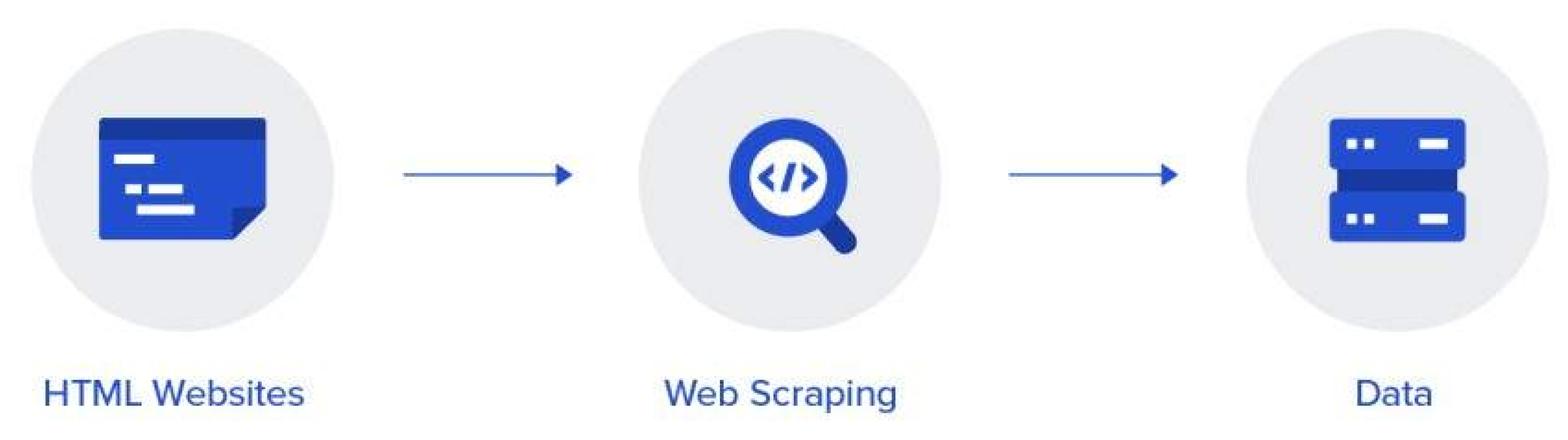
Github Topics Details - Web Scraping Project



Introduction:

Web scraping is the process of parsing and extracting data from the websites. It is very useful when we want to collect data from the websites for our work.

I'm going to scrap Github's topics page(https://github.com/topics) to know-

- Different topics present on Github.
- For each topics,
  - topic titles, description and topic URL.
  - popular repository.
  - And for each popular repositories-
    - username(created by).
    - number of stars
    - URL of the repository.
    - number of times forked.
    - number of times commited.
    - last commited time.

Required data format:

Topics	Descripton	Topic_URL	Popular_Repository	Username	Repository_URL	Number_Of_Stars	Forked_Count	Total_commits
3D	--descr--	https://github.com/topics/3d	three.js	mrdoob	https://github.com/mrdoob/three.js	73300	28708	37892

Tools to be used:
Python, Pandas, BeautifulSoup, Requests

Let's scrap it...

Part I

First, let's import required libraries.

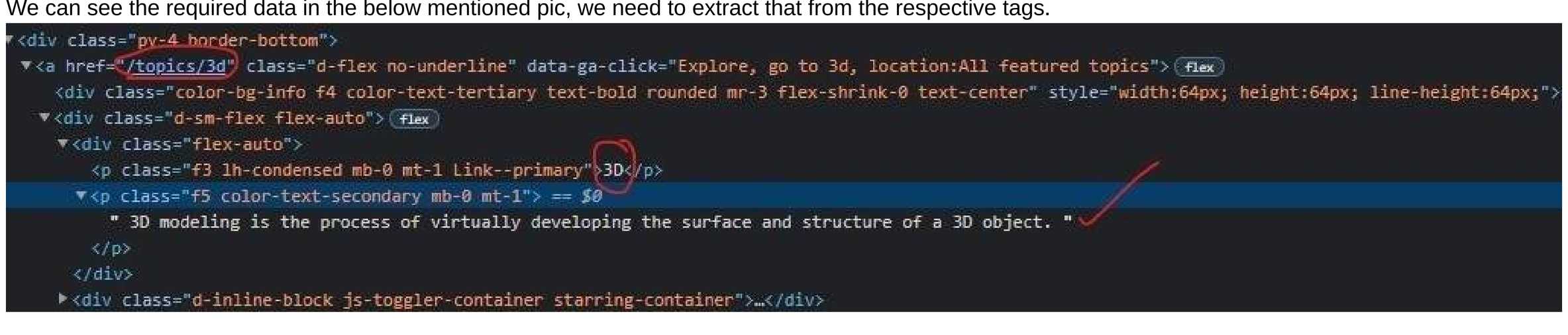
In [1]:
```python
import requests
from bs4 import BeautifulSoup
import pandas as pd
```

Now let's define a function which loads all the required topics pages and returns BeautifulSoup object.

In [2]:
```python
def topics_pages_loader():
    page_content=''
    i=1
    while i<7:    # i<7 because there are only 6 topics pages
        url = 'https://github.com/topics?page={}'.format(i)
        r =requests.get(url)
        if r.status_code != 200:
            i-=1 #if status code!=200, it means failed to load the page. So reloading the page by decrementing the t
he i value
        else:
            page_content += '\n' + r.text
        i+=1
    doc = BeautifulSoup(page_content,'html.parser')
    return doc
```

We have loaded all the required topics pages successfully.

We can see the required data in the below mentioned pic, we need to extract that from the respective tags.



Now let's get all the 'Topics', 'Description' and 'Topics_URL' by defining the functions `get_topic_titles(doc)`, `get_topic_description(doc)` and `get_topic_urls(doc)` which return topics titles, description and topics URL respectively.

In [3]:
```python
def get_topic_titles(doc):
    topic_selection_class= 'f3 lh-condensed mb-0 mt-1 Link--primary'
    topic_p_tags =doc.find_all('p',{'class':topic_selection_class})
    topic_titles =[]
    for tag in topic_p_tags:
        topic_titles.append(tag.text)
    return topic_titles

def get_topic_description(doc):
    desc_selection_class ='f5 color-text-secondary mb-0 mt-1'
    desc_ptags =doc.find_all('p',{'class':desc_selection_class})
    topic_descs =[]
    for tag in desc_ptags:
        topic_descs.append(tag.text.strip())
    return topic_descs

def get_topic_urls(doc):
    link_selection_class = 'd-flex no-underline'
    topic_link_tags =doc.find_all('a',{'class':link_selection_class})
    topic_urls =[]
    base_url ='https://github.com'
    for tag in topic_link_tags:
        topic_urls.append(base_url + tag['href'])
    return topic_urls
```

Now let's define a function `scrape_topics()` which returns the dataframe containing the columns 'Topics', 'Description', and 'Topic_URL'.

In [4]:
```python
def scrape_topics():
    doc = topics_pages_loader()
    topics_dict = {
        'Topics': get_topic_titles(doc),
        'Description': get_topic_description(doc),
        'Topic_URL': get_topic_urls(doc)
    }
    return pd.DataFrame(topics_dict)
```

In [5]:
```python
df_topics = scrape_topics()
df_topics.head()
```

Out[5]:

	Topics	Description	Topic_URL
0	3D	3D modeling is the process of virtually develo...	https://github.com/topics/3d
1	Ajax	Ajax is a technique for creating interactive w...	https://github.com/topics/ajax
2	Algorithm	Algorithms are self-contained sequences that c...	https://github.com/topics/algorithm
3	Amp	Amp is a non-blocking concurrency framework fo...	https://github.com/topics/amphp
4	Android	Android is an operating system built by Google...	https://github.com/topics/android

This is how our required semi-dataframe looks like. We have scraped first 3 columns which gives us the basic informations of the topics.

This is not complete CSV file we wanted but we can store this also as another CSV file which basically gives us the basic informations of the topics.

We can store this in a CSV format as shown below.

In [6]:
```python
df_topics.to_csv('Github_topics.csv',index=False)
```

Part II

Now let's gather some data about popular repositories for each topics.

We can utilize the 'Topic_URL' column from the above dataframe to get some of the required information of the popular repositories.

In [7]:
```python
topic_urls = df_topics['Topic_URL']
```

As we can see that repository name and username are present in `h3` tag, let's define a function which returns us these values. And also let's get the repository URL from the same function only.

In [8]:
```python
def get_repo_info(h3_tags):
    atags = h3_tags.find_all('a')
    username = atags[0].text.strip()
    repo_name = atags[1].text.strip()
    repo_url ='https://github.com' + atags[1]['href']

    return username,repo_name,repo_url
```

The function `popular_repo_info()` loads each topics pages and get the popular repository(most starred) then returns 'Popular_Repository', 'Username' and 'Repo_URL'.

In [9]:
```python
def popular_repo_info():
    repo_details ={'Popular_repository(most_starred)':[],'Repo_Username':[],'Repo_URL':[]}
    i=0
    while i<len(topic_urls):
        url = topic_urls[i] + '?o=desc&s=stars'
        r =requests.get(url)
        if r.status_code !=200:
            i-=1
        else:
            doc = BeautifulSoup(r.text,'html.parser')

            h3_tags = doc.find_all('h3',{'class':'f3 color-text-secondary text-normal lh-condensed'}, limit=1)

            repo_info = get_repo_info(h3_tags[0])
            repo_details['Repo_Username'].append(repo_info[0])
            repo_details['Popular_repository(most_starred)'].append(repo_info[1])
            repo_details['Repo_URL'].append(repo_info[2])
        i+=1
    return pd.DataFrame(repo_details)
```

In [10]:
```python
df_popular_repo = popular_repo_info()
df_popular_repo.head()
```

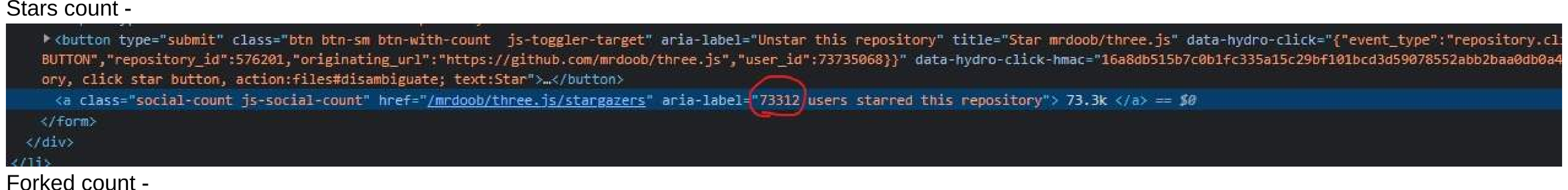
Out[10]:

	Popular_repository(most_starred)	Repo_Username	Repo_URL
0	three.js	mrdoob	https://github.com/mrdoob/three.js
1	infinite-scroll	metafizzy	https://github.com/metafizzy/infinite-scroll
2	coding-interview-university	jwasham	https://github.com/jwasham/coding-interview-un...
3	amp	amphp	https://github.com/amphp/amp
4	flutter	flutter	https://github.com/flutter/flutter

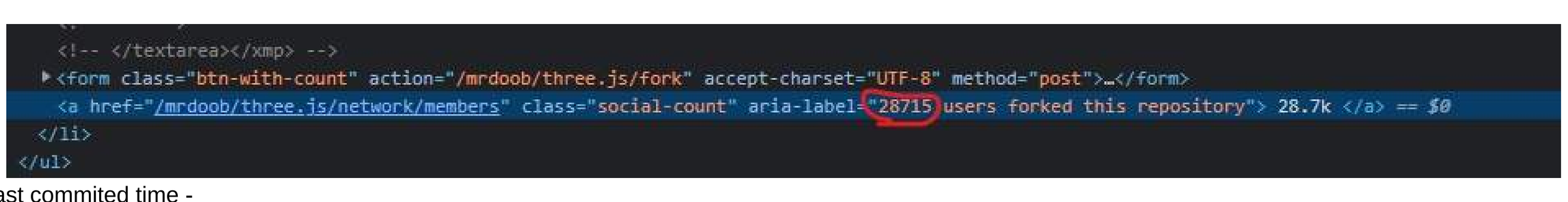
Now we have the basic informations of the popular repositories like 'Popular_Repository', 'Username' and 'Repo_URL'. Let's get some other informations for these popular repositories like 'Number_Of_Stars','Forked_Count', 'Total_Commits' and 'Last_Commited'.

First let's have a look where our required data is located.

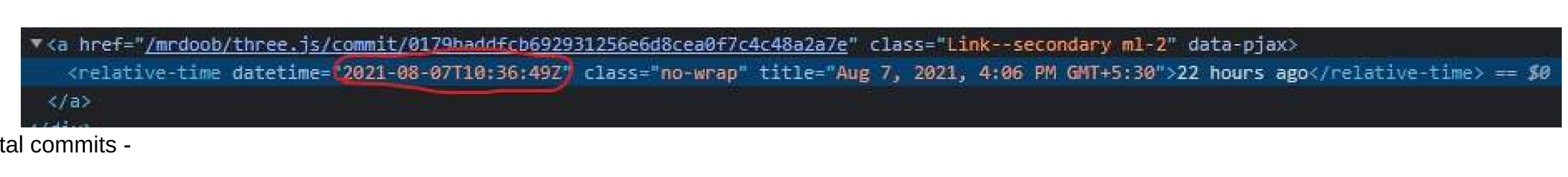
Stars count -



Forked count -



Last commited time -



Total commits -

We can utilize `df_popular_repo['Repo_URL']` which we have already extracted, to extract remaining data.

In [11]:
```python
repo_urls =df_popular_repo['Repo_URL']
```

Let's define a function `get_repo_info2(star_atags,forks_atags,commit_span_tags,last_commit_atag)` which returns us all the values we are expecting(as above).

In [12]:
```python
def get_repo_info2(star_atags,forks_atags,commit_span_tags,last_commit_atag):
    stars = int(star_atags[0]['aria-label'].split()[0])
    forks = int(forks_atags[1]['aria-label'].split()[0])
    commits = int(commit_span_tags[1].strong.text.replace(',', '')) if len(commit_span_tags)==2 else int(commit_span
_tags[0].strong.text.replace(',', ''))
    last_updated = last_commit_atag[0].find_all('relative-time')[0]['datetime'] if len(last_commit_atag)>=1 else Non
e

    return stars,forks,commits,last_updated
```

The function `popular_repo_info2()` which we are going to define, loads the pages to get the required values ('Number_Of_Stars','Forked_Count', 'Total_Commits' and 'Last_Commited') and then returns a dataframe of these values.

In [13]:
```python
def popular_repo_info2():
    repo_details2 ={'Number_Of_Stars':[],'Forked_count':[],'Total_commits':[],'Last_commited':[]}
    i=0
    while i<len(repo_urls):
        url = repo_urls[i]
        r =requests.get(url)
        if r.status_code != 200:
            i-=1
        else:
            doc =BeautifulSoup(r.text, 'html.parser')

            star_atags = doc.find_all('a',{'class':'social-count js-social-count'})
            forks_atags =doc.find_all('a',{'class':'social-count'})
            commit_span_tags = doc.find_all('span',{'class':'d-none d-sm-inline'})
            last_commit_atag =doc.find_all('a',{'class':'Link--secondary ml-2'})

            repo_info2 = get_repo_info2(star_atags,forks_atags, commit_span_tags, last_commit_atag)
            repo_details2['Number_Of_Stars'].append(repo_info2[0])
            repo_details2['Forked_count'].append(repo_info2[1])
            repo_details2['Total_commits'].append(repo_info2[2])
            repo_details2['Last_commited'].append(repo_info2[3])
        i+=1

    return pd.DataFrame(repo_details2)
```

In [14]:
```python
df_pop_repo_info2 = popular_repo_info2()
df_pop_repo_info2.head()
```

```
Failed to load the page https://github.com/jwasham/coding-interview-university. Retrying...
Failed to load the page https://github.com/jwasham/coding-interview-university. Retrying...
Failed to load the page https://github.com/jwasham/coding-interview-university. Retrying...
Failed to load the page https://github.com/jwasham/coding-interview-university. Retrying...
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Failed to load the page https://github.com/jwasham/coding-interview-university. Retrying...
```

Out[14]:

	Number_Of_Stars	Forked_count	Total_commits	Last_commited
0	73372	28744	37899	2021-08-10T10:15:21Z
1	6932	1760	471	2021-01-03T19:57:17Z
2	189361	50869	1735	2021-07-31T17:45:09Z
3	3303	184	1385	2021-07-16T20:25:09Z
4	127074	18224	25382	2021-08-09T22:21:17Z

Now let's concat all these dataframes to get the final required outcome.

In [15]:
```python
df = pd.concat([df_topics, df_popular_repo, df_pop_repo_info2], axis=1)
df.head()
```

Out[15]:

	Topics	Description	Topic_URL	Popular_repository(most_starred)	Repo_Username	Repo_URL	Number_Of_Stars
0	3D	3D modeling is the process of virtually develo...	https://github.com/topics/3d	three.js	mrdoob	https://github.com/mrdoob/three.js	73372
1	Ajax	Ajax is a technique for creating interactive w...	https://github.com/topics/ajax	infinite-scroll	metafizzy	https://github.com/metafizzy/infinite-scroll	6932
2	Algorithm	Algorithms are self-contained sequences that c...	https://github.com/topics/algorithm	coding-interview-university	jwasham	https://github.com/jwasham/coding-interview-un...	189361
3	Amp	Amp is a non-blocking concurrency framework fo...	https://github.com/topics/amphp	amp	amphp	https://github.com/amphp/amp	3303
4	Android	Android is an operating system built by Google...	https://github.com/topics/android	flutter	flutter	https://github.com/flutter/flutter	127074

We have extracted all the required data. Now the final work is to store this data into a CSV file.

In [16]:
```python
df.to_csv('Github_topics_detailed.csv')
```

Here we come to an end of this project.

Thank you...