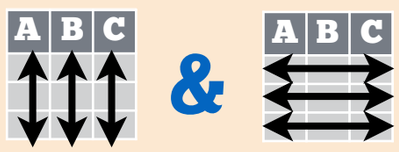
Data Transformation
with dplyr Cheat Sheet

RStudio

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))

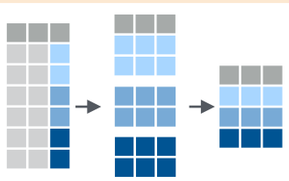
count(x, ..., wt = NULL, sort = FALSE**)**
Count number of rows in each group defined by the variables in … Also **tally()**.
count(iris, Species)

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 created 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))
```

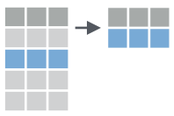
group_by(.data, ..., add = FALSE**)**
Returns copy of table grouped by …
g_iris <- group_by(iris, Species)

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

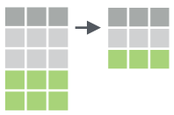
Manipulate Cases

Extract Cases

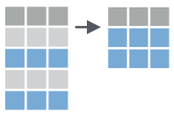
Row functions return a subset of rows as a new table. Use a variant that ends in _ for non-standard evaluation friendly code.



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

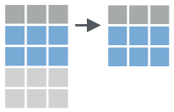


distinct(.data, ..., .keep_all = FALSE**)**
Remove rows with duplicate values. Also **distinct_()**. *distinct(iris, Species)*



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)

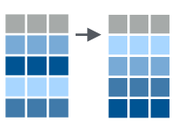
top_n(*x, n, wt***)**
Select and order top n entries (by group if grouped data). *top_n(iris, 5, Sepal.Width)*

Logical and boolean operators to use with filter()

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

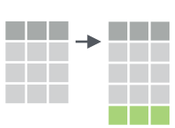
See **?base::logic** and **?Comparison** for help.

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.

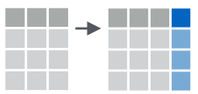
select(.data, …**)**
Extract columns by name. Also **select_if()**
select(iris, Sepal.Length, Species)

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**)**	

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).



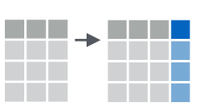
mutate(.data, …**)**
Compute new column(s).
mutate(mtcars, gpm = 1/mpg)

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

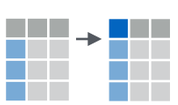
mutate_all(.tbl, .funs, ...**)**
Apply funs to every column. Use with **funs()**. *mutate_all(faithful, funs(log(.), log2(.)))*

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 >= left & x <= 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

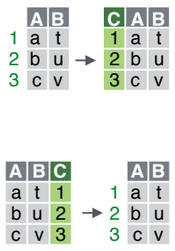
quantile() - nth quantile
min() - minimum value
max() - maximum value

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.



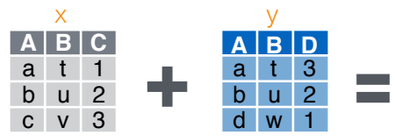
rownames_to_column()
Move row names into col.
a <- rownames_to_column(iris, var = "C")

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

Also **has_rownames()**, **remove_rownames()**

Combine Tables

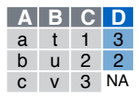
Combine Variables



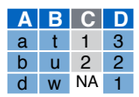
Use **bind_cols()** to paste tables beside each other as they are.

bind_cols(…**)**
Returns tables placed side by side as a single table.
BE SURE THAT ROWS ALIGN.

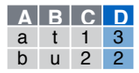
Use a "**Mutating Join**" to join one table to columns from another, matching values with the rows that they correspond to. Each join retains a different combination of values from the tables.



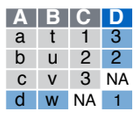
left_join(x, y, by = NULL, copy=FALSE, suffix=c(".x",".y"),…**)**
Join matching values from y to x.



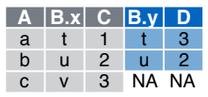
right_join(x, y, by = NULL, copy = FALSE, suffix=c(".x",".y"),…**)**
Join matching values from x to y.



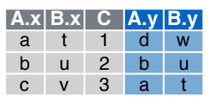
inner_join(x, y, by = NULL, copy = FALSE, suffix=c(".x",".y"),…**)**
Join data. Retain only rows with matches.



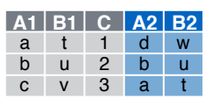
full_join(x, y, by = NULL, copy=FALSE, suffix=c(".x",".y"),…**)**
Join data. Retain all values, all rows.



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

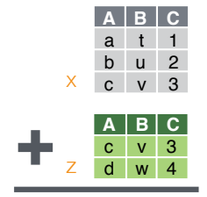


Use a named vector, **by = c("col1" = "col2")**, to match on columns with different names in each data set.
left_join(x, y, by = c("C" = "D"))



Use **suffix** to specify suffix to give to duplicate column names.
left_join(x, y, by = c("C" = "D"), suffix = c("1", "2"))

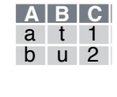
Combine Cases



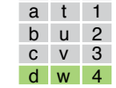
Use **bind_rows()** to paste tables below each other as they are.

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)

intersect(x, y, …**)**
Rows that appear in both x and z.



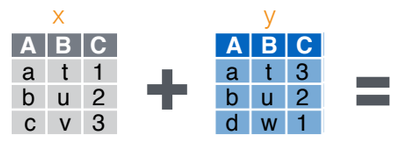
setdiff(x, y, …**)**
Rows that appear in both x but not z.



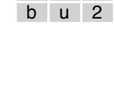
union(x, y, …**)**
Rows that appear in x or z. (Duplicates removed). **union_all()** retains duplicates.

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

Extract Rows



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



semi_join(x, y, by = NULL, …**)**
Return rows of x that have a match in y.
USEFUL TO SEE WHAT WILL BE JOINED.

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.