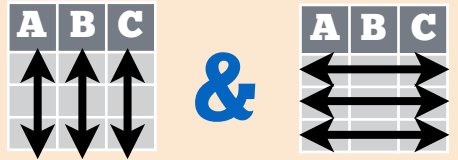


Data Transformation with dplyr Cheat Sheet



dplyr functions work with pipes and expect **tidy data**. In tidy data:



Each **variable** is in its own **column** & Each **observation**, or **case**, is in its own **row**

pipes
x %>% f(y)
becomes f(x, y)

Summarise Cases

These apply **summary functions** to columns to create a new table. Summary functions take vectors as input and return one value (see back).



summarise(.data, ...)
Compute table of summaries. Also **summarise_()**.
`summarise(mtcars, avg = mean(mpg))`

count(x, ..., wt = NULL, sort = FALSE)
Count number of rows in each group defined by the variables in ... Also **tally()**.
`count(iris, Species)`

Variations

- **summarise_all()** - Apply funs to every column.
- **summarise_at()** - Apply funs to specific columns.
- **summarise_if()** - Apply funs to all cols of one type.

Group Cases

Use **group_by()** to create a "grouped" copy of a table. dplyr functions will manipulate each "group" separately and then combine the results.

`mtcars %>%
group_by(cyl) %>%
summarise(avg = mean(mpg))`

group_by(.data, ..., add = FALSE)
Returns copy of table grouped by ...
`g_iris <- group_by(iris, Species)`

ungroup(x, ...)
Returns ungrouped copy of table.
`ungroup(g_iris)`

Manipulate Cases

Extract Cases

Row functions return a subset of rows as a new table. Use a variant that ends in **_** for non-standard evaluation friendly code.

filter(.data, ...)
Extract rows that meet logical criteria. Also **filter_()**. `filter(iris, Sepal.Length > 7)`

distinct(.data, ..., .keep_all = FALSE)
Remove rows with duplicate values. Also **distinct_()**. `distinct(iris, Species)`

sample_frac(tbl, size = 1, replace = FALSE, weight = NULL, .env = parent.frame())
Randomly select fraction of rows.
`sample_frac(iris, 0.5, replace = TRUE)`

sample_n(tbl, size, replace = FALSE, weight = NULL, .env = parent.frame())
Randomly select size rows.
`sample_n(iris, 10, replace = TRUE)`

slice(.data, ...)
Select rows by position. Also **slice_()**.
`slice(iris, 10:15)`

top_n(x, n, wt)
Select and order top n entries (by group if grouped data). `top_n(iris, 5, Sepal.Width)`

Logical and boolean operators to use with filter()

<	<=	is.na()	%in%		xor()
>	>=	!is.na()	!	&	

See **?base::logic** and **?Comparison** for help.

Arrange Cases

arrange(.data, ...)
Order rows by values of a column (low to high), use with **desc()** to order from high to low.
`arrange(mtcars, mpg)`
`arrange(mtcars, desc(mpg))`

Add Cases

add_row(.data, ..., .before = NULL, .after = NULL)
Add one or more rows to a table.
`add_row(faithful, eruptions = 1, waiting = 1)`

Manipulate Variables

Extract Variables

Column functions return a set of columns as a new table. Use a variant that ends in **_** for non-standard evaluation friendly code.

select(.data, ...)
Extract columns by name. Also **select_if()**.
`select(iris, Sepal.Length, Species)`

Use these helpers with **select()**,
e.g. `select(iris, starts_with("Sepal"))`

contains(match)	num_range(prefix, range)	;, e.g. mpg:cyl
ends_with(match)	one_of(...)	-, e.g. -Species
matches(match)	starts_with(match)	everything()

Make New Variables

These apply **vectorized functions** to columns. Vectorized funs take vectors as input and return vectors of the same length as output (see back).



mutate(.data, ...)
Compute new column(s).
`mutate(mtcars, gpm = 1/mpg)`

transmute(.data, ...)
Compute new column(s), drop others.
`transmute(mtcars, gpm = 1/mpg)`

mutate_all(.tbl, .funs, ...)
Apply funs to every column. Use with **funs()**. `mutate_all(faithful, funs(log(.), log2(.)))`

mutate_at(.tbl, .cols, .funs, ...)
Apply funs to specific columns. Use with **funs()**, **vars()** and the helper functions for **select()**.
`mutate_at(iris, vars(-Species), funs(log(.)))`

mutate_if(.tbl, .predicate, .funs, ...)
Apply funs to all columns of one type. Use with **funs()**.
`mutate_if(iris, is.numeric, funs(log(.)))`

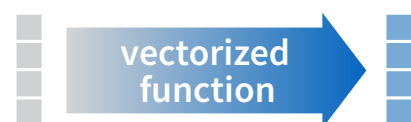
add_column(.data, ..., .before = NULL, .after = NULL)
Add new column(s).
`add_column(mtcars, new = 1:32)`

rename(.data, ...)
Rename columns.
`rename(iris, Length = Sepal.Length)`

Vectorized Functions

to use with mutate()

mutate() and **transmute()** apply vectorized functions to columns to create new columns. Vectorized functions take vectors as input and return vectors of the same length as output.



Offsets

`dplyr::lag()` - Offset elements by 1
`dplyr::lead()` - Offset elements by -1

Cumulative Aggregates

`dplyr::cumall()` - Cumulative all()
`dplyr::cumany()` - Cumulative any()
`cummax()` - Cumulative max()
`dplyr::cummean()` - Cumulative mean()
`cummin()` - Cumulative min()
`cumprod()` - Cumulative prod()
`cumsum()` - Cumulative sum()

Rankings

`dplyr::cume_dist()` - Proportion of all values <=
`dplyr::dense_rank()` - rank with ties = min, no gaps
`dplyr::min_rank()` - rank with ties = min
`dplyr::ntile()` - bins into n bins
`dplyr::percent_rank()` - min_rank scaled to [0,1]
`dplyr::row_number()` - rank with ties = "first"

Math

`+`, `-`, `*`, `/`, `^`, `%/%`, `%%` - arithmetic ops
`log()`, `log2()`, `log10()` - logs
`<`, `<=`, `>`, `>=`, `!=`, `==` - logical comparisons

Misc

`dplyr::between()` - $x \geq \text{left} \ \& \ x \leq \text{right}$
`dplyr::case_when()` - multi-case if_else()
`dplyr::coalesce()` - first non-NA values by element across a set of vectors
`dplyr::if_else()` - element-wise if() + else()
`dplyr::na_if()` - replace specific values with NA
`pmax()` - element-wise max()
`pmin()` - element-wise min()
`dplyr::recode()` - Vectorized switch()
`dplyr::recode_factor()` - Vectorized switch() for factors

Summary Functions

to use with summarise()

summarise() applies summary functions to columns to create a new table. Summary functions take vectors as input and return single values as output.



Counts

`dplyr::n()` - number of values/rows
`dplyr::n_distinct()` - # of uniques
`sum(!is.na())` - # of non-NA's

Location

`mean()` - mean, also `mean(!is.na())`
`median()` - median

Logicals

`mean()` - Proportion of TRUE's
`sum()` - # of TRUE's

Position/Order

`dplyr::first()` - first value
`dplyr::last()` - last value
`dplyr::nth()` - value in nth location of vector

Rank

`quantile()` - nth quantile
`min()` - minimum value
`max()` - maximum value

Spread

`IQR()` - Inter-Quartile Range
`mad()` - mean absolute deviation
`sd()` - standard deviation
`var()` - variance

Row names

Tidy data does not use rownames, which store a variable outside of the columns. To work with the rownames, first move them into a column.

A	B
1	a t
2	b u
3	c v

 →

C	A	B
1	a	t
2	b	u
3	c	v

`rownames_to_column()`
 Move row names into col.
`a <- rownames_to_column(iris, var = "C")`

A	B	C
a	t	1
b	u	2
c	v	3

 →

A	B
1	a t
2	b u
3	c v

`column_to_rownames()`
 Move col in row names.
`column_to_rownames(a, var = "C")`

Also `has_rownames()`, `remove_rownames()`

Combine Tables

Combine Variables

x			y		
A	B	C	A	B	D
a	t	1	a	t	3
b	u	2	b	u	2
c	v	3	d	w	1

Use **bind_cols()** to paste tables beside each other as they are.

A	B	C	A	B	D
a	t	1	a	t	3
b	u	2	b	u	2
c	v	3	d	w	1

bind_cols(...)

Returns tables placed side by side as a single table.
 BE SURE THAT ROWS ALIGN.

Use a "Mutating Join" to join one table to columns from another, matching values with the rows that they correspond to. Each join retains a different combination of values from the tables.

A	B	C	D
a	t	1	3
b	u	2	2
c	v	3	NA

left_join(x, y, by = NULL, copy=FALSE, suffix=c("x","y"),...)
 Join matching values from y to x.

A	B	C	D
a	t	1	3
b	u	2	2
d	w	NA	1

right_join(x, y, by = NULL, copy = FALSE, suffix=c("x","y"),...)
 Join matching values from x to y.

A	B	C	D
a	t	1	3
b	u	2	2

inner_join(x, y, by = NULL, copy = FALSE, suffix=c("x","y"),...)
 Join data. Retain only rows with matches.

A	B	C	D
a	t	1	3
b	u	2	2
c	v	3	NA
d	w	NA	1

full_join(x, y, by = NULL, copy=FALSE, suffix=c("x","y"),...)
 Join data. Retain all values, all rows.

A	B.x	C	B.y	D
a	t	1	t	3
b	u	2	u	2
c	v	3	NA	NA

Use **by = c("col1", "col2")** to specify the column(s) to match on.

`left_join(x, y, by = "A")`

A.x	B.x	C	A.y	B.y
a	t	1	d	w
b	u	2	b	u
c	v	3	a	t

Use a named vector, **by = c("col1" = "col2")**, to match on columns with different names in each data set.

`left_join(x, y, by = c("C" = "D"))`

A1	B1	C	A2	B2
a	t	1	d	w
b	u	2	b	u
c	v	3	a	t

Use **suffix** to specify suffix to give to duplicate column names.

`left_join(x, y, by = c("C" = "D"), suffix = c("1", "2"))`

Combine Cases

A	B	C
a	t	1
b	u	2
c	v	3

Use **bind_rows()** to paste tables below each other as they are.

DF	A	B	C
x	a	t	1
x	b	u	2
x	c	v	3
z	c	v	3
z	d	w	4

bind_rows(..., .id = NULL)

Returns tables one on top of the other as a single table. Set .id to a column name to add a column of the original table names (as pictured)

A	B	C
c	v	3

intersect(x, y, ...)

Rows that appear in both x and z.

A	B	C
a	t	1
b	u	2

setdiff(x, y, ...)

Rows that appear in x but not z.

A	B	C
a	t	1
b	u	2
c	v	3
d	w	4

union(x, y, ...)

Rows that appear in x or z. (Duplicates removed). **union_all()** retains duplicates.

Use **setequal()** to test whether two data sets contain the exact same rows (in any order).

Extract Rows

x			y		
A	B	C	A	B	C
a	t	1	a	t	3
b	u	2	b	u	2
c	v	3	d	w	1

Use a "Filtering Join" to filter one table against the rows of another.

A	B	C
a	t	1
b	u	2

semi_join(x, y, by = NULL, ...)

Return rows of x that have a match in y. USEFUL TO SEE WHAT WILL BE JOINED.

A	B	C
c	v	3

anti_join(x, y, by = NULL, ...)

Return rows of x that do not have a match in y. USEFUL TO SEE WHAT WILL NOT BE JOINED.