Web Scraping using Python

Design Laboratory (CS69202)
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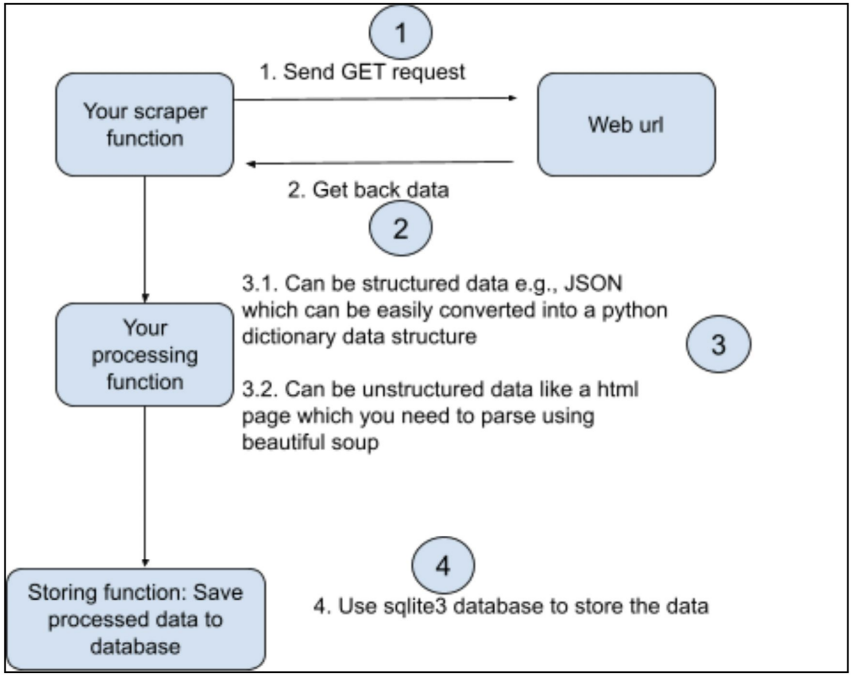
What is Web Scrapping

Web scrapers are programs that can collect data from websites, parse it and store the data (e.g., for analysis later).

A web request can be GET or POST. Using GET requests you can get data from the world wide web (WWW).

Pipeline for Scraping

1. Send the request (GET/POST)
2. Get the response
3. Based on response type; process the data
4. Store the data



Tools required for this assignment

1. Requests: “allows you to send HTTP/1.1 requests extremely easily”
2. BeautifulSoup (BS4): “scrape information from web pages. Sits atop an HTML parser, assists iterating, searching, and modifying the parse tree.”
3. Selenium: “Primarily it is for automating web applications for testing purposes, but is certainly not limited to just that.”
4. Sqlite3: “provides a lightweight disk-based database that doesn’t require a separate server process and allows accessing the database using a nonstandard variant of the SQL query language.”

Requests: snippet to retrieve data from a url

```
import requests
url = '...'
response = requests.get(url)
if response.status_code == 200:
  output = response.text
else:
  print('Exception: url not correct or No response')
```

Caveat: *Best to set browser headers*

```
headers = {

    'User-Agent': 'Mozilla/5.0 (Macintosh; Intel Mac OS X 10_11_6)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/61.0.3163.100 Safari/537.36'

}

...

response = requests.get(url, headers=headers)
...
```

BeautifulSoup

```
html_doc = """
<html><head><title>The Dormouse's story</title></head>
<body>
<p class="title"><b>The Dormouse's story</b></p>

<p class="story">Once upon a time there were three little sisters; and their names were
<a href="http://example.com/elsie" class="sister" id="link1">Elsie</a>,
<a href="http://example.com/lacie" class="sister" id="link2">Lacie</a> and
<a href="http://example.com/tillie" class="sister" id="link3">Tillie</a>;
and they lived at the bottom of a well.</p>

<p class="story">...</p>
"""
```

```
from bs4 import BeautifulSoup

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

Here are some simple ways to navigate that data structure:

```
soup.title
# <title>The Dormouse's story</title>

soup.title.name
# u'title'

soup.title.string
# u'The Dormouse's story'

soup.title.parent.name
# u'head'

soup.p
# <p class="title"><b>The Dormouse's story</b></p>

soup.p['class']
# u'title'

soup.a
# <a class="sister" href="http://example.com/elsie" id="link1">Elsie</a>

soup.find_all('a')
# [<a class="sister" href="http://example.com/elsie" id="link1">Elsie</a>,
#  <a class="sister" href="http://example.com/lacie" id="link2">Lacie</a>,
#  <a class="sister" href="http://example.com/tillie" id="link3">Tillie</a>]

soup.find(id="link3")
# <a class="sister" href="http://example.com/tillie" id="link3">Tillie</a>
```

BeautifulSoup: Searching the tree

Two most popular methods: find() and find_all()

You can search for an element using different kinds of filters:

- `String: soup.find_all('b')`
- `Regex : soup.find_all(re.compile("^b"))`
- `List  : soup.find_all(["a", "b"])`

find_all(name, attrs, recursive, string, limit, **kwargs)

```
soup.find_all("title")
# [<title>The Dormouse's story</title>]

soup.find_all("p", "title")
# [<p class="title"><b>The Dormouse's story</b></p>]

soup.find_all("a")
# [<a class="sister" href="http://example.com/elsie" id="link1">Elsie</a>,
#  <a class="sister" href="http://example.com/lacie" id="link2">Lacie</a>,
#  <a class="sister" href="http://example.com/tillie" id="link3">Tillie</a>]

soup.find_all(id="link2")
# [<a class="sister" href="http://example.com/lacie" id="link2">Lacie</a>]

import re
soup.find(string=re.compile("sisters"))
# u'Once upon a time there were three little sisters; and their names were\n'
```

find(name, attrs, recursive, string, **kwargs)

The *find_all()* method scans the entire document looking for results, but sometimes you only want to find one result. — use **find()**

```
soup.find_all('title', limit=1)
# [<title>The Dormouse's story</title>]

soup.find('title')
# <title>The Dormouse's story</title>
```

Other methods: find_all_next, find_next

These methods use iterates over whatever tags and strings that come after it in the document

```
first_link = soup.a
first_link
# <a class="sister" href="http://example.com/elsie" id="link1">Elsie</a>

first_link.find_all_next(string=True)
# [u'Elsie', u',\n', u'Lacie', u' and\n', u'Tillie',
#  u';\nand they lived at the bottom of a well.', u'\n\n', u'...', u'\n']

first_link.find_next("p")
# <p class="story">...</p>
```

Selenium: Writing your first script

- Start the session

```
driver = webdriver.Chrome()
```

- Take action on browser

```
driver.get("https://www.selenium.dev/selenium/web/web-form.html")
```

- Request browser information

```
title = driver.title
```

- Find an element

```
text_box = driver.find_element(by=By.NAME, value="my-text")
submit_button = driver.find_element(by=By.CSS_SELECTOR, value="button")
```

Selenium: Writing your first script

- Take action on element

```
text_box.send_keys("Selenium")
submit_button.click()
```

- Request element information

```
text = message.text
```

- End the session

```
driver.quit()
```

Sqlite3: Writing your first script

- Create a new database and open a database connection

```
import sqlite3
con = sqlite3.connect("tutorial.db")
```

- Create a database cursor: to execute SQL statements and fetch results from SQL queries

```
cur = con.cursor()
```

- Create a database table movie with columns for title, release year, and review score

```
cur.execute("CREATE TABLE movie(title, year, score)")
```

- Add data supplied as SQL literals by executing an INSERT statement

```
cur.execute("""
     INSERT INTO movie VALUES
     ('Monty Python and the Holy Grail', 1975, 8.2)
""")
```

Sqlite3: Writing your first script

- Fetching results from a table by executing SELECT

```
res = cur.execute('SELECT score FROM movie")
res.fetchall()
```

- Saving the changes

```
con.commit()
```

- Closing the db connection

```
con.close()
```