dt(is.character)
df %>% relocate_dt(is.numeric, how = "last")
df %>% relocate_dt("[aeiou]")

df %>% relocate_dt(a, how = "after",where = f)
df %>% relocate_dt(f, how = "before",where = a)
df %>% relocate_dt(f, how = "before",where = c)
df %>% relocate_dt(f, how = "after",where = c)

df2 <- data.table(a = 1, b = "a", c = 1, d = "a")
df2 %>% relocate_dt(is.numeric,
                    how = "after",
```

```

                                where = is.character)
df2 %>% relocate_dt(is.numeric,
                    how="before",
                    where = is.character)

```

---

|           |                                    |
|-----------|------------------------------------|
| rename_dt | <i>Rename column in data.frame</i> |
|-----------|------------------------------------|

---

### Description

Rename one or more columns in the data.frame.

### Usage

```

rename_dt(.data, ...)

rename_with_dt(.data, .fn, ...)

```

### Arguments

|       |                                                                                                                   |
|-------|-------------------------------------------------------------------------------------------------------------------|
| .data | data.frame                                                                                                        |
| ...   | statements of rename, e.g. 'sl = Sepal.Length' means the column named as "Sepal.Length" would be renamed to "sl"  |
| .fn   | A function used to transform the selected columns. Should return a character vector the same length as the input. |

### Value

data.table

### See Also

[rename](#)

### Examples

```

iris %>%
  rename_dt(sl = Sepal.Length,sw = Sepal.Width) %>%
  head()
iris %>% rename_with_dt(toupper)
iris %>% rename_with_dt(toupper,"^Pe")

```

---

|            |                                             |
|------------|---------------------------------------------|
| replace_dt | <i>Fast value replacement in data frame</i> |
|------------|---------------------------------------------|

---

### Description

While `replace_na_dt` could replace all NAs to another value, `replace_dt` could replace any value(s) to another specific value.

### Usage

```
replace_dt(.data, ..., from = is.nan, to = NA)
```

### Arguments

|                    |                                                                                                      |
|--------------------|------------------------------------------------------------------------------------------------------|
| <code>.data</code> | A data.frame                                                                                         |
| <code>...</code>   | Columns to be replaced. If not specified, use all columns.                                           |
| <code>from</code>  | A value, a vector of values or a function returns a logical value. Defaults to <code>is.nan</code> . |
| <code>to</code>    | A value. Defaults to NA.                                                                             |

### Value

A data.table.

### See Also

[replace\\_na\\_dt](#)

### Examples

```
iris %>% mutate_vars(is.factor,as.character) -> new_iris

new_iris %>%
  replace_dt(Species, from = "setosa",to = "SS")
new_iris %>%
  replace_dt(Species,from = c("setosa","virginica"),to = "sv")
new_iris %>%
  replace_dt(Petal.Width, from = .2,to = 2)
new_iris %>%
  replace_dt(from = .2,to = NA)
new_iris %>%
  replace_dt(is.numeric, from = function(x) x > 3, to = 9999 )
```



---

|        |                                         |
|--------|-----------------------------------------|
| rn_col | <i>Tools for working with row names</i> |
|--------|-----------------------------------------|

---

**Description**

The enhanced data.frame, including tibble and data.table, do not support row names. To link to some base r facilities, there should be functions to save information in row names. These functions are analogous to rownames\_to\_column and column\_to\_rownames in **tibble**.

**Usage**

```
rn_col(.data, var = "rowname")
```

```
col_rn(.data, var = "rowname")
```

**Arguments**

|       |                                     |
|-------|-------------------------------------|
| .data | A data.frame.                       |
| var   | Name of column to use for rownames. |

**Value**

rn\_col returns a data.table, col\_rn returns a data frame.

**Examples**

```
mtcars %>% rn_col()
mtcars %>% rn_col("rn")

mtcars %>% rn_col() -> new_mtcars

new_mtcars %>% col_rn() -> old_mtcars
old_mtcars
setequal(mtcars,old_mtcars)
```

---

|           |                                          |
|-----------|------------------------------------------|
| sample_dt | <i>Sample rows randomly from a table</i> |
|-----------|------------------------------------------|

---

**Description**

Select a number or proportion of rows randomly from the data frame

sample\_dt is a merged version of sample\_n\_dt and sample\_frac\_dt, this could be convenient.

**Usage**

```
sample_dt(.data, n = NULL, prop = NULL, replace = FALSE, by = NULL)
```

```
sample_n_dt(.data, size, replace = FALSE, by = NULL)
```

```
sample_frac_dt(.data, size, replace = FALSE, by = NULL)
```

**Arguments**

|         |                                                                                                    |
|---------|----------------------------------------------------------------------------------------------------|
| .data   | A data.frame                                                                                       |
| n       | Number of rows to select                                                                           |
| prop    | Fraction of rows to select                                                                         |
| replace | Sample with or without replacement? Default uses FALSE.                                            |
| by      | (Optional) Character. Specify if you want to sample by group.                                      |
| size    | For sample_n_dt, the number of rows to select. For sample_frac_dt, the fraction of rows to select. |

**Value**

data.table

**See Also**

[sample\\_n](#), [sample\\_frac](#)

**Examples**

```
sample_n_dt(mtcars, 10)
sample_n_dt(mtcars, 50, replace = TRUE)
sample_frac_dt(mtcars, 0.1)
sample_frac_dt(mtcars, 1.5, replace = TRUE)

sample_dt(mtcars, n=10)
sample_dt(mtcars, prop = 0.1)

# sample by group(s)
iris %>% sample_n_dt(2, by = "Species")
iris %>% sample_frac_dt(.1, by = "Species")

mtcars %>% sample_n_dt(1, by = "cyl, vs")
# equals to
mtcars %>% sample_n_dt(1, by = c("cyl", "vs"))
```

---

|           |                                      |
|-----------|--------------------------------------|
| select_dt | <i>Select column from data.frame</i> |
|-----------|--------------------------------------|

---

### Description

Select specific column(s) via various ways. One can select columns by their column names, indexes or regular expression recognizing the column name(s).

### Usage

```
select_dt(.data, ..., cols = NULL, negate = FALSE)
```

```
select_mix(.data, ..., rm.dup = TRUE)
```

### Arguments

|        |                                                                                                                                                                                                                |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| .data  | data.frame                                                                                                                                                                                                     |
| ...    | List of variables or name-value pairs of summary/modifications functions. It can also receive conditional function to select columns. When starts with '-' (minus symbol) or ';', return the negative columns. |
| cols   | (Optional) A numeric or character vector.                                                                                                                                                                      |
| negate | Applicable when regular expression and "cols" is used. If TRUE, return the non-matched pattern. Default uses FALSE.                                                                                            |
| rm.dup | Should duplicated columns be removed? Defaults to TRUE.                                                                                                                                                        |

### Value

data.table

### See Also

[select](#), [select\\_if](#)

### Examples

```
iris %>% select_dt(Species)
iris %>% select_dt(Sepal.Length, Sepal.Width)
iris %>% select_dt(Sepal.Length:Petal.Length)
iris %>% select_dt(-Sepal.Length)
iris %>% select_dt(-Sepal.Length, -Petal.Length)
iris %>% select_dt(-(Sepal.Length:Petal.Length))
iris %>% select_dt(c("Sepal.Length", "Sepal.Width"))
iris %>% select_dt(-c("Sepal.Length", "Sepal.Width"))
iris %>% select_dt(1)
iris %>% select_dt(-1)
iris %>% select_dt(1:3)
iris %>% select_dt(-(1:3))
```

```

iris %>% select_dt(1,3)
iris %>% select_dt("Pe")
iris %>% select_dt("-Se")
iris %>% select_dt(!"Se")
iris %>% select_dt("Pe",negate = TRUE)
iris %>% select_dt("Pe|Sp")
iris %>% select_dt(cols = 2:3)
iris %>% select_dt(cols = 2:3,negate = TRUE)
iris %>% select_dt(cols = c("Sepal.Length","Sepal.Width"))
iris %>% select_dt(cols = names(iris)[2:3])

iris %>% select_dt(is.factor)
iris %>% select_dt(-is.factor)
iris %>% select_dt(!is.factor)

# select_mix could provide flexible mix selection
select_mix(iris, Species,"Sepal.Length")
select_mix(iris,1:2,is.factor)

select_mix(iris,Sepal.Length,is.numeric)
# set rm.dup to FALSE could save the duplicated column names
select_mix(iris,Sepal.Length,is.numeric,rm.dup = FALSE)

```

---

separate\_dt

*Separate a character column into two columns using a regular expression separator*


---

## Description

Given either regular expression, `separate_dt()` turns a single character column into two columns.

## Usage

```

separate_dt(
  .data,
  separated_colname,
  into,
  sep = "[^[:alnum:]]+",
  remove = TRUE
)

```

## Arguments

|                                |                                                      |
|--------------------------------|------------------------------------------------------|
| <code>.data</code>             | A data frame.                                        |
| <code>separated_colname</code> | Column to be separated, can be a character or alias. |
| <code>into</code>              | Character vector of length 2.                        |
| <code>sep</code>               | Separator between columns.                           |
| <code>remove</code>            | If TRUE, remove input column from output data frame. |

**See Also**

[separate](#), [unite\\_dt](#)

**Examples**

```
df <- data.frame(x = c(NA, "a.b", "a.d", "b.c"))
df %>% separate_dt(x, c("A", "B"))
# equals to
df %>% separate_dt("x", c("A", "B"))

# If you just want the second variable:
df %>% separate_dt(x,into = c(NA,"B"))
```

---

slice\_dt

*Subset rows using their positions*

---

**Description**

'slice\_dt()' lets you index rows by their (integer) locations. It allows you to select, remove, and duplicate rows. It is accompanied by a number of helpers for common use cases:

\* 'slice\_head\_dt()' and 'slice\_tail\_dt()' select the first or last rows. \* 'slice\_sample\_dt()' randomly selects rows. \* 'slice\_min\_dt()' and 'slice\_max\_dt()' select rows with highest or lowest values of a variable.

**Usage**

```
slice_dt(.data, ..., by = NULL)

slice_head_dt(.data, n, by = NULL)

slice_tail_dt(.data, n, by = NULL)

slice_max_dt(.data, order_by, n, by = NULL, with_ties = TRUE)

slice_min_dt(.data, order_by, n, by = NULL, with_ties = TRUE)

slice_sample_dt(.data, n, replace = FALSE, by = NULL)
```

**Arguments**

|       |                                                                                                                                      |
|-------|--------------------------------------------------------------------------------------------------------------------------------------|
| .data | A data.table                                                                                                                         |
| ...   | Provide either positive values to keep, or negative values to drop. The values provided must be either all positive or all negative. |
| by    | Slice by which group(s)?                                                                                                             |
| n     | When larger than or equal to 1, the number of rows. When between 0 and 1, the proportion of rows to select.                          |

|           |                                                                                                                                                      |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| order_by  | Variable or function of variables to order by.                                                                                                       |
| with_ties | Should ties be kept together? The default, 'TRUE', may return more rows than you request. Use 'FALSE' to ignore ties, and return the first 'n' rows. |
| replace   | Should sampling be performed with ('TRUE') or without ('FALSE', the default) replacement.                                                            |

**Value**

A data.table

**See Also**

[slice](#)

**Examples**

```
a = iris
slice_dt(a,1,2)
slice_dt(a,2:3)
slice_dt(a,141:.N)
slice_dt(a,1,.N)
slice_head_dt(a,5)
slice_head_dt(a,0.1)
slice_tail_dt(a,5)
slice_tail_dt(a,0.1)
slice_max_dt(a,Sepal.Length,10)
slice_max_dt(a,Sepal.Length,10,with_ties = FALSE)
slice_min_dt(a,Sepal.Length,10)
slice_min_dt(a,Sepal.Length,10,with_ties = FALSE)
slice_sample_dt(a,10)
slice_sample_dt(a,0.1)

# use by to slice by group

## following codes get the same results
slice_dt(a,1:3,by = "Species")
slice_dt(a,1:3,by = Species)
slice_dt(a,1:3,by = .(Species))

slice_head_dt(a,2,by = Species)
slice_tail_dt(a,2,by = Species)

slice_max_dt(a,Sepal.Length,3,by = Species)
slice_max_dt(a,Sepal.Length,3,by = Species,with_ties = FALSE)
slice_min_dt(a,Sepal.Length,3,by = Species)
slice_min_dt(a,Sepal.Length,3,by = Species,with_ties = FALSE)

# in `slice_sample_dt`, "by" could only take character class
slice_sample_dt(a,.1,by = "Species")
slice_sample_dt(a,3,by = "Species")
```

```
slice_sample_dt(a,51,replace = TRUE,by = "Species")
```

---

 sql\_join
 

---

*Case insensitive table joining like SQL*


---

### Description

Work like the ‘\*\_join\_dt’ series functions, joining tables with common or customized keys in various ways. The only difference is the joining is case insensitive like SQL.

### Usage

```
sql_join_dt(x, y, by = NULL, type = "inner", suffix = c(".x", ".y"))
```

### Arguments

|        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| x      | A data.table                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| y      | A data.table                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| by     | (Optional) A character vector of variables to join by.<br>If ‘NULL’, the default, ‘*_join_dt()’ will perform a natural join, using all variables in common across ‘x’ and ‘y’. A message lists the variables so that you can check they’re correct; suppress the message by supplying ‘by’ explicitly.<br>To join by different variables on ‘x’ and ‘y’, use a named vector. For example, ‘by = c("a" = "b")’ will match ‘x\$a’ to ‘y\$b’.<br>To join by multiple variables, use a vector with length > 1. For example, ‘by = c("a", "b")’ will match ‘x\$a’ to ‘y\$a’ and ‘x\$b’ to ‘y\$b’. Use a named vector to match different variables in ‘x’ and ‘y’. For example, ‘by = c("a" = "b", "c" = "d")’ will match ‘x\$a’ to ‘y\$b’ and ‘x\$c’ to ‘y\$d’.<br>Notice that in ‘sql_join’, the joining variables would turn to upper case in the output table. |
| type   | Which type of join would you like to use? Default uses "inner", other options include "left", "right", "full", "anti", "semi".                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| suffix | If there are non-joined duplicate variables in x and y, these suffixes will be added to the output to disambiguate them. Should be a character vector of length 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

### Value

A data.table

### See Also

[join](#)

**Examples**

```
dt1 = data.table(x = c("A","b"),y = 1:2)
dt2 = data.table(x = c("a","B"),z = 4:5)
sql_join_dt(dt1,dt2)
```

---

|              |                                           |
|--------------|-------------------------------------------|
| summarise_dt | <i>Summarise columns to single values</i> |
|--------------|-------------------------------------------|

---

**Description**

Summarise group of values into one value for each group. If there is only one group, then only one value would be returned. The summarise function should always return a single value.

**Usage**

```
summarise_dt(.data, ..., by = NULL)
summarize_dt(.data, ..., by = NULL)
summarise_when(.data, when, ..., by = NULL)
summarize_when(.data, when, ..., by = NULL)
summarise_vars(.data, .cols = NULL, .func, ..., by)
summarize_vars(.data, .cols = NULL, .func, ..., by)
```

**Arguments**

|       |                                                                                                                                                                       |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| .data | data.frame                                                                                                                                                            |
| ...   | List of variables or name-value pairs of summary/modifications functions for summarise_dt. Additional parameters to be passed to parameter '.func' in summarise_vars. |
| by    | unquoted name of grouping variable or list of unquoted names of grouping variables. For details see <a href="#">data.table</a>                                        |
| when  | An object which can be coerced to logical mode                                                                                                                        |
| .cols | Columns to be summarised.                                                                                                                                             |
| .func | Function to be run within each column, should return a value or vectors with same length.                                                                             |

**Details**

summarise\_vars could complete summarise on specific columns.

**Value**

data.table



**See Also**[summarise](#)**Examples**

```
iris %>% summarise_dt(avg = mean(Sepal.Length))
iris %>% summarise_dt(avg = mean(Sepal.Length),by = Species)
mtcars %>% summarise_dt(avg = mean(hp),by = .(cyl,vs))

# the data.table way
mtcars %>% summarise_dt(cyl_n = .N, by = .(cyl, vs)) # `.` is short for list

iris %>% summarise_vars(is.numeric,min)
iris %>% summarise_vars(-is.factor,min)
iris %>% summarise_vars(1:4,min)

iris %>% summarise_vars(is.numeric,min,by = "Species")
mtcars %>% summarise_vars(is.numeric,mean,by = "vs,am")

# use multiple functions on multiple columns
iris %>%
  summarise_vars(is.numeric,.func = list(mean,sd,median))
iris %>%
  summarise_vars(is.numeric,.func = list(mean,sd,median),by = Species)
```

---

`sys_time_print`*Convenient print of time taken*

---

**Description**

Convenient printing of time elapsed. A wrapper of `data.table::timetaken`, but showing the results more directly.

**Usage**

```
sys_time_print(expr)
```

```
pst(expr)
```

**Arguments**

`expr` Valid R expression to be timed.

**Value**

A character vector of the form `HH:MM:SS`, or `SS.MMMsec` if under 60 seconds (invisibly for `show_time`). See examples.

**See Also**

[timetaken](#), [system.time](#)

**Examples**

```
sys_time_print(Sys.sleep(1))

a = iris
sys_time_print({
  res = iris %>%
    mutate_dt(one = 1)
})
res
```

---

t\_dt

*Efficient transpose of data.frame*

---

**Description**

An efficient way to transpose data frames([data.frame](#)/[data.table](#)/[tibble](#)).

**Usage**

```
t_dt(.data)
```

**Arguments**

.data            A [data.frame](#)/[data.table](#)/[tibble](#)

**Details**

This function would return the original [data.frame](#) structure, keeping all the row names and column names. If the row names are not available or, "V1,V2..." will be provided.

**Value**

A transposed [data.frame](#)

**Examples**

```
t_dt(iris)
t_dt(mtcars)
```

---

|            |                               |
|------------|-------------------------------|
| uncount_dt | <i>"Uncount" a data frame</i> |
|------------|-------------------------------|

---

**Description**

Duplicating rows according to a weighting variable. This is the opposite operation of 'count\_dt'. Analogous to 'tidyr::uncount'.

**Usage**

```
uncount_dt(.data, wt, .remove = TRUE)
```

**Arguments**

|         |                                                              |
|---------|--------------------------------------------------------------|
| .data   | A data.frame                                                 |
| wt      | A vector of weights.                                         |
| .remove | Should the column for weights be removed? Default uses TRUE. |

**See Also**

[count](#), [uncount](#)

**Examples**

```
df <- data.table(x = c("a", "b"), n = c(1, 2))
uncount_dt(df, n)
uncount_dt(df, n, FALSE)
```

---

|          |                                                                    |
|----------|--------------------------------------------------------------------|
| unite_dt | <i>Unite multiple columns into one by pasting strings together</i> |
|----------|--------------------------------------------------------------------|

---

**Description**

Convenience function to paste together multiple columns into one.

**Usage**

```
unite_dt(
  .data,
  united_colname,
  ...,
  sep = "_",
  remove = FALSE,
  na2char = FALSE
)
```

**Arguments**

|                             |                                                                                                                                    |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <code>.data</code>          | A data frame.                                                                                                                      |
| <code>united_colname</code> | The name of the new column, string only.                                                                                           |
| <code>...</code>            | A selection of columns. If want to select all columns, pass "" to the parameter. See example.                                      |
| <code>sep</code>            | Separator to use between values.                                                                                                   |
| <code>remove</code>         | If TRUE, remove input columns from output data frame.                                                                              |
| <code>na2char</code>        | If FALSE, missing values would be merged into NA, otherwise NA is treated as character "NA". This is different from <b>tidyr</b> . |

**See Also**

[unite,separate\\_dt](#)

**Examples**

```
df <- expand.grid(x = c("a", NA), y = c("b", NA))
df

# Treat missing value as NA, default
df %>% unite_dt("z", x:y, remove = FALSE)
# Treat missing value as character "NA"
df %>% unite_dt("z", x:y, na2char = TRUE, remove = FALSE)
df %>%
  unite_dt("xy", x:y)

# Select all columns
iris %>% unite_dt("merged_name", "")
```

---

utf8\_encoding

*Use UTF-8 for character encoding in a data frame*

---

**Description**

fread from **data.table** could not recognize the encoding and return the correct form, this could be inconvenient for text mining tasks. The utf8-encoding could use "UTF-8" as the encoding to override the current encoding of characters in a data frame.

**Usage**

```
utf8_encoding(.data)
```

**Arguments**

|                    |               |
|--------------------|---------------|
| <code>.data</code> | A data.frame. |
|--------------------|---------------|

**Value**

A data.table with characters in UTF-8 encoding

---

|          |                                     |
|----------|-------------------------------------|
| wider_dt | <i>Pivot data from long to wide</i> |
|----------|-------------------------------------|

---

**Description**

Transform a data frame from long format to wide by increasing the number of columns and decreasing the number of rows.

**Usage**

```
wider_dt(.data, ..., name, value = NULL, fun = NULL, fill = NA)
```

**Arguments**

|       |                                                                                                                                                                 |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| .data | A data.frame                                                                                                                                                    |
| ...   | Optional. The unchanged group in the transformation. Could use integer vector, could receive what select_dt receives.                                           |
| name  | Character. One column name of class to spread                                                                                                                   |
| value | Character. One column name of value to spread. If NULL, use all other variables.                                                                                |
| fun   | Should the data be aggregated before casting? Defaults to NULL, which uses length for aggregation. If a function is provided, with aggregated by this function. |
| fill  | Value with which to fill missing cells. Default uses NA.                                                                                                        |

**Details**

The parameter of 'name' and 'value' should always be provided and should be explicit called (with the parameter names attached).

**Value**

data.table

**See Also**

[longer\\_dt](#), [dcast](#), [pivot\\_wider](#)

**Examples**

```

stocks = data.frame(
  time = as.Date('2009-01-01') + 0:9,
  X = rnorm(10, 0, 1),
  Y = rnorm(10, 0, 2),
  Z = rnorm(10, 0, 4)
) %>%
  longer_dt(time) -> longer_stocks

longer_stocks

longer_stocks %>%
  wider_dt("time",
    name = "name",
    value = "value")

longer_stocks %>%
  mutate_dt(one = 1) %>%
  wider_dt("time",
    name = "name",
    value = "one")

## using "fun" parameter for aggregation
DT <- data.table(v1 = rep(1:2, each = 6),
  v2 = rep(rep(1:3, 2), each = 2),
  v3 = rep(1:2, 6),
  v4 = rnorm(6))
## for each combination of (v1, v2), add up all values of v4
DT %>%
  wider_dt(v1,v2,
    value = "v4",
    name = ".",
    fun = sum)

```

---

%notin%

*Not in operator*

---

**Description**

Inverse operation of match (‘

**Usage**

x %notin% y

**Arguments**

x                    vector or NULL  
y                    vector or NULL

**Examples**

```
"a" %in% letters[1:3]  
"a" %notin% letters[1:3]
```

```
1 %in% 1:3  
1 %notin% 1:3
```

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