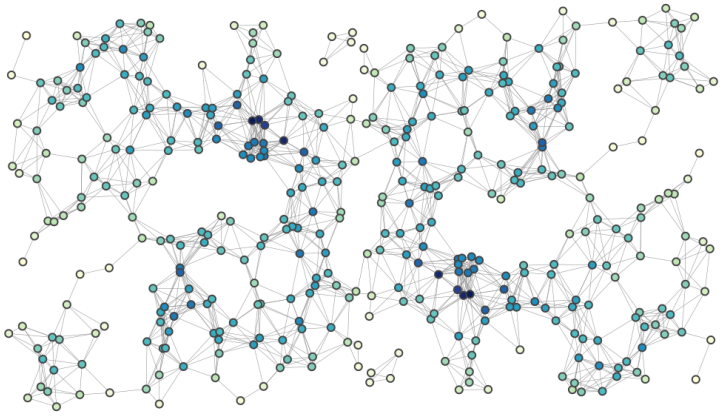


Old Dominion University

CS 432 Web Science

Assignment Two

Derek Goddeau

Professor

Michael L. Nelson

February 14, 2017

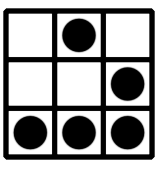
1 Extract 1000 Unique URIs from Twitter using Python

The benxihu program accepts a variety of command line arguments as shown below. All that is required is one keyword and a valid credentials file and at least one keyword. Once the desired settings have been applied a `Miner` class is instantiated and ran. When `Miner.run()` is called it extracts the login credentials from the supplied file, logs in, and uses tweepy to connect to the twitter streaming API and apply a filter with the supplied keywords.

When data is successfully found the `on_data()` function applies another filter which removes any tweets without a URI. It also checks that it is unique by checking the URI of the final redirect against what has been gathered already. If it does not successfully resolve it is also filtered. If successful the URI and tweet are saved to a unique filename generated each run by concatenating the first keyword argument with the current Unix time in whole seconds.

```
        regex = r'https?://[^\s<>"]+|www\.[^\s<>"]+'
        match = re.search(regex, data)
        if match:
            link = match.group(0).strip().replace('\\', '')
            link = link.strip()
            response = get_response(link)
            self.final_redirects.append(response.url)
            if link not in self.links and link not in self.final_redirects:
                self.tweet_save(data, link)
                self.links.append(link)
                return True
        return False
```


Derek Goddeau (Datenstrom)
Old Dominion University



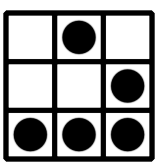
2 Timemap the URIs

After collecting a list of 2000 URIs for good measure I use a Jupyter notebook to pass them through a series of filters using Python before passing them off to R for graphing. First I use fuzzywuzzy to do fuzzy string matching to see if the filters implemented in The benxihu missed anything, and they did. Removing all offeners by fliping a coin using `random.choice()` still leaves me with over 1900 links.

Next I use fuzzywuzzy again, this time to filter for keywords related to the topic directly in the link text. This leaves just over 1000 links so I grab 1000 randomly from the set and run them through a loop to grab the number of mementos for each pairing them in tuples.

```
def get_num_mementos(link):
    url = 'http://memgator.cs.odu.edu/timemap/json/http://' + link
    try:
        mementos = requests.get(url).json()
    except ValueError as e:
        print("No memento for URL: {}".format(link))
        return 0
    num_mementos = len(mementos['mementos']['list'])
    return num_mementos


link_mementos = []
for link in final_links:
    link_mementos.append((link, get_num_mementos(link)))
```

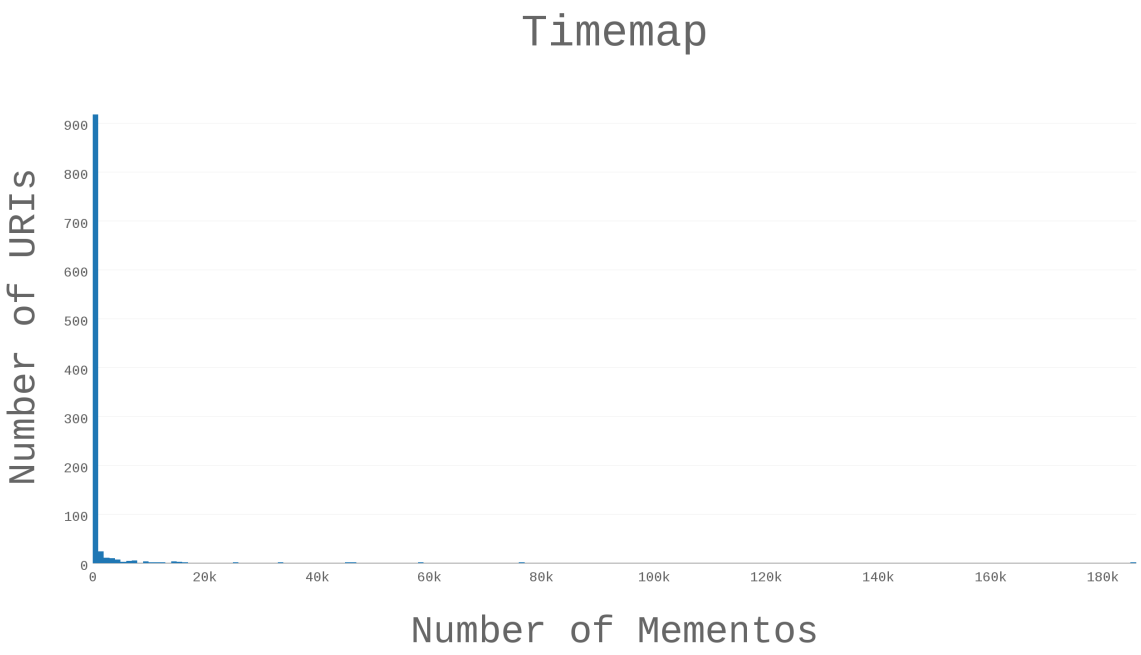
Finally I create the Python list `data` using a list comprehension which is then used as input into a cell using one of the built-in magic commands specifically `rmagic` which is now a part of rpy2. I then use plotly which supports over 10 languages to create the graph.

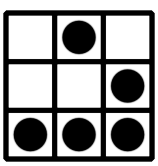
```
%%R -i data

    library(plotly);

    p <- plot_ly(x = data, type = "histogram")

    embed_notebook(p)
    htmlwidgets::saveWidget(as.widget(p), "histogram.html")
```

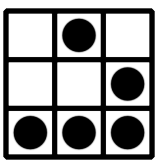




3 Carbon Date URIs

Using GitLab Continuous Integration it is easy to create images for use with docker. The preferred method of accomplishing this is using docker-in-docker (dind) to create the image, rather than allowing the image access to the host docker daemon though `docker.sock` for security reasons, which are that essentially access to `docker.sock` from a container means root on the host. Regardless dind is the only way unless using private runners. I build the docker container and upload it to my repositories registry with the following in my `.gitlab-ci.yml`.

```
build_carbon_date:
    image: docker:git
    services:
        - docker:dind
    stage: build
    script:
        - docker login -u gitlab-ci-token -p $CI_BUILD_TOKEN registry.gitlab.com
        - git clone https://github.com/oduwsdl/CarbonDate.git
        - cd CarbonDate
        - docker build -t $CONTAINER_TEST_IMAGE .
        - docker push $CONTAINER_TEST_IMAGE
    tags:
        - $docker
    only:
        - master
        - assignment-2
```

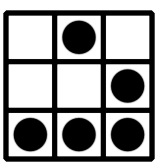
In the process of generating, filtering, and graphing in the Carbon Date notebook I mix bash, Python, and R using each where they shine. First I read in the links and then use the inline bash magic command `!` inside a python loop over the links to run the dockerized Carbon Date on each. I then grab the date from the json output, convert it to a Python datetime object and store it in a list.

```
creation_dates = []
for link in init_links:

    JSON = !docker run --rm -i -p 4444:4444 \
                registry.gitlab.com/datenstrom/cs532-s17:assignment-2 \
                ./main.py -l search {link}

    j = JSON.n
    j = json.loads(' '.join(j.split('\n')[2:]))
    time = j['Estimated Creation Date']
    if time != '':
        time = datetime.strptime(time, '%Y-%m-%dT%H:%M:%S')
        creation_dates.append(time)
    else:
        creation_dates.append(None)
```

Then I package the creation date data combined with the links and number of mementos in a pandas dataframe. From here on R is a good tool for the job so I pass the dataframe into R for processing and graphing. To make the data more friendly to R I also packaged the missing dates as `NaN`.



Removing all rows without a date is as simple as the following line which removes all rows with `NaN` values.

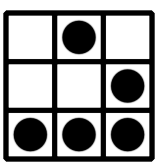
```
df <- df[complete.cases(df),]
```

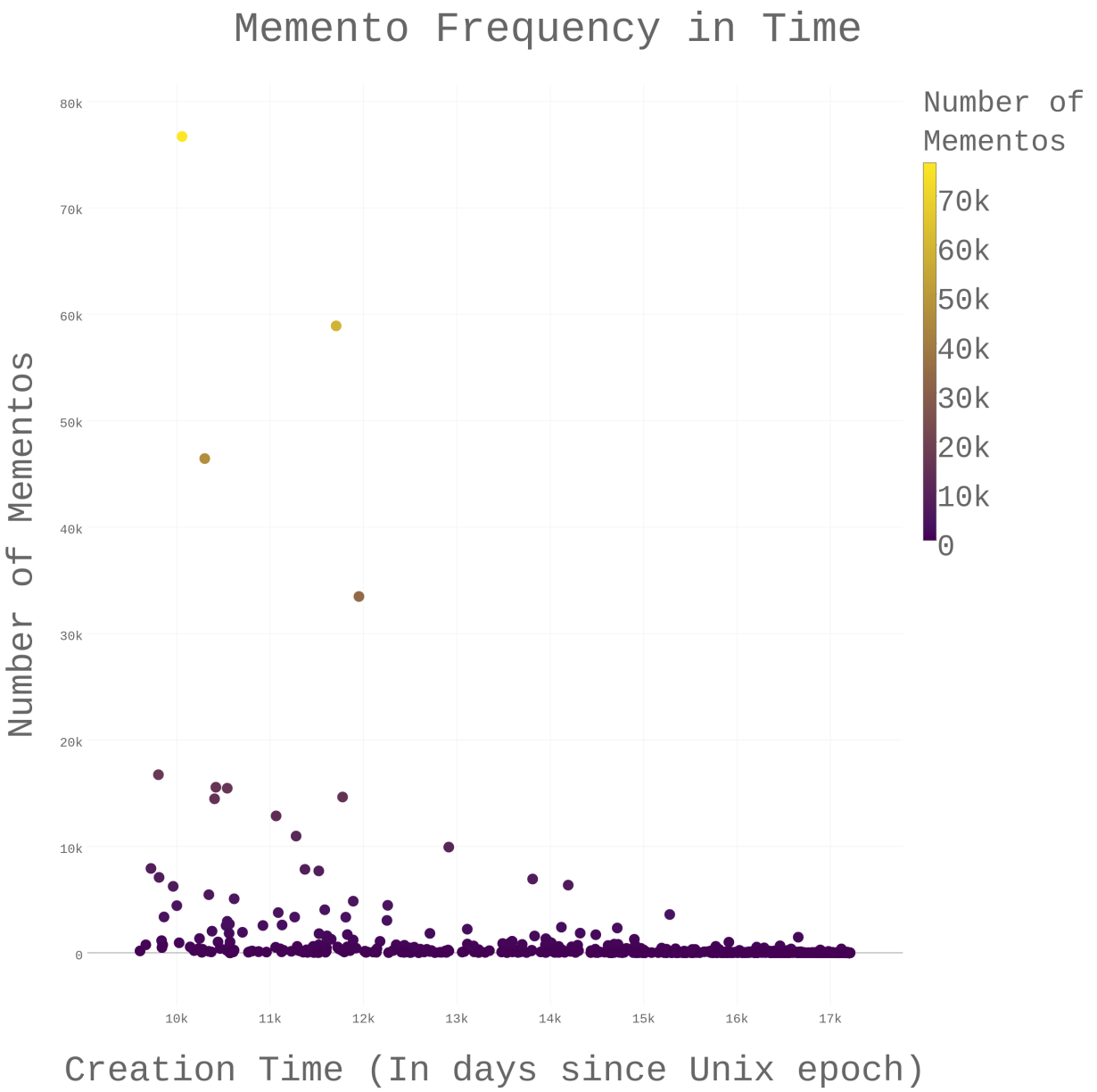
Removing URIs with no date is an equally simple one liner that checks each row for a zero value in the memento column.

```
df <- df[!(df\$X.memento==0),]
```

Again plotly is used to with very little effort create a nice looking interactive graph. The graph also provides detailed information on each data point on hover which includes estimated creation date, the URI, and number of mementos. It is also possible to zoom in and pan around the graph.

```
p <- plot_ly(df, x = ~creation_date, y = ~X.memento,
     type = 'scatter',
     mode = 'markers',
     color = ~X.memento,
     marker = list(
         size = 8
     ),
     # Hover text
     text = ~paste("Mementos: ", X.memento,
                   '<br>Date: ', (function(x) anydate(x*secs))(creation_date),
                   '<br>URI: ', link
                  )
    )
```



Derek Goddeau (Datenstrom)
Old Dominion University