SI 206 Discussion 9

HTML and Beautiful Soup

HTTP Requests

- Library for making HTTP (Hypertext Transfer Protocol) requests to interact with web services, websites, and APIs

```
import requests


url = "https://www.google.com/"


r = requests.get(url)


print(r)

print(r.text)
```


```
<Response [200]>
<!doctype html><html itemscope="" itemtype="http://schema.org/WebPage" lan
, including webpages, images, videos and more. Google has many special fea
ame="description"><meta content="noodp" name="robots"><meta content="text/
nt="/images/branding/googleg/1x/googleg_standard_color_128dp.png" itemprop
-w07ce2OA">(function(){var _g={kEI:'QNU2ZdzmNpjS2roP2M-y4As',kEXPI:'0,1816
7528,16112,28687,22430,1362,12314,17585,4998,17075,38444,2872,2891,3926,21
894,29703,1457,22610,6627,7596,1,42154,2,16395,342,3533,19491,5679,1021,31
14491,873,19633,7,1922,9779,42459,20199,20136,14,82,7651,8863,3692,109,241
,12089,1632,2173,6669,868,3785,949,3692,8565,7769,146,21746,5203198,12,692
5,2,40,7,16,6,9,8,9,23940932,4044106,14298,2374,39458,1446,1763,1216,3,210
3,4636,2945,5463,2093,787,1597,26,3525,5494,943,19,216,241,1725,3780,7351,
2490,419,1104,1484,149,1243,3,3363,2174,365,1718,2,3263,2811,9,217,3590,56
,2116,4,498,574,1594,85,614,4,872,438,534,894,1,14,762,9,217,1328,750,7,1,
,706,233,46,1095,35,707,828,42,28,3,2,537,406,114,127,795,206,128,2,1021,6
40,298,426,106,109,1150,78,11,1,3,4,2,2,2,545,41,539,2,497,131,773,206,429
7,477,227,29,337,86,714,1,437,5,243,1,3,27,136,300,7,108,192,4,193,238,47,
449};(function(){var a;(null==(a=window.google)?0:a.stvsc)?google.kEI=_g.k
sn='webhp';google.kHL='en';})();(function(){
var h=this||self;function l(){return void 0!==window.google&&void 0!==wind
null};var m,n=[];function p(a){for(var b;a&&(!a.getAttribute||!(b=a.getAtt
for(var b=null;a&&(!a.getAttribute||!(b=a.getAttribute("leid")));)a=a.pare
==window.location.protocol&&(google.ml&&google.ml(Error("a"),!1,{src:a,glm
function t(a,b,c,d,k){var e="";-1===b.search("&ei=")&&(e="&ei="+p(d),-1===
===b.search("&cshid=")&&"slh"!==a,f=[];f.push(["zx",Date.now().toString()]
.push(["opi",c.toString()]);for(c=0;c<f.length;c++){if(0===c||0<c)d+="&";d
="+String(a)+"&cad="+(b+e+d)};m=google.kEI;google.getEI=p;google.getLEI=q;
c,d,k,e){e=void 0===e?l:e;c||(c=t(a,b,e,d,k));if(c=r(c)){a=new Image;var g
elete n[g]};a.src=c}};google.logUrl=function(a,b){b=void 0===b?l:b;return
=[];google.x=function(a,b){if(a)var c=a.id;else{do c=Math.random();while(g
(a){google.sy.push(a)};google.lm=[];google.plm=function(a){google.lm.push.
c){google.lq.push([[a],b,c])};google.loadAll=function(a,b){google.lq.push(
e.fce=function(a,b,c,e){d.push([a,b,c,e])};google.qce=d;}).call(this);goog
document.documentElement.addEventListener("submit",function(b){var a;if(a=
=c||"q"===c&&!a.elements.q.value?!0:!1}else a=!1;a&&(b.preventDefault(),b.
istener("click",function(b){var a;a:{for(a=b.target;a&&a!==document.docume
getAttribute("data-nohref");break a}a=!1}a&&b.preventDefault()},!0);}).cal
```

BeautifulSoup for scraping

```
import requests
from bs4 import BeautifulSoup

url = "https://www.google.com/"

response = requests.get(url)

if response.status_code == 200:
   html = response.text
else:
   print("Failed to retrieve the web
page.")

soup = BeautifulSoup(html, 'html.parser')
```

Scraping: extracting data from the structured data (e.g. HTML) of web pages.

- import BeautifulSoup
- Load your raw data using requests or other methods
- Create a BeautifulSoup object to begin parsing your data!

Parsing Your Soup

```
soup =
BeautifulSoup(html,
'html.parser')


print(soup.find('a'))
```

Return first match

```
<a class="gb1"
href="https://www.google.com/imghp?hl=en&a
mp;tab=wi">Images</a>
```

```
soup =
BeautifulSoup(html,
'html.parser')


print(soup.find_all('a'))
```

Return list of all matches

```
[<a class="gb1"
href="https://www.google.com/imghp?hl=en&amp;ta
b=wi">Images</a>, <a class="gb1"
href="https://maps.google.com/maps?hl=en&amp;ta
b=wl">Maps</a>, <a class="gb1"
href="https://play.google.com/?hl=en&amp;tab=w8
">Play</a>, <a class="gb1"
href="https://www.youtube.com/?tab=w1">YouTube<
/a>, …]
```

Working with Tag Objects

```
<a class="gb1"
href="https://www.google.com/imghp?hl=en&amp;tab=wi">Images</a>
```

```
soup = BeautifulSoup(html,
'html.parser')
first_tag = soup.find('a')


print(first_tag.attrs)
print(first_tag.get('class'))
```

```
{'class': ['gb1'], 'href':
'https://www.google.com/imghp?h
l=en&tab=wi'}
```

```
['gb1']
```

N.B.: You can use `find()` and `find_all()` on a tag object to find children tags

More on `find()` and `find_all()`

- You can pass attributes and their values as arguments to your function to run a more specific search

E.g.:

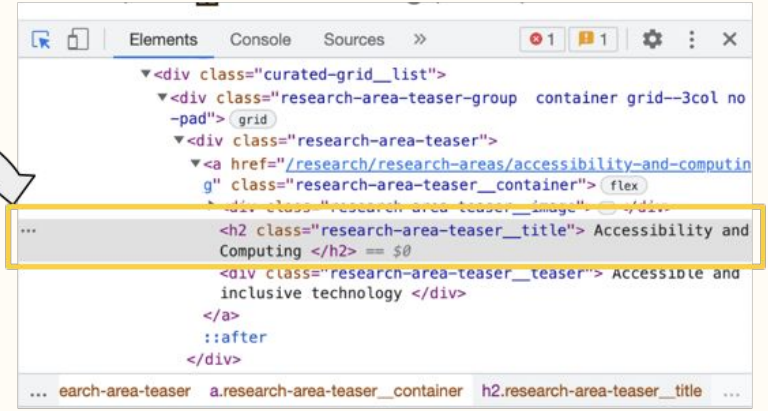
- `soup.find_all('a', href='https://www.google.com')`
  - All tags that link to Google
- `soup.find_all('div', class_='myClass')`
  - All divs with the class ‘myClass’
  - Because ‘class’ is a reserved keyword in Python, use ‘**class_**’
- `soup.find_all('div', class_='myClass myClass2 myClass3')`
  - Multiple classes are separated by a space; these are not one class

- N.B.: When trying to decide how to grab a certain tag, remember that a class can be assigned to multiple tags while ids are unique

Getting Info Using DevTools - `find()`


```
# Get first tag of a certain type from the soup
footer = soup.find('div', class_="footer-links")
contact = footer.find('a')
# Get info from tag
contact_link = contact.get('href')
```

Getting Info Using DevTools - `find_all()`




```
# Get Get all tags of a certain type from the soup
research_areas = soup.find_all("h2", class_="research-area-teaser__title")
research_areas_list = []
for tag in research_areas:
    # Get info from tag
    research_areas_list.append(tag.text)
```

Assignment: Scraping Wikipedia

We will use BeautifulSoup to scrape data from:
https://en.wikipedia.org/wiki/University_of_Michigan

- **Task 1:** Create a BeautifulSoup object
- **Task 2:** get the link (source) for the University of Michigan emblem

Assignment: Scraping Wikipedia

- **Task 3:** Get the details of the table that has the founding year of all schools/colleges at the University of Michigan and organize the information into key-value pairs in a dictionary.Be sure to convert the founding year to an integer.

  Output:

```
{'College of Literature, Science, and the Arts': 1841,
'College of Engineering': 1854,
'Law School': 1859,
'School of Dentistry': 1875,
'College of Pharmacy': 1876,
'School of Music, Theatre & Dance': 1880,
'School of Nursing': 1893, ….. }
```

College/school	Year founded[168]
A. Alfred Taubman College of Architecture & Urban Planning	1906
School of Dentistry	1875
College of Engineering	1854
School for Environment and Sustainability	1927
School of Information	1969
School of Kinesiology	1984
Law School	1859
College of Literature, Science, and the Arts	1841
Marsal Family School of Education	1921
Medical School	1921
School of Music, Theatre & Dance	1880
School of Nursing	1893
College of Pharmacy	1876
School of Public Health	1941
Gerald R. Ford School of Public Policy	1914
Stephen M. Ross School of Business	1924
School of Social Work	1951
Penny W. Stamps School of Art & Design	1974
University of Michigan, Ann Arbor*	–

*included other standalone units

Assignment: Scraping Wikipedia

- **Task 4:** Sort the dictionary by founding year to see what the 3 newest programs are at the University of Michigan.

  Output:

```
Three newest programs at the University of Michigan:
School of Kinesiology: 1984
Penny W. Stamps School of Art & Design: 1974
School of Information: 1969
```