SAS and Python for Code-blooded Programmers

Chris Hemedinger, SAS

TechRepublic

Why Python is likely to pass Java in popularity

According to RedMonk programming languages analysis, Python has a way to

1 m

TNW

Could Python topple Java as the web's most popular coding language? Signs say it could happen.

TLDR: Python is on the rise — and with the training in The Absolute Python Programmin

2 weeks ago

JAXenter

Python is on its way to become the top programming language ...

The TIOBE Index for December 2019 reaffirms the status quo. Java, C, Python,

Dec 9, 20

Dice Insights (blog)

Python Keeps Swallowing the Programming Universe: TIOBE

Python leapt from fourth to third place in TIOBE's monthly rankings of programming-language popularity, placing it just behind Java and C (and ...

Jun 11, 2019

Developers appreciate programming languages for what the languages can do for **them**.

It's not about the syntax.
It's about the **framework**.

Agenda

SAS 9.4 and Python: Ways of working

SASPy

Open source code library to connect Python to SAS

PROC FCMP

Functional hook to call Python code from SAS programs

Python <--> SAS

Run Python.
Run SAS.
Hand off using data exchange.

SASPy

Python access to your SAS environment

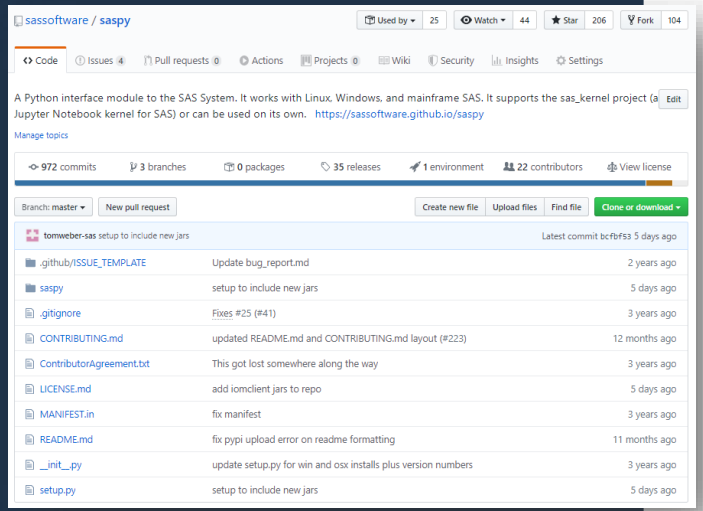
SASPy

Python code to access SAS

- Python library on GitHub: github.com/sassoftware/saspy
- **Requires** a SAS installation – local or remote
- Simple to install with pip:

```
pip install saspy
```

- Think of it as just another SAS client (similar to SAS Enterprise Guide or SAS Add-In for Microsoft Office)
- Getting started: https://sassoftware.github.io/saspy/



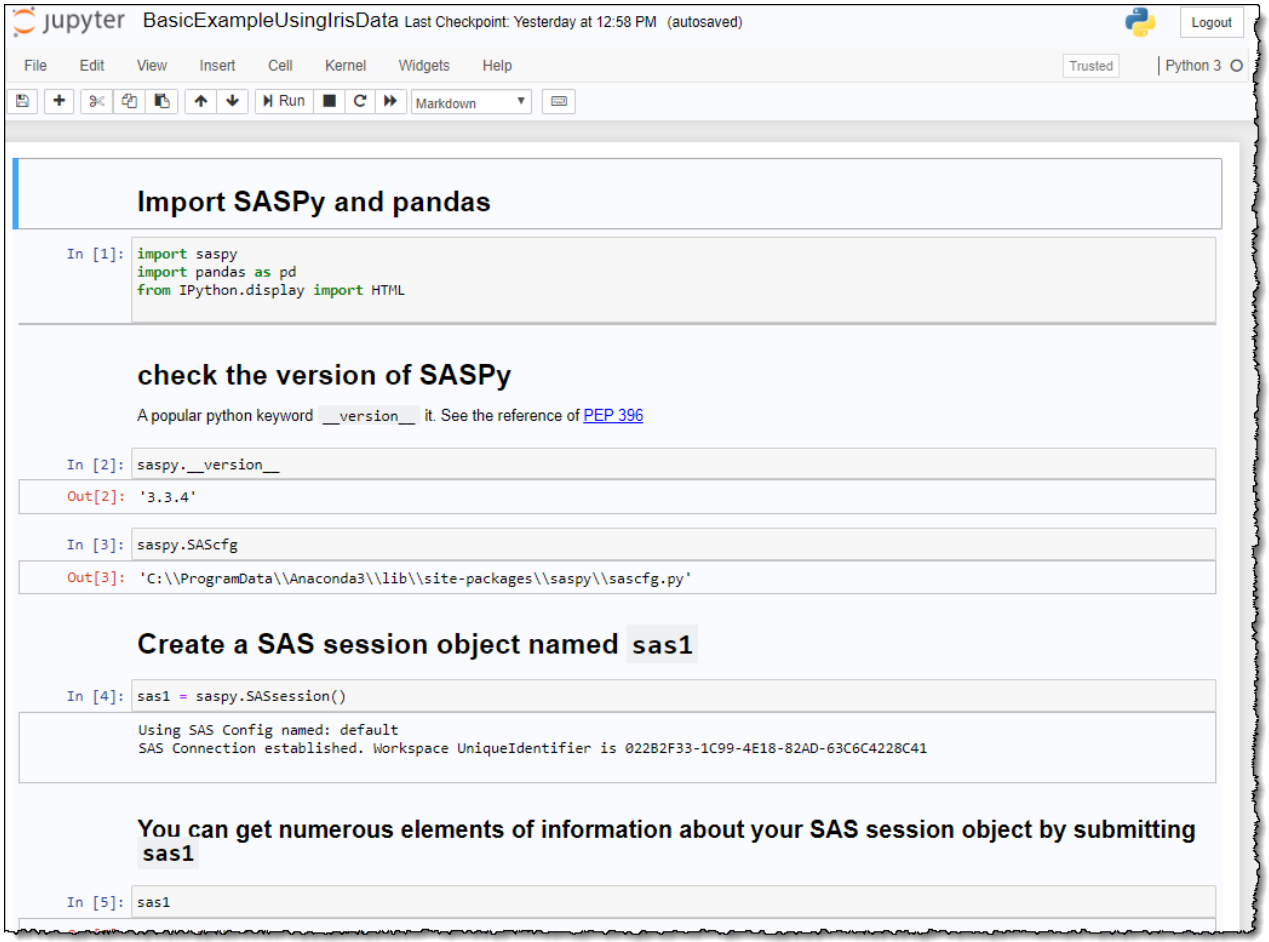
What can you do?

- Access SAS data
- Run SAS code
- Use Python functions for certain PROCs
- Exchange data with pandas DataFrames
- Use in SAS Grid environment
- Learn SAS!

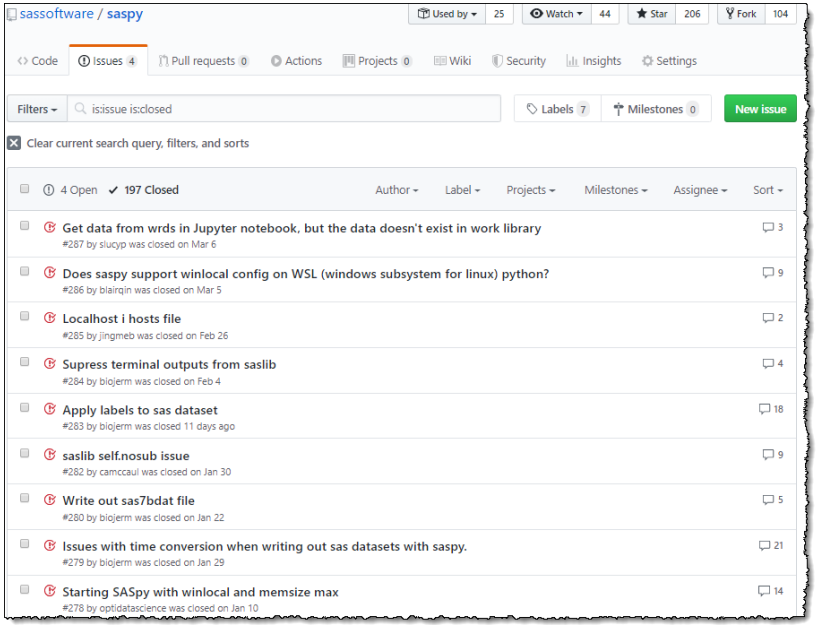
SASPy features

```
In [1]: import saspy

In [2]: sas = saspy.SASsession()
Using SAS Config named: default
SAS Connection established. Workspace UniqueIdentifier is 9152FF02-B744-4369-9407-309C51AB3DC8


In [3]: cars=sas.sasdata('cars', 'sashelp')

In [4]: cars.head()
Out[4]:
    Make            Model   Type Origin  ... MPG_Highway  Weight  Wheelbase  Length
0  Acura              MDX    SUV   Asia  ...        23.0  4451.0      106.0   189.0
1  Acura   RSX Type S 2dr  Sedan   Asia  ...        31.0  2778.0      101.0   172.0
2  Acura          TSX 4dr  Sedan   Asia  ...        29.0  3230.0      105.0   183.0
3  Acura           TL 4dr  Sedan   Asia  ...        28.0  3575.0      108.0   186.0
4  Acura       3.5 RL 4dr  Sedan   Asia  ...        24.0  3880.0      115.0   197.0

[5 rows x 15 columns]

In [6]: c = cars.means()

In [7]: c
Out[7]:
      Variable            Label      N  ...      P50      P75       Max
0         MSRP                   428.0  ...  27635.0  39215.0  192465.0
1      Invoice                   428.0  ...  25294.5  35732.5  173560.0
2   EngineSize  Engine Size (L)  428.0  ...      3.0      3.9       8.3
3    Cylinders                   426.0  ...      6.0      6.0      12.0
4   Horsepower                   428.0  ...    210.0    255.0     500.0
5     MPG_City       MPG (City)  428.0  ...     19.0     21.5      60.0
6  MPG_Highway    MPG (Highway)  428.0  ...     26.0     29.0      66.0
7       Weight     Weight (LBS)  428.0  ...   3474.5   3978.5    7190.0
8    Wheelbase   Wheelbase (IN)  428.0  ...    107.0    112.0     144.0
9       Length      Length (IN)  428.0  ...    187.0    194.0     238.0

[10 rows x 12 columns]
```

DEMO - SASPy


jupyter BasicExampleUsingIrisData Last Checkpoint: Yesterday at 12:58 PM (autosaved)
Logout
File Edit View Insert Cell Kernel Widgets Help
Trusted
Python 3
Run
Markdown
Import SASPy and pandas
In [1]:
import saspy
import pandas as pd
from IPython.display import HTML
check the version of SASPy
A popular python keyword __version__ it. See the reference of PEP 396
In [2]:
saspy.__version__
Out[2]:
'3.3.4'
In [3]:
saspy.SAScfg
Out[3]:
'C:\\ProgramData\\Anaconda3\\lib\\site-packages\\saspy\\sascfg.py'
Create a SAS session object named sas1
In [4]:
sas1 = saspy.SASsession()
Using SAS Config named: default
SAS Connection established. Workspace UniqueIdentifier is 022B2F33-1C99-4E18-82AD-63C6C4228C41
You can get numerous elements of information about your SAS session object by submitting sas1
In [5]:
sas1

Open Source and actively maintained



- SASPy dev team responds quickly to issues
- New ideas and examples are welcome
- **Contribute!**
  Bug fixes, enhancements, new extensions for SAS PROCs, etc.
- **Try it!**
  Built into SAS University Edition, launch Jupyter Notebook

The History and Evolution of SASPy, Including an Overview of What It Can Do and How to Use It

PROC FCMP and Python

Call Python functions from your SAS programs

PROC FCMP

This SAS procedure extends the SAS language by allowing user-written functions.

SAS 9.4M6 allows Python code in these functions.

Add Python code as functions in SAS

- Embed and import Python functions into SAS programs
- Python code runs in the Python interpreter
- Introduced with SAS Micro Analytic Service to score Python models…but now part of Base SAS.

Some special notes for setup
Environment variables to point SAS to Python and the SAS Micro Analytic Service

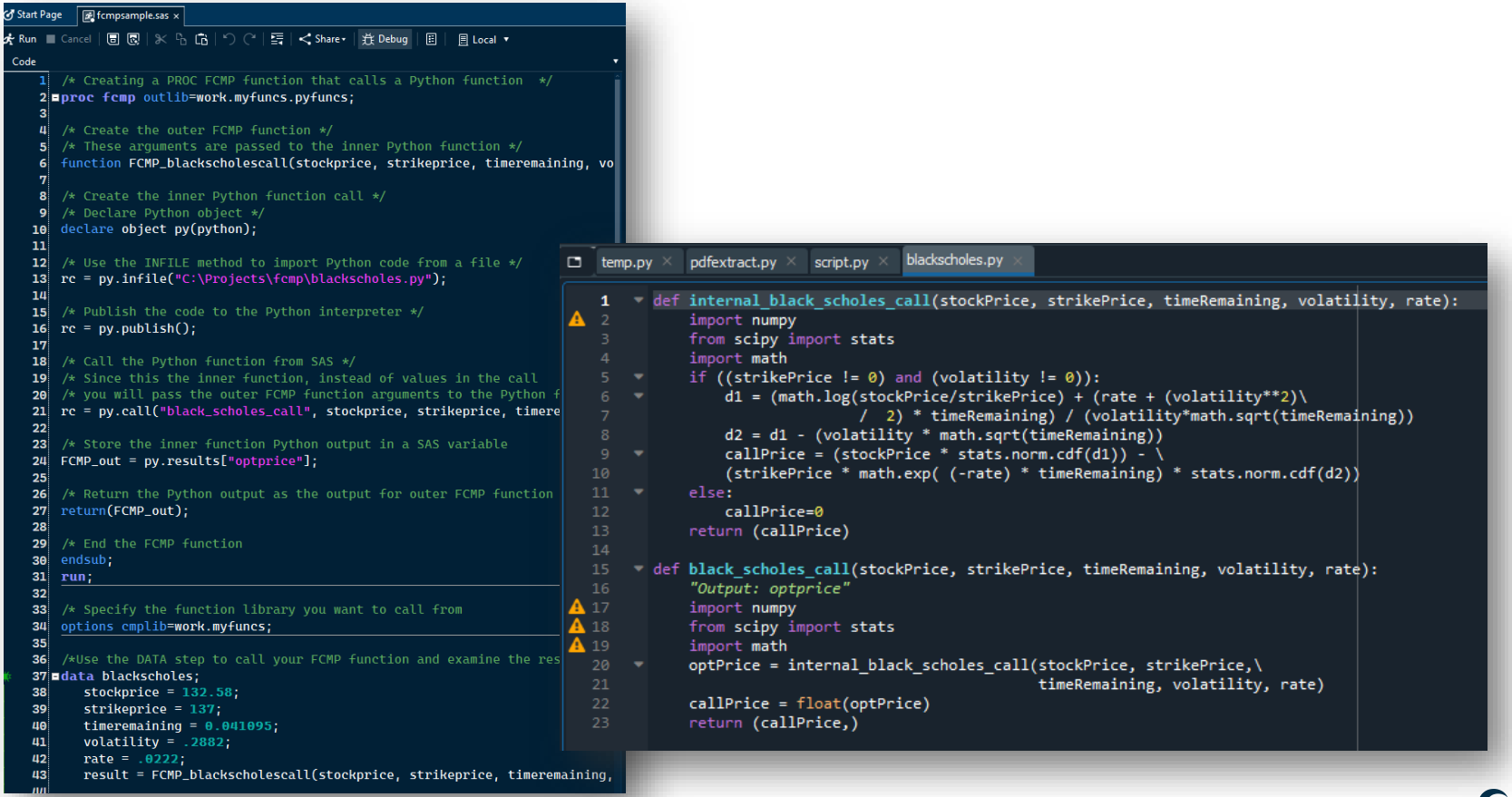
PROC FCMP and Python

Workflow example

```
proc fcmp outlib=work.fcmp.pyfuncs;
declare object py(python);
submit into py;
def PyProduct(var1, var2):
    "Output: MyKey"
    newvar = var1 * var2
    return newvar,
endsubmit;
rc = py.publish();
rc = py.call("PyProduct", 5, 10);
MyResult = py.results["MyKey"];
put MyResult=;
run;
```

- PROC FCMP wrapper
- Declare the Python object
- Inline Python code with **submit into**
- **Or**, use INFILE method to import a Python script
- Publish the code to Python
- (Optional) Return Python output

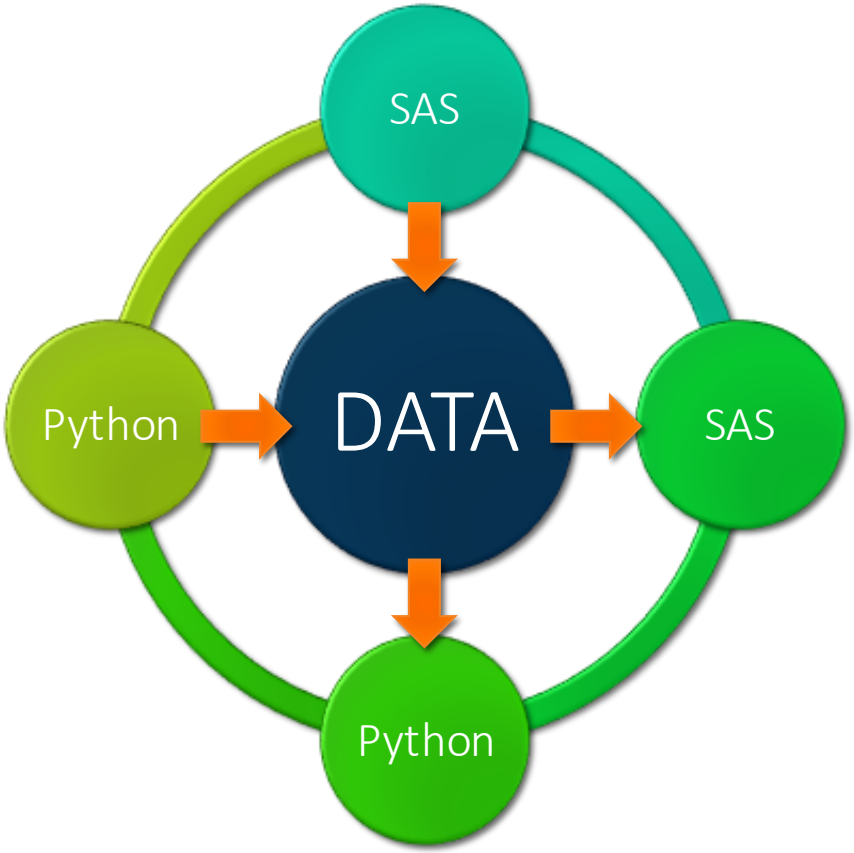
DEMO – Python object in SAS



Python ←→ SAS

Use data and services to link processes together

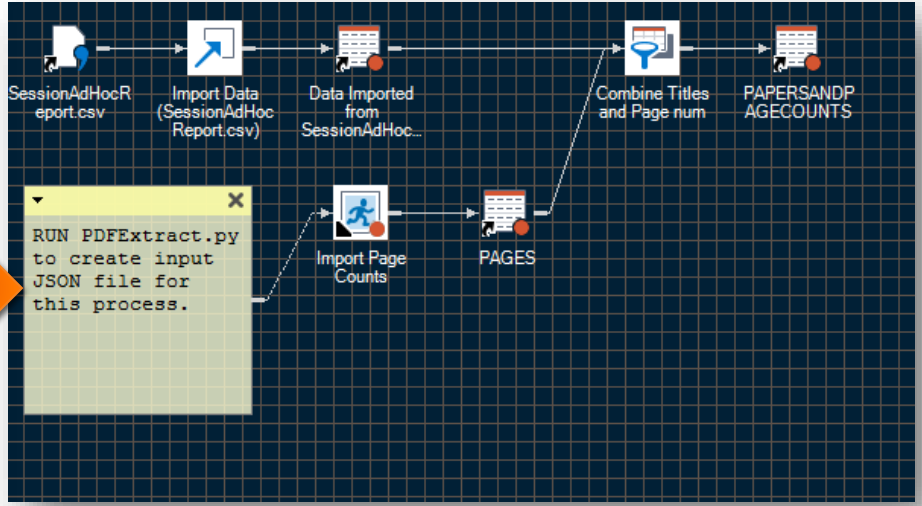
This might seem obvious, but…



- **Data** is the primary currency in data science
- **Python** and **SAS** can easily hand off to one another, using **data** as the interchange

DEMO – Python-to-SAS handoff

```python
from PyPDF2 import PdfFileReader
import os
import json


def get_info(path):
    with open(path, 'rb') as f:
        pdf = PdfFileReader(f)
 #       info = pdf.getDocumentInfo()
        info = pdf.getNumPages()

    return info


if __name__ == '__main__':
    allfiles = {}
    directory = 'C:\\Projects\\SASGF2020_Proceedings'
    for filename in os.listdir(directory):
        if filename.endswith(".pdf"):
            info = get_info(os.path.join(directory,filename))
            allfiles[filename] = info
            continue
        else:
            continue
    paper_json = json.dumps(allfiles, indent=4)
    outfile = open("c:\\projects\\fcmp\\pagecounts.json",'w')
    rc = outfile.write(paper_json)
    outfile.close()
```



Learn more

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- Introducing SASPy: Use Python code to access SAS
- SAS or Python? Why not use both? Using Python functions inside SAS programs
- Developers forum on communities.sas.com
- Python integration on developer.sas.com

Thank you

sas.com