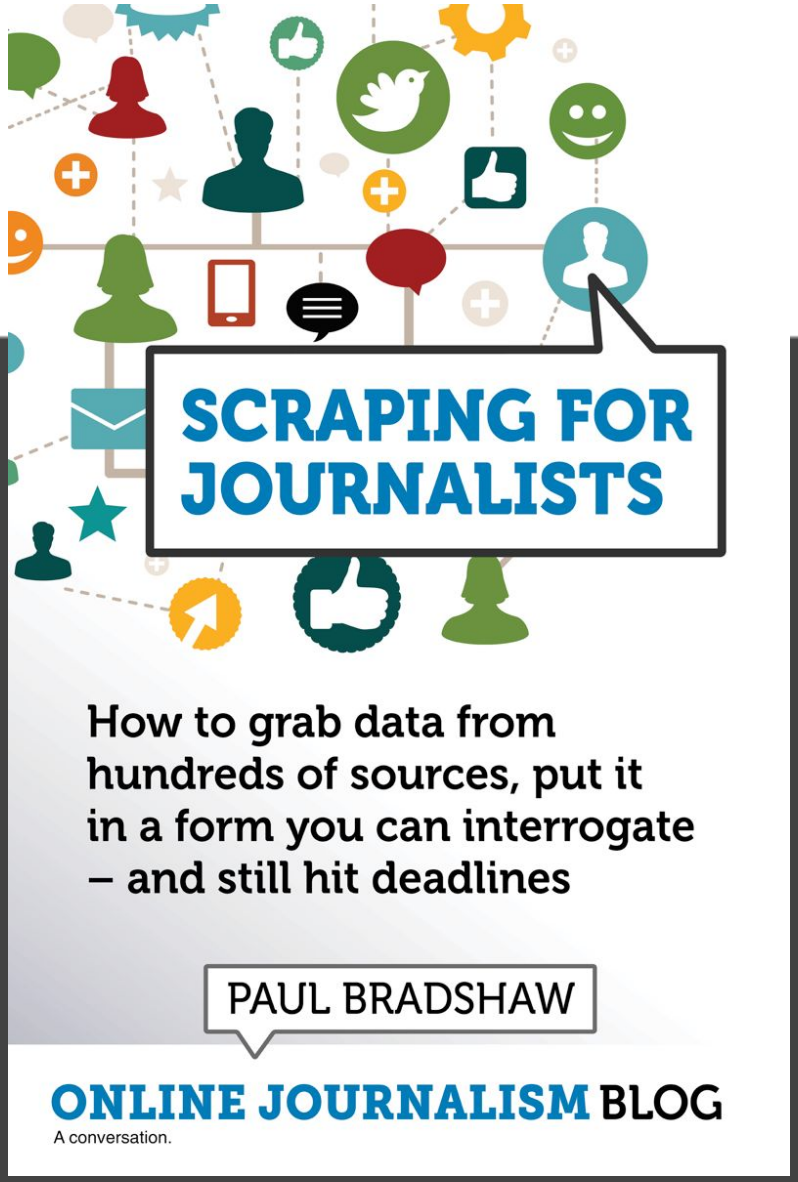
Creating functions for scrapers



Paul Bradshaw

Leanpub.com/scrapingforjournalists

What we'll cover

- How to create your own functions
- Scraping multiple pages

```
def sayhello():
  print("hello")
```

Define a function

Name it

Name any ingredients (parameters) in parentheses

Don’t forget the colon!

Indented lines of code will run when the function is ‘called’

Those ingredients

- Start with **`def`**
- Then name the function (arbitrary)
- Then brackets
- Inside those: name the ingredients
- Then colon
- Then indented lines which represent the ‘recipe’ you are storing in the function (this will likely use the ingredients you named)

```
def print_this_word(thisword):
  print(thisword)
```

‘Calling’ the function

...is like using any other function:

- Type the name of the function
- Then brackets
- Inside those: specify the ingredient(s) (‘arguments’)
- Run it!

```
print_this_word("pumpkin")
```

When this function is called
it needs one ingredient.
We ‘pass’ that inside the parentheses

If a function has multiple ingredients they are separated by commas

```
def addtwonumbers(numone, numtwo):
  #add the two ingredients
  total = numone+numtwo
  #return that value
  return(total)
```

The `return` command is often used to return information to whatever 'called' the function

```
#call the function and
#store result in a variable
whatisit = addtwonumbers(3,8)
print(whatisit)
```

This function needs two ingredients, so we 'pass' those with commas between

The results 'returned' by the function are stored in a new variable

```
#define a function - it takes one ingredient and calls it 'theurl'
def scrapepage(theurl):
  #fetch URL from that 'theurl'
  page = requests.get(theurl)
  #command beautiful soup to parse the page
  soup = BeautifulSoup(page.content,'html.parser')
  ...
  #return that dataframe to whatever called the function
  return(casedataframe)
```

04createFunctionsScraper.ipynb

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Creating functions in Python (for scraping)

In previous notebooks we covered:

- How to create variables in Python (to store things like URLs for scraping, and the data from pages that we scrape);
- How to loop through lists (in order to scrape or store each item in that list, for example); and
- How to create data frames using `pandas` (to store the scraped data).

Now we're going to bring those together into a final multi-page scraper by creating our own **functions**.

We've used functions already such as `range()` and `len()`. These are **built-in functions** that come with Python. We've also used functions from libraries, like `requests.get()` and `pd.DataFrame()`.

You can create your own function - a **user-defined function** - with the `def` command like so:

```
[ ] def sayhello():
      print("hello")
```

https://colab.research.google.com/drive/13L-09cYMqDOBXxIwHNdZnnW6QAvmNI3H?usp=sharing

You’ve already written the code!

exampleScraperBS.ipynb

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An example scraper showing how to use selectors in Beautiful Soup

This notebook explains how to scrape an example webpage as a way of demonstrating how to use sel on an 'object' scraped with the `BeautifulSoup` function.

First, we import the libraries we will need.

0s

```
#install the libraries
#requests is a library for fetching URLs
import requests
#bs4 is a library for scraping webpages - BeautifulSoup is a function from that
from bs4 import BeautifulSoup
#the pandas library which is used to work with data - we rename it pd
import pandas as pd
```

https://colab.research.google.com/drive/1UuFhlQYB7K6cjONPNOaGfQeQbqTv-FkE?usp=sharing

Before:

```
#fetch URL
page =
requests.get("https://www.gov.uk/employment-tribunal-decisions")

#command beautiful soup to parse the page
soup = BeautifulSoup(page.content,'html.parser')

#grab all the <div> tags with class="gem-c-document-list__item-title"
divswewant =
soup.select('div[class="gem-c-document-list__item-title"]')
```

After:

Old code is 'wrapped' in a function. You give a name to the variable that will change (the URL)

```
#define a function - it takes one ingredient and calls it
'theurl'
def scrapepage(theurl):
    #fetch URL from that 'theurl'
    page = requests.get(theurl)
    #command beautiful soup to parse the page
    soup = BeautifulSoup(page.content,'html.parser')
    #grab all the <div> tags with
    class="gem-c-document-list__item-title"
    divswewant =
    soup.select('div[class="gem-c-document-list__item-titl
    e"]')
    ...LOOP THROUGH THE MATCHES AND CREATE A DATAFRAME...
    #return that dataframe to whatever called the function
    return(casedataframe)
```

Your previous code is now indented, with the specific URL replaced with the variable taken by the function

At the end the function returns some results

Adapting your code

- Instead of a specific URL string, you use a **variable** to represent ‘any url’
- There may be code to handle **variation** between URLs (e.g. different numbers of items) or contents
- Add a line to **‘return’** the results once the scraper function is finished

```python
#define a function - it takes one ingredient and calls it 'theurl'
def scrapepage(theurl):
	#fetch URL from that 'theurl'
	page = requests.get(theurl)
	#command beautiful soup to parse the page
	soup = BeautifulSoup(page.content,'html.parser')
	#grab all the <div> tags with class="gem-c-document-list__item-title"
	divswewant = soup.select('div[class="gem-c-document-list__item-title"]')
	#this grabs the <time> tags
	times = soup.select('time')
	#create an empty list
	casetitles = []
	#loop through the divswewant list
	for i in divswewant:
		#extract the text
		casename = i.get_text()
		#add the text and link to the previously empty lists
		casetitles.append(casename)
		#create an empty list
	datelist = []
	#loop through the divswewant list
	for i in times:
		#extract the text
		timetext = i.get_text()
		#add the text and link to the previously empty lists
		datelist.append(timetext)
	#create a new dataframe which uses those two lists as its two columns
	casedataframe = pd.DataFrame({"case name" : casetitles,
	"date" : datelist})
	#return that dataframe to whatever called the function
	return(casedataframe)
```

Expand the code inside the function if you want it to do more. Extra lines here fetch all the <time> tags and extract all the contents.

As before, we create a dataframe from the two lists that are generated

Running a function on multiple URLs (lists again!)

Create a range of numbers to loop through - they'll need to be converted to a string to be part of a URL

```
#loop through the numbers 1 to 2
for i in range(1,3):
    #convert to a string and add it to the end of a URL
    fullurl =
    "https://www.gov.uk/employment-tribunal-decisions?page="+str(i)
    #and print it
    print(fullurl)
    #run the scraper function, and store what's returned
    theseresults = scrapepage(fullurl)
    #print what was returned
    print(theseresults)
```

The generated URL is 'passed' to the function as its main ingredient. What the function returns is stored in a variable.

```
#create an empty dataframe
fillme = pd.DataFrame()

#loop through the numbers 1 to 2
for i in range(1,3):
    #add it to the end of a URL,
    fullurl =
    "https://www.gov.uk/employment-tribunal-decisions?page="+str(i)
    #and print it
    print(fullurl)
    #run the scraper function, and store what's returned
    theseresults = scrapepage(fullurl)
    #print what was returned
    #print(theseresults)
    fillme = pd.concat([fillme,theseresults])

fillme
```

pd.concat joins multiple dataframes - a [list of dataframes] needs to be provided in square brackets

What’s happening

- We create an empty data frame for the results of the scraper
- We loop through the URLs we want to scrape, and run the scraper function on each one
- Each time it stores the data frame ‘returned’ by the function in a variable
- We then update the empty data frame by concatenating the empty data frame with the new data frame
- After 1 loop it has 50 items, after 2 it has 100 (50+50 more) and so on

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Recap

- Want it done more than once? Create a user-defined function

```
def iamlazy(ingredient1, ingredient2):
   storesomething = dosomething(ingredient1)
   return(storesomething)
```

- The function turns your previous code into a recipe that can be run on multiple URLs
- Trial and error: later pages may not be quite the same - adapt code to handle errors

Try it now:

- Create a notebook and put the code you've already written for one page into a function
- Test it on the same page - does it work?
- Test it on a couple pages
- Test it on the last page