Achieving a seamless workflow between R, Python, and SAS from within RStudio

rstudio::conf(2022)

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Statistics Canada

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Achieving a seamless workflow between R, Python, and SAS from within RStudio


SAS®

Breakfast: Bunny Rabbit Pancakes

with fresh fruit and maple syrup

Preparation time: 25 mins
Cooking difficulty: Easy

Allergens: Egg • Wheat • Gelatin

Ingredients

1 unit
Pancake mix

1 unit
Egg

1 tbsp
Vegetable oil

1 fl oz
Maple syrup

0.6 lbs
Cantaloupe

8 oz
Strawberries

3oz
Blueberries

1 package
Marshmallows

Instructions

1. Combine egg, oil, and pancake mix. Stir until large lumps disappear.
2. Lightly grease and heat skillet over medium-low heat. Pour batter into skillet for each pancake and turn when bottoms are golden brown.
3. Add cantaloupe slices for the ears, blueberries for the eyes, a strawberry for the nose, and marshmallows for the teeth. Drizzle with maple syrup as desired.

Breakfast: Bunny Rabbit Pancakes

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Ingredients

~~1 unit Pillsbury pancake mix~~
~~Pancake mix~~

~~0.6 lbs Bananas~~
~~Cantaloupe~~

1 unit
Egg

8 oz
Strawberries

~~1 tbsp Canola oil~~
~~Vegetable oil~~

3oz
Blueberries

~~1 fl oz Table syrup~~
~~Maple syrup~~

1 package
Marshmallows

Instructions

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Outline

I'll be discussing how to incorporate all three languages into your workflow

- My ideal approach
  - 3 step recipe with all ingredients available
- My less ideal approach
  - A few ingredient substitutions

Who am I?

- Melissa Van Bussel, M. Sc. Statistics, A. Stat., B. Sc. Math & CS
- Analyst at Statistics Canada (Government of Canada)
- Statistics Canada = Canada's official statistical agency (over **6,000** employees)

Statistics Canada Statistique Canada

Challenge:

- Statistics Canada **wants** to adopt open-source programming languages

...**but**...

- Legal obligation to ensure that personal information is kept **strictly** confidential

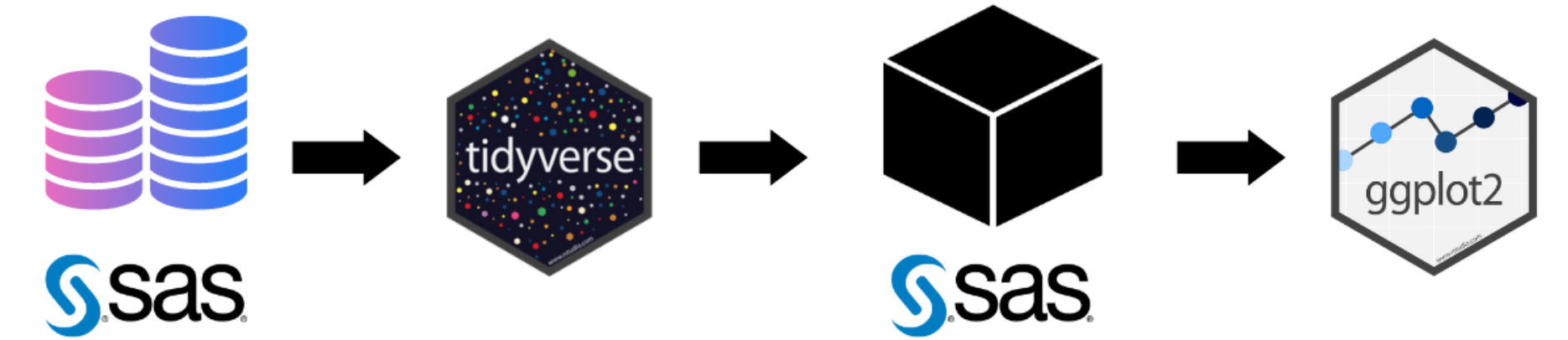
...**therefore**...

- **G-Confid** (internal system) is used; prevents the release of confidential information

...**and**...

- G-Confid is **only** implemented in the SAS programming language

My typical workflow (now)



Solution:

Analysts at Statistics Canada need a way to combine R, Python, and SAS in one script, in a way that doesn't cause a headache!

The 3 step recipe

Step 1: Install the following

Step 2: Install SASPy

- **SASPy** is an (open source) Python package created by the SAS Foundation

```
reticulate::py_install("saspy", pip = TRUE)
```

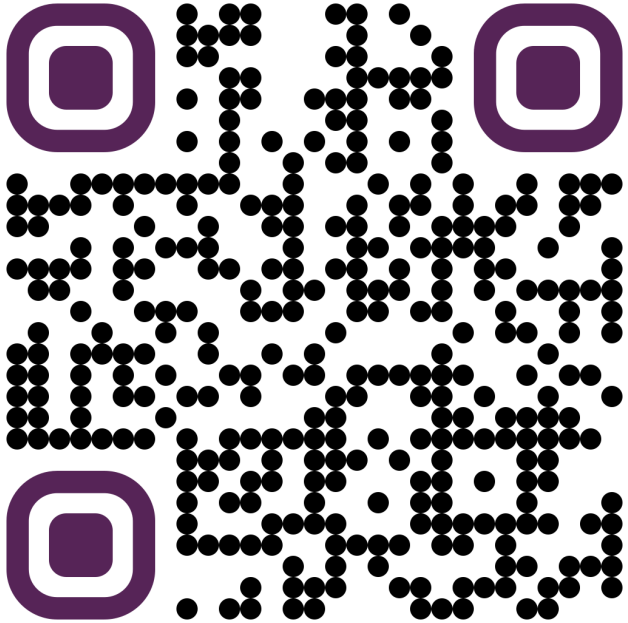
Step 3: System configurations

- Navigate to the **site-packages** folder where your Python installation is located
- Copy the **sascfg.py** file and rename the copy to **sascfg_personal.py**
- Switch which of the `SAS_config_names` lines is commented out:

```
# SAS_config_names = ['default', 'ssh', 'iomlinux', 'iomwin',
'winlocal', 'winiomlinux', 'winiomwin', 'httpsviya', 'httpviya',
'iomcom']
#

SAS_config_names=['default']
```

- Add `java` as an Environment Variable on your computer



How to run SAS, Python, & R code from within RStudio...

What to do when you don't have all the ingredients

Option 1: The `SASmarkdown` package

Provides interaction between SAS+R? ❌

Can do without admin privileges? ✅

Usefulness rating: ★★★★★

The `SASmarkdown` package allows you to include SAS chunks in your RMarkdown documents.

Option 1: The SASmarkdown package

```
```{r, engine="sashtml", engine.path="C:/Program Files/SASHome/SASFoundation/9.4/sa
proc means data=sashelp.class;
run;
```
```

```
```{r}
plot(cars)
```
```

```
```{python}
print("Hello world!"[0:5])
```
```

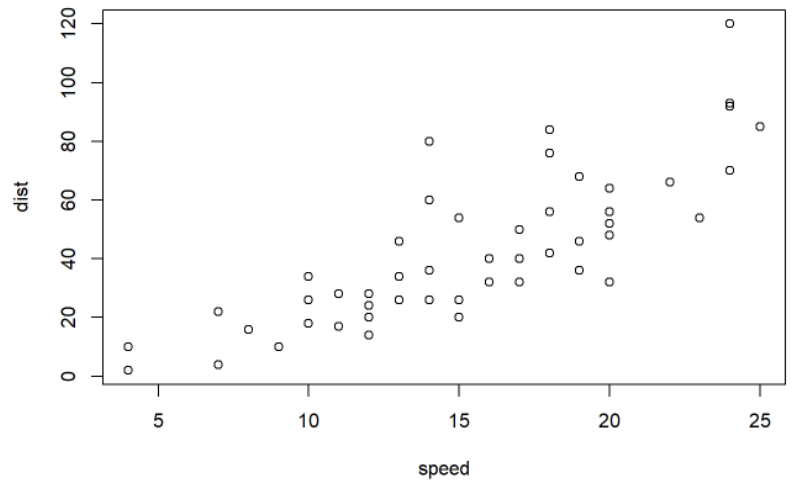
```
proc means data=sashelp.class;
run;
```

SAS chunk

Variable	N	Mean	Std Dev	Minimum	Maximum
Age	19	13.3157895	1.4926722	11.0000000	16.0000000
Height	19	62.3368421	5.1270752	51.3000000	72.0000000
Weight	19	100.0263158	22.7739335	50.5000000	150.0000000

```
plot(cars)
```

R chunk




```
print("Hello world"[0:5])
```

```
## Hello
```

Python chunk

Option 2: The RLANG option

Provides interaction between SAS+R? ✅

Can do without admin privileges? ✅ ❌

Usefulness rating: ★★★★★

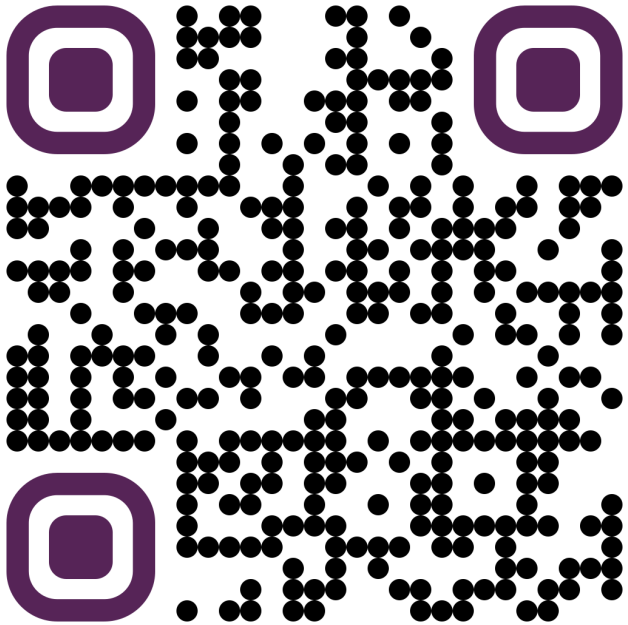
```
proc iml;
  submit / R;
    # Your R code goes here
  endsubmit;
submit;
```

To move data between R and SAS:

```
call ImportDataSetFromR("sas_data_name", "r_data_name");

call ExportDataSetToR("sas_data_name", "r_data_name");
```

Option 2: The RLANG option



Option 3: Command line

Provides interaction between SAS+R? ✅

Can do without admin privileges? ✅

Usefulness rating: ★★★★★

```
SAS_code ← "proc freq data=work.in_df; tables cyl / out=work.out_df; run;"
manipulate_df_in_SAS(in_df = mtcars,
                     SAS_location = "C:/Program Files/SASHome/SASFoundation/9.4",
                     SAS_code = SAS_code)
```

cyl	COUNT	PERCENT
4	11	34.375
6	7	21.875
8	14	43.750

Option 3: Command line

Conclusions...

1. SASmarkdown package
2. RLANG option
3. DIY command line

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