

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

<pre>data new_data; set old_data; run;</pre>	<pre>new_data <- old_data</pre>
<pre>data new_data (keep=id) ; set old_data (drop=job_title) ; run;</pre>	<pre>new_data <- old_data %>% select(-job_title) %>% select(id)</pre>
<pre>data new_data (drop = temp:) ; set old_data; run;</pre>	<pre>new_data <- old_data %>% select(-starts_with("temp"))) C.f. contains(), ends_with()</pre>
<pre>data new_data; set old_data; rename old_name = new_name; run;</pre>	<pre>new_data <- old_data %>% rename(new_name = old_name)</pre> <p><i>Note order differs</i></p>

Conditional filtering

<pre>data new_data; set old_data; if Sex = "M"; run;</pre>	<pre>new_data <- old_data %>% filter(Sex == "M")</pre>
<pre>data new_data; set old_data; if year in (2010,2011,2012) ; run;</pre>	<pre>new_data <- old_data %>% filter(year %in% c(2010,2011,2012))</pre>
<pre>data new_data; set old_data; by id; if first.id; run;</pre>	<pre>new_data <- old_data %>% group_by(id) %>% slice(1)</pre> <p><i>Could use slice(n()) for last</i></p>
<pre>data new_data; set old_data; if dob > "25APR1990"d; run;</pre>	<pre>new_data <- old_data %>% filter(dob > as.Date("1990-04-25"))</pre>

New variables, conditional editing

<pre>data new_data; set old_data; total_income = wages + benefits; run;</pre>	<pre>new_data <- old_data %>% mutate(total_income = wages + benefits)</pre>
<pre>data new_data ; set old_data ; if hours > 30 then full_time = "Y"; else full_time = "N"; run;</pre>	<pre>new_data <- old_data %>% mutate(full_time = if_else(hours > 30 , "Y", "N"))</pre>
<pre>data new_data ; set old_data ; if temp > 20 then weather = "Warm"; else if temp > 10 then weather = "Mild"; else weather = "Cold"; run;</pre>	<pre>new_data <- old_data %>% mutate(weather = case_when(temp > 20 ~ "Warm", temp > 10 ~ "Mild", TRUE ~ "Cold"))</pre>

Counting and Summarising

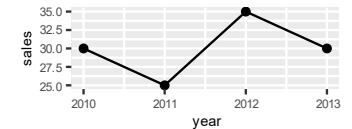
<pre>proc freq data=old_data; table job_type ; run;</pre>	<pre>old_data %>% count(job_type)</pre> <p><i>For percent, add: %>% mutate(percent = n*100/sum(n))</i></p>
<pre>proc freq data=old_data; table job_type*region; run;</pre>	<pre>old_data %>% count(job_type , region)</pre>
<pre>proc summary data=old_data nway; class job_type region; output out = new_data; run;</pre>	<pre>new_data <- old_data %>% group_by((job_type , region)) %>% summarise(Count = n())</pre> <p><i>Equivalent without nway not trivially produced</i></p>
<pre>proc summary data=old_data nway; class job_type region ; var salary ; output out = new_data sum(salary) = total_salaries ; run;</pre>	<pre>new_data <- old_data %>% group_by(job_type , region) %>% summarise(total_salaries = sum(salary) , Count = n())</pre> <p><i>Lots of summary functions in both languages Swap summarise() for mutate() to add summary data to original data</i></p>

Combining datasets

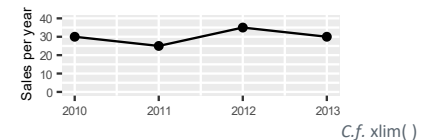
<pre>data new_data; set data_1 data_2 ; run;</pre>	<pre>new_data <- bind_rows(data_1 , data_2)</pre>
<pre>data new_data; merge data_1 (in = in_1) data_2 ; by id ; if in_1 ; run;</pre>	<pre>new_data <- left_join(data_1 , data_2 , by = "id")</pre> <p><i>C.f. full_join(), right_join(), inner_join()</i></p>

Some plotting in R

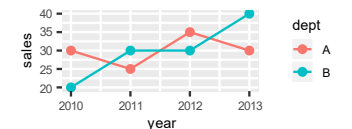
```
ggplot( my_data , aes( year , sales ) ) +  
geom_point( ) + geom_line( )
```



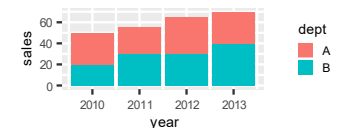
```
ggplot( my_data , aes( year , sales ) ) +  
geom_point( ) + geom_line( ) + ylim(0, 40) +  
labs(x="", y="Sales per year")
```



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

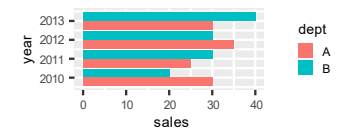


```
ggplot( my_data , aes( year , sales , fill=dept ) ) +  
geom_col( )
```



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

Sorting and Row-Wise Operations

<pre>proc sort data=old_data out=new_data; by id descending income; run;</pre>	<pre>new_data <- old_data %>% arrange(id , -income)</pre>
<pre>proc sort data=old_data nodup; by id job_type; run;</pre>	<pre>old_data <- old_data %>% arrange(id , job_type) %>% distinct()</pre>
<i>N.B. nodup relies on adjacency of duplicate rows, distinct() does not</i>	
<pre>proc sort data=old_data nodupkey; by id ; run;</pre>	<pre>old_data <- old_data %>% arrange(id) %>% group_by(id) %>% slice(1)</pre>
<pre>data new_data; set old_data; by id descending income; if first.id;</pre>	<pre>new_data <- old_data %>% group_by(id) %>% slice(which.max(income))</pre> <p><i>C.f. which.min()</i></p> <p><i>Swap to preserve duplicate maxima: ... filter(income == max(income))</i> <i>alternatively: ... top_n(1 , income)</i></p>
<pre>data new_data; set old_data; prev_id= lag(id); run;</pre>	<pre>new_data <- old_data %>% mutate(prev_id= lag(id , 1))</pre> <p><i>C.f. lead() for subsequent rows</i></p>
<pre>data new_data; set old_data; by id; counter + 1 ; if first.id then counter = 1 ; run;</pre>	<pre>new_data <- old_data %>% group_by(id) %>% mutate(counter = row_number())</pre>

Converting and Rounding

<pre>data new_data; set old_data ; num_var= input("5" , 8.); text_var = put(5 , 8.); run;</pre>	<pre>new_data <- old_data %>% mutate(num_var = as.numeric("5")) %>% mutate(text_var = as.character(5))</pre>
<pre>data new_data ; set old_data ; nearest_5 = round(x , 5) two_decimals = round(x , 0.01) run;</pre>	<pre>new_data <- old_data %>% mutate(nearest_5 = round(x / 5)*5) %>% mutate(two_decimals = round(x , digits = 2))</pre>

Creating functions to modify datasets

<pre>%macro add_variable(dataset_name); data &dataset_name; set &dataset_name; new_variable = 1; run; %mend; %add_variable(my_data);</pre>	<pre>add_variable <- function (dataset_name){ dataset_name <- dataset_name %>% mutate(new_variable = 1) return(dataset_name) } my_data <- add_variable(my_data)</pre> <p><i>Note SAS can modify within the macro,</i> <i>whereas R creates a copy within the function</i></p>
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Dealing with strings

<pre>data new_data; set old_data; if find(job_title , "Health"); run;</pre>	<pre>new_data <- old_data %>% filter(str_detect(job_title , "Health"))</pre>
<pre>data new_data; set old_data; if job_title =: "Health"; run;</pre>	<pre>new_data <- old_data %>% filter(str_detect(job_title , "^Health"))</pre> <p><i>Use ^ for start of string, \$ for end of string, e.g. "Health\$"</i></p>
<pre>data new_data; set old_data; substring= substr(big_string , 3, 4); run;</pre>	<pre>new_data <- old_data %>% mutate(substring = str_sub(big_string , 3 , 6))</pre> <p><i>Returns characters 3 to 6. Note SAS uses <start> <length>, R uses <start>, <end></i></p>
<pre>data new_data; set old_data; address = tranwrd(address , "Street", "St"); run;</pre>	<pre>new_data <- old_data %>% mutate(address = str_replace_all(address , "Street", "St"))</pre> <p><i>C.f. str_replace() for first instance of pattern only</i></p>
<pre>data new_data; set old_data; full_name = catx(" " , first_name , surname); run;</pre>	<pre>new_data <- old_data %>% mutate(full_name = str_c(first_name , surname , sep = " "))</pre> <p><i>Drop sep = " " for equivalent to cats() in SAS</i></p>
<pre>data new_data; set old_data; first_word= scan(sentence , 1); run;</pre>	<pre>new_data <- old_data %>% mutate(first_word= word(sentence , 1))</pre> <p><i>R example preserves punctuation at the end of words, SAS doesn't</i></p>
<pre>data new_data; set old_data; house_number = compress(address , , "dk"); run;</pre>	<pre>new_data <- old_data %>% mutate(house_number = str_extract(address , "\\d*"))</pre> <p><i>Wide range of regexps in both languages, this example extracts digits only</i></p>

File operations

<p>Operate in 'Work' library. Use libname to define file locations</p>	<p>Operate in a particular 'working directory' (identify using getwd()) Move to other locations using setwd()</p>
<pre>libname library_name "file_location"; data library_name.saved_data ; set data_in_use ; run;</pre>	<pre>save(data_in_use , file="file_location/saved_data.rda") or setwd("file_location") save(data_in_use , file="saved_data.rda")</pre>
<pre>libname library_name "file_location"; data data_in_use ; set library_name.saved_data ; run;</pre>	<pre>load("file_location/saved_data.rda") or setwd("file_location") load("saved_data.rda")</pre> <p><i>save() can store multiple data frames in a single .rda file, load() will restore all of these</i></p>
<pre>proc import datafile = "my_file.csv" out = my_data dbms = csv; run;</pre>	<pre>my_data <- read_csv("my_file.csv")</pre> <p><i>Both examples assume columns headers in csv file</i></p>