Web Scraping for Data Collection

Inspired by code from tsvm and Digital Ocean

Data Collection

Sometimes, our data comes in a nice and clean format:

- ipums.org - Census Bureau Data
- collegescorecard.ed.gov - Education Data
- gss.norc.org - General Social Survey

Data Collection

Sometimes, not so much...

```
<p class="text-gray text-truncate mb-xs-0 text-body">
Dungeons and Dragons Your Stick Figure Family rolled a 1 /
</p>
<div class="v2-listing-card__shop">
<p class="text-gray-lighter text-body-smaller display-inli
<div class="v2-listing-card__rating icon-t-2">
<div class="stars-svg stars-smaller ">
<input type="hidden" name="initial-rating" value="4.985">
<input type="hidden" name="rating" value="4.985">
<span class="screen-reader-only">5 out of 5 stars</span>
```

Searched "dungeons and dragons" on Etsy

What can we do?

We need data, but it is embedded in a web site, and wrapped in lots of HTML code.

- Download all of the code from the webpage and manually cut out the information?
- Copy and paste from the tables on a rendered website?

These might be feasible on a small scale, but what if I want to know about information stored on 1000's of pages?

Web Scraping

Web Scraping is the process of extracting information from web pages.

- Irregular
- Interactive
- Iterative

No webpage is designed the same as any other (typically), so we have to build an understanding of the pages we want to scrape before we can write our code.

What to Know

In order to scrape a web page, we need to have a basic understanding of:

- HTML tags
- CSS formatting, (here also)
- JSON data structures

From there, we will spend LOTS of time on Google making sure we get it right for the page(s) that we care about.

Brickset

Let's say that I want to collect information about lots of different Lego sets.

10251: Brick Bank

10251-1 | ADVANCED MODELS | MODULAR BUILDINGS | 2016

BANK | BASEPLATE | BRICK BUILT TREE | CREATOR EXPERT | D2C

LAMPPOST | LAUNDROMAT | MODULAR BUILDING | SAFE

★★★★★ 5 REVIEWS

PIECES 2380

MINIFIGS 5

RRP $169.99, 149.99€ | More

PPP 7.1c, 6.3c

PACKAGING Box

AVAILABILITY Retail - limited

FIRST SOLD

USA: Jan 16, UK/EU: Jan 16

INSTRUCTIONS Yes

ADDITIONAL IMAGES 26

SET TYPE Normal

NOTES Labelled Creator - Expert.

RELATED SETS

Connects with 10182-1 | 10185-1 | 10190-1 | 10197-1 | 10232-1

Brickset

This is a good page to learn scraping, because we also have the option of getting our search results back as a CSV, so we can check whether or not we collect the correct information.

Say we want to collect

- Set name
- # of Pieces
- # of Minifigs (Lego people)
- The URL of a picture of the set

Brickset

We need to

1. Identify the pieces of HTML that surround the information we need,
2. Create code that will allow us to extract that information
3. Create code that can do this for all pages

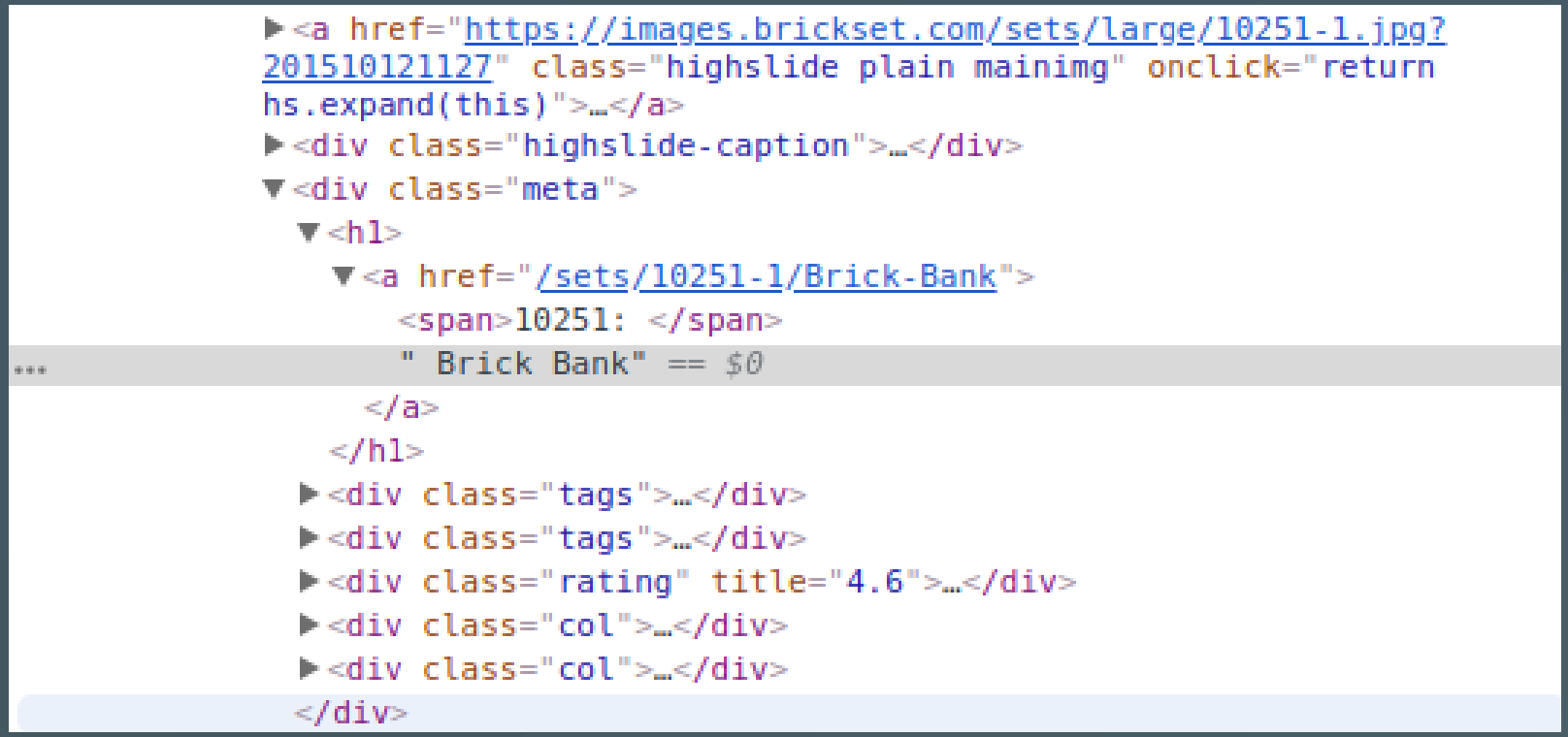
Let's go to the Brickset website to find what we are looking for

Our Objects of Interest

In order to find the way in which information is stored in the Brickset page, we will use our browser's developer tools to explore the page source.

Right click on the name ("10251: Brick Bank") of the first lego set after you follow the link, and choose the **Inspect** option

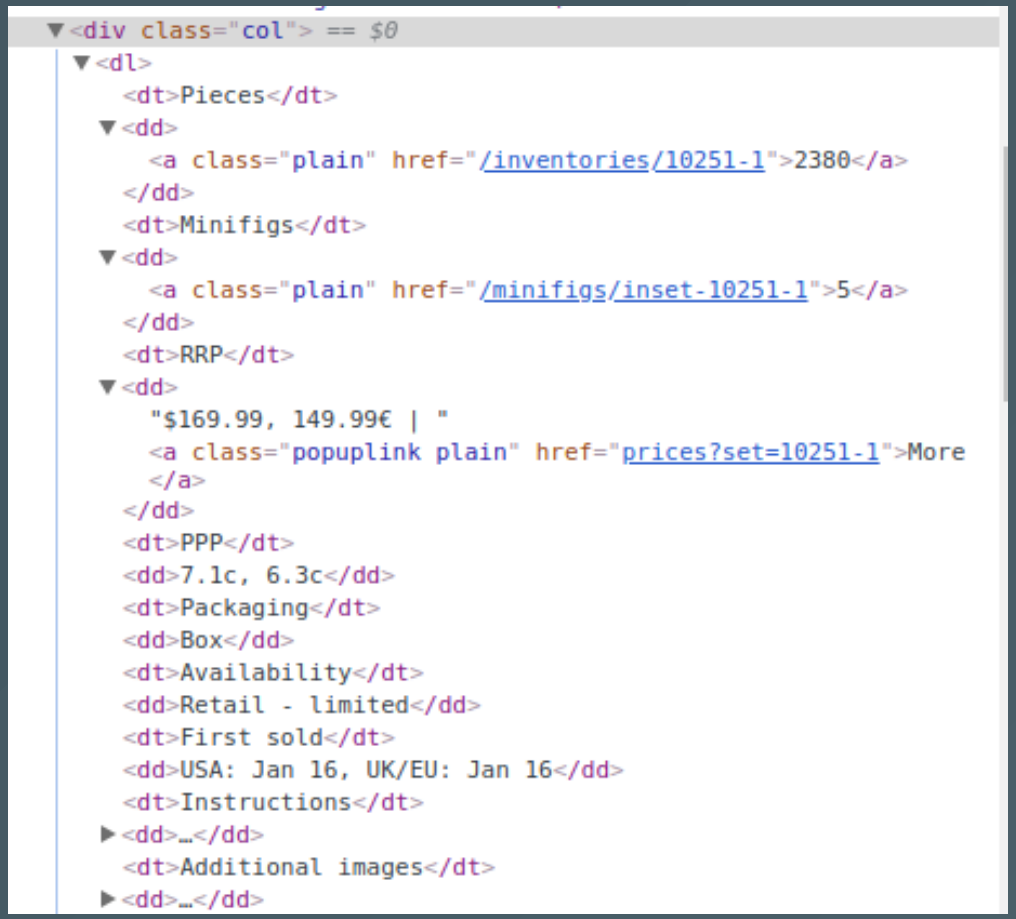
Our Objects of Interest



We can see that the set's name is inside of an `<h1>` tag, as well as an `<a>` tag (header and link tags, respectively)

Our Objects of Interest

If we continue further, we will see that most other information is contained in a list:



Extracting the Data

In order to write code that will retrieve this data from each search result, we will use the `scrapy` library.

1. Create our spider (code to **crawl** a **web**site) as a **subclass** of the `scrapy.Spider` class
2. Customize that class to detect the data we care about
3. From a command prompt, set our spider loose on the sites we are scraping

Extracting the Data

```
import scrapy

class BrickSetSpider(scrapy.Spider):
  name = "brickset_spider"
  start_urls = [
        'http://brickset.com/sets/year-2016'
        ]
```

Let's start by creating our class, and giving it a helpful name.

We then need to tell our spider where it will start crawling.

Extracting the Data

Next, we need to create a header for our CSV, so that it is clear what each column of extracted data contains:

```
with open('myresults.csv', 'w') as f:
        f.write("name, pieces, minifigs, image\n")
```

This also goes inside of our `BrickSetSpider` class.

Extracting the Data

Now, define a method named `parse`. This method will be called for each web page that is crawled by the spider.

```
def parse(self, response):
  with open('myresults.csv', 'a') as f:
    SET_SELECTOR = ".set"
    for brickset in response.css(SET_SELECTOR):
      NAME_SELECTOR = 'h1 ::text'
      PIECES_SELECTOR = './/dl[dt/text() = "Pieces"]/dd/a/
      MINIFIGS_SELECTOR = './/dl[dt/text() = "Minifigs"]/d
      IMAGE_SELECTOR = 'img ::attr(src)'
      ...
```

Extracting the Data

Now, define a method named `parse`. This method will be called for each web page that is crawled by the spider.

```
def parse(self, response):
  with open('myresults.csv', 'a') as f:
    SET_SELECTOR = ".set"
    for brickset in response.css(SET_SELECTOR):
      ...
      result = str(brickset.css(NAME_SELECTOR).extract_fir
      result += str(brickset.xpath(PIECES_SELECTOR).extrac
      result += str(brickset.xpath(MINIFIGS_SELECTOR).extr
      result += str(brickset.css(IMAGE_SELECTOR).extract_f

      f.write(result)
      ...
```

Extracting the Data

Now, define a method named `parse`. This method will be called for each web page that is crawled by the spider.

```
def parse(self, response):
  with open('myresults.csv', 'a') as f:
    SET_SELECTOR = ".set"
    for brickset in response.css(SET_SELECTOR):
      ...
      NEXT_PAGE_SELECTOR = '.next a ::attr(href)'
      next_page = response.css(NEXT_PAGE_SELECTOR).extract
      if next_page:
        yield scrapy.Request(
          response.urljoin(next_page),
          callback=self.parse
        )
```

Running Our Spider

In order to run our Spider, we will need to open a Terminal/PowerShell/Command Prompt:

Lab Computers/Windows:

```
python C:\ProgramFiles\Anaconda3\Scripts\scrapy bricks.py
```

Mac/Unix/Linux:

```
scrapy bricks.py
```

In both cases, we need to be in the directory containing `bricks.py`

Another (harder) Crawl

In the case of Brickset, the data that we want to collect is relatively easy to access. This is certainly not going to be the case for every website.

- Let's take a look at scraping some data from a search on Etsy.com
- Let's say that we are interested in collecting the URL, name, an image of the item, item description, lowest price listed, and average rating

Etsy Crawl

1. Find where the information we want is stored
2. Determine the structure of our crawl
3. Write code to move through all the necessary pages
4. Write code to break down the information on each page

Lab/Homework For This Week

This week, your job will be to write the scraping code that you will use for your semester project.

- Determine what data you want to collect
- Determine which of the three possible websites will help you to collect that data
- Create and use a `scrapy` spider sub-class to collect that data.

Turn in: Your spider script (see my examples), as well as a CSV containing the first 100 lines resulting from your scrape.