SAS <-> R :: CHEAT SHEET

Introduction

This guide aims to familiarise SAS users with R.
R examples make use of tidyverse collection of packages.

Install tidyverse:	`install.packages("tidyverse")`
Attach tidyverse packages for use:	`library( tidyverse )`

R data here in 'data frames', and occasionally vectors (via **c( )**)
Other R structures (lists, matrices...) are not explored here.

Keyboard shortcuts: **<-** Alt + - **%>%** Ctrl + Shift + m

Datasets; drop, keep & rename variables

```
data new_data;
 set old_data;
run;
```

```
new_data <- old_data
```

```
data new_data (keep=id) ;
 set old_data (drop=job_title) ;
run;
```

```
new_data <- old_data %>%
 select(-job_title) %>%
 select(id)
```

```
data new_data (drop = temp: ) ;
 set old_data;
run;
```

```
new_data <- old_data %>%
 select( -starts_with("temp") )
```

C.f. contains( ) , ends_with( )

```
data new_data;
 set old_data;
 rename old_name = new_name;
run;
```

```
new_data <- old_data %>%
 rename(new_name = old_name)
```

Note order differs

Conditional filtering

```
data new_data;
 set old_data;
 if Sex = "M";
run;
```

```
new_data <- old_data %>%
 filter(Sex == "M")
```

```
data new_data;
 set old_data;
 if year in (2010,2011,2012) ;
run;
```

```
new_data <- old_data %>%
 filter(year %in% c(2010,2011,2012) )
```

```
data new_data;
 set old_data;
 by id;
 if first.id;
run;
```

```
new_data <- old_data %>%
 group_by( id ) %>%
 slice(1)
```

Could use slice(n( )) *for last*

```
data new_data;
 set old_data;
 if dob > "25APR1990"d;
run;
```

```
new_data <- old_data %>%
 filter(dob > as.Date("1990-04-25"))
```

New variables, conditional editing

```
data new_data;
 set old_data;
 total_income = wages + benefits;
run;
```

```
new_data <- old_data %>%
 mutate(total_income = wages + benefits)
```

```
data new_data ;
 set old_data ;
 if hours > 30 then full_time = "Y";
 else full_time = "N";
run;
```

```
new_data <- old_data %>%
 mutate(full_time = if_else(hours > 30 ,"Y", "N"))
```

```
data new_data ;
 set old_data ;
 if temp > 20 then weather = "Warm";
 else if temp > 10 then weather = "Mild";
 else weather = "Cold";
run;
```

```
new_data <- old_data %>%
 mutate(weather = case_when(
  temp > 20 ~ "Warm",
  temp > 10 ~ "Mild",
  TRUE ~ "Cold" ) )
```

Counting and Summarising

```
proc freq data=old_data;
 table job_type ;
run;
```

```
old_data %>%
 count( job_type )
```

For percent, add:
%>% mutate(percent = n*100/sum(n))

```
proc freq data=old_data;
 table job_type*region;
run;
```

```
old_data %>%
 count( job_type , region )
```

```
proc summary data=old_data nway;
 class job_type region;
 output out = new_data;
run;
```

```
new_data <- old_data %>%
 group_by(( job_type , region ) %>%
 summarise( Count = n( ) )
```

Equivalent without nway not trivially produced

```
proc summary data=old_data nway;
 class job_type region ;
 var salary ;
 output out = new_data
   sum( salary ) = total_salaries ;
run;
```

```
new_data <- old_data %>%
 group_by(job_type , region ) %>%
 summarise( total_salaries = sum( salary ) ,
   Count = n( ) )
```

Lots of summary functions in both languages
Swap summarise( ) *for* mutate( ) *to add summary data to original data*

Combining datasets

```
data new_data;
 set data_1 data_2 ;
run;
```

```
new_data <- bind_rows( data_1 , data_2 )
```

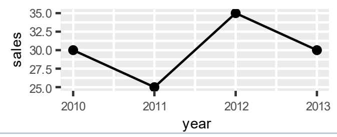
```
data new_data;
 merge data_1 (in = in_1) data_2 ;
 by id ;
 if in_1 ;
run;
```

```
new_data <- left_join( data_1 , data_2 , by = "id")
```

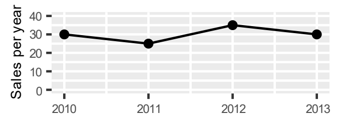
C.f. full_join( ) ,right_join( ), inner_join( )

Some plotting in R

```
ggplot( my_data , aes( year , sales ) ) +
  geom_point( ) + geom_line( )
```

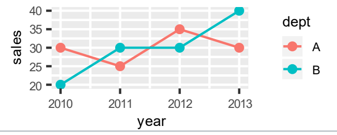


```
ggplot( my_data , aes( year , sales ) ) +
  geom_point( ) + geom_line( ) +  ylim(0, 40)
  labs(x="" , y="Sales per year")
```

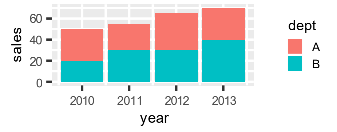


C.f. xlim( )

```
ggplot( my_data , aes( year , sales, colour=dept ) ) +
geom_point( ) + geom_line( )
```

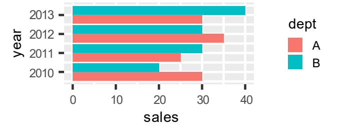


```
ggplot( my_data , aes( year , sales, fill=dept ) ) +
geom_col( )
```



N.B. 'colour' for lines & points, 'fill' for shapes

```
ggplot( my_data , aes( year , sales, fill=dept ) ) +
geom_col( position="dodge" ) + coord_flip( )
```



C.f. position = "fill" *for 100% stacked bars/cols*

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Sorting and Row-Wise Operations

```
proc sort data=old_data out=new_data;
 by id descending income;
run;
```

```
new_data <- old_data %>%
 arrange( id , -income )
```

```
proc sort data=old_data nodup;
 by id job_type;
run;
```

```
old_data <- old_data %>%
 arrange( id , job_type ) %>%
 distinct( )
```

N.B. nodup relies on adjacency of duplicate rows, distinct( ) *does not*

```
proc sort data=old_data nodupkey;
 by id ;
run;
```

```
old_data <- old_data %>%
 arrange( id ) %>%
 group_by( id ) %>%
 slice( 1 )
```

```
data new_data;
 set old_data;
 by id descending income;
 if first.id;
run;
```

```
new_data <- old_data %>%
 group_by( id ) %>%
 slice(which.max( income ))
```

C.f. which.min( )

Swap to preserve duplicate maxima: … filter(income == max(income))

alternatively: … top_n(1 , income)

```
data new_data;
 set old_data;
 prev_id= lag( id );
run;
```

```
new_data <- old_data %>%
 mutate( prev_id= lag( id, 1 ))
```

C.f. lead( ) *for subsequent rows*

```
data new_data;
 set old_data;
 by id;
 counter + 1 ;
 if first.id then counter = 1 ;
run;
```

```
new_data <- old_data %>%
 group_by( id ) %>%
 mutate( counter = row_number( ) )
```

Converting and Rounding

```
data new_data;
 set old_data ;
 num_var= input("5" , 8.);
 text_var = put(5 , 8.);
run;
```

```
new_data <- old_data %>%
 mutate(num_var = as.numeric( "5" )) %>%
 mutate(text_var = as.character( 5 ))
```

```
data new_data ;
 set old_data ;
 nearest_5 = round(x , 5)
 two_decimals = round(x , 0.01)
run;
```

```
new_data <- old_data %>%
 mutate(nearest_5 = round(x / 5)*5) %>%
 mutate(two_decimals = round( x , digits = 2)
```

Creating functions to modify datasets

```
%macro add_variable(dataset_name);
data &dataset_name;
 set &dataset_name;
 new_variable = 1;
run;
%mend;
%add_variable( my_data );
```

```
add_variable <- function ( dataset_name ){
 dataset_name <- dataset_name %>%
   mutate(new_variable = 1)
 return( dataset_name )
}
my_data <- add_variable( my_data )
```

Note SAS can modify within the macro, whereas R creates a copy within the function

Dealing with strings

```
data new_data;
 set old_data;
 if find( job_title , "Health");
run;
```

```
new_data <- old_data %>%
 filter(str_detect( job_title , "Health"))
```

```
data new_data;
 set old_data;
 if job_title =: "Health";
run;
```

```
new_data <- old_data %>%
 filter(str_detect( job_title , "^Health"))
```

Use ^ for start of string, $ for end of string, e.g. "Health$"

```
data new_data;
 set old_data;
 substring= substr( big_string , 3, 4 );
run;
```

```
new_data <- old_data %>%
 mutate( substring = str_sub( big_string  , 3 , 6 ))
```

Returns characters 3 to 6. Note SAS uses <start> <length>, R uses <start>, <end>

```
data new_data;
 set old_data;
 address = tranwrd( address , "Street", "St" );
run;
```

```
new_data <- old_data %>%
 mutate( address = str_replace_all( address , "Street", "St" ))
```

C.f. str_replace( ) *for first instance of pattern only*

```
data new_data;
 set old_data;
 full_name = catx(" ", first_name , surname );
run;
```

```
new_data <- old_data %>%
 mutate( full_name = str_c( first_name , surname , sep =" "))
```

Drop sep = " " for equivalent to cats( ) in SAS

```
data new_data;
 set old_data;
 first_word= scan( sentence , 1);
run;
```

```
new_data <- old_data %>%
 mutate( first_word= word( sentence , 1 ))
```

R example preserves punctuation at the end of words, SAS doesn't

```
data new_data;
 set old_data;
 house_number = compress( address , , "dk" );
run;
```

```
new_data <- old_data %>%
 mutate( house_number = str_extract( address, "\\d*" ))
```

Wide range of regexps in both languages, this example extracts digits only

File operations

Operate in 'Work' library.
Use **libname** to define file locations

Operate in a particular 'working directory' (identify using **getwd( )**)
Move to other locations using **setwd( )**

```
libname library_name "file_location";
data library_name.saved_data ;
 set data_in_use ;
run;
```

```
save(data_in_use , file="file_location/saved_data.rda")
or
setwd("file_location")
save(data_in_use , file="saved_data.rda")
```

```
libname library_name "file_location";
data data_in_use ;
 set library_name.saved_data ;
run;
```

```
load( "file_location/saved_data.rda" )
or
setwd("file_location")
load("saved_data.rda")
```

save( ) *can store multiple data frames in a single .rda file,* load( ) *will restore all of these*

```
proc import datafile = "my_file.csv"
 out = my_data dbms = csv;
run;
```

```
my_data <- read_csv("my_file.csv")
```

Both examples assume columns headers in csv file