Ciencia de Datos con Python

Caso de estudio: Notas periodísticas del Newyork Times

Adquisición de datos

Fuente de origen: Archivo de texto (.txt)

Estructura destino: Lista de cadenas de texto, cada una representa una línea del archivo

```
filename = "nytimes_news_articles.txt"

file = open(filename)

content = file.read()

lines = content.split("\n")

print("Líneas: {}".format(len(lines)))

lines[:5]
```

```
Líneas: 192578
```

```
['URL: http://www.nytimes.com/2016/06/30/sports/baseball/washington-nationals-max-sch
erzer-baffles-mets-completing-a-sweep.html',
 '',
 'WASHINGTON — Stellar pitching kept the Mets afloat in the first half of last season d
 '“We were going to ride our pitching,” Manager Terry Collins said before Wednesday’s g
 'Wednesday’s 4-2 loss to the Washington Nationals was cruel for the already-limping Me
```

Limpieza de datos

Estructura de entrada: Lista de cadenas de texto, dónde cada entrada representa una línea

Limpieza: Quitar las líneas vacías

```
import re

lines = list(filter(lambda line: not re.search(r"^\s*$", line), lines))

print("Líneas: {}".format(len(lines)))

lines[:5]
```

```
Líneas: 174788
```

```
['URL: http://www.nytimes.com/2016/06/30/sports/baseball/washington-nationals-max-sch
erzer-baffles-mets-completing-a-sweep.html',
 'WASHINGTON — Stellar pitching kept the Mets afloat in the first half of last season d
 '“We were going to ride our pitching,” Manager Terry Collins said before Wednesday’s g
 'Wednesday’s 4-2 loss to the Washington Nationals was cruel for the already-limping Me
 '“We’re not even giving ourselves chances,” Collins said, adding later, “We just can’t
```

Estructuración de datos

Estructura de entrada: Lista de cadenas de texto, dónde cada entrada representa una línea

Estructuración: Detectar cada nota que consiste de una URL y un texto en varias líneas

```
notes = []
note_url = ""
note_lines = []

def addNote(url, lines):
    if len(lines) == 0:
        return
    notes.append({
        "url": url,
        "lines": lines
    })

for line in lines:
    if re.search("^URL:", line):
        addNote(note_url, note_lines)
        note_url = line
        note_lines = []
        continue
    note_lines.append(line)

addNote(note_url, note_lines)

print("Notas: {}".format(len(notes)))

notes[:1]
```

```
Notas: 8884




[{'url': 'URL: http://www.nytimes.com/2016/06/30/sports/baseball/washington-nationals
-max-scherzer-baffles-mets-completing-a-sweep.html',
  'lines': ['WASHINGTON — Stellar pitching kept the Mets afloat in the first half of la
   '“We were going to ride our pitching,” Manager Terry Collins said before Wednesday’s
   'Wednesday’s 4-2 loss to the Washington Nationals was cruel for the already-limping
   '“We’re not even giving ourselves chances,” Collins said, adding later, “We just can
   'The Mets did not score until the ninth inning, when a last-gasp two-run homer by Ja
   'The Mets were swept in the three-game series and fell six games behind the National
   '“I don’t think we’ve played half our games yet this year,” right fielder Curtis Gra
   'Scherzer toyed with the Mets, who were initially without Granderson after he was sc
   'After Scherzer gave up a single to Asdrubal Cabrera and walked Loney in the second
   'The Mets struggled again with runners on base. After Nimmo and the pinch-hitting Gr
   '“If they keep adding pressure on themselves, they’re going to continue to struggle,
   'General Manager Sandy Alderson, Collins and the coaching staff have met about the o
   '“We’re just not driving in any runs,” Collins said. “That’s been the frustrating pa
   'The Mets have a power-hitting team, so asking players to bunt or hit and run would
   '“When you start to change a team that’s built one way and start to make them do som
   'Earlier in the season, the Mets appeared like an all-or-nothing, home-run-driven te
   'In the second inning, Verrett gave up a solo home run to the ex-Met Daniel Murphy.
   '“I felt like I kept us in the game and gave us a chance to come back and win it,” V
   'Verrett was put in this position because of the effects of bone spurs on the Mets’
   'Noah Syndergaard has a smaller and less intrusive bone spur in the back of his righ
   '“As long as I’m staying on my anti-inflammatories and my mechanics are on point, I’
   'For the Mets, the immediate road ahead will be even tougher. Matz was expected to p
```

Procesamiento de datos

Estructura de entrada: Lista de diccionarios, cada diccionario contiene la información de una nota (url: texto, lines: lista de textos)

Procesamiento: Extraer de la URL la fecha (año, mes y día), las categorías, el título codificado y la lista de palabras clave.

```
urls = [note["url"] for note in notes]

urls[:10]
```

```
['URL: http://www.nytimes.com/2016/06/30/sports/baseball/washington-nationals-max-sch
erzer-baffles-mets-completing-a-sweep.html',
 'URL: http://www.nytimes.com/2016/06/30/nyregion/mayor-de-blasios-counsel-to-leave-nex
 'URL: http://www.nytimes.com/2016/06/30/nyregion/three-men-charged-in-killing-of-cuomo
 'URL: http://www.nytimes.com/2016/06/30/nyregion/tekserve-precursor-to-the-apple-store
 'URL: http://www.nytimes.com/2016/06/30/sports/olympics/once-at-michael-phelpss-feet-a
 'URL: http://www.nytimes.com/2016/06/30/sports/olympics/missy-franklin-breaks-through-
 'URL: http://www.nytimes.com/2016/06/30/business/dealbook/lionsgate-is-said-to-be-near
 'URL: http://www.nytimes.com/2016/06/30/nyregion/pool-rules-no-running-no-eating-or-dr
 'URL: http://www.nytimes.com/2016/06/30/sports/basketball/knicks-look-to-young-blood-a
 'URL: http://www.nytimes.com/2016/06/30/nyregion/latest-sign-of-change-in-harlem-its-c
```

```
for note in notes:
    url = note["url"]
    note["link"] = re.sub(r"^URL:\s*", "", url)
    for match in re.findall(r"(\d{4}/\d{2}/\d{2})/(.*)", url):
        date = match[0]
        content = match[1]
        #print(date, content)
        match = re.search("/[\w-]+.html", content)
        left = content[:match.start()]
        right = content[match.start() + 1:]
        #print(left, right)
        categories = left.split("/")
        title = right.replace(".html", "").split("-")
        #print(categories, title)
        note["date"] = date
        year, month, day = tuple(date.split("/"))
        note["at_year"], note["at_month"], note["at_day"] = (int(year), int(month), int
        note["categories"] = categories
        note["main_category"] = categories[0]
        note["title"] = title

def describe_note(note):
    print(note["link"])
    print(note["date"], (note["at_year"], note["at_month"], note["at_day"]))
    print(note["categories"], note["main_category"])
    print(note["title"])

for i in range(0, 5):
    print("-" * 20)
    describe_note(notes[i])
```

```
--------------------
http://www.nytimes.com/2016/06/30/sports/baseball/washington-nationals-max-scherzer-baffles-mets-completing-a-sweep.html
2016/06/30 (2016, 6, 30)
['sports', 'baseball'] sports
['washington', 'nationals', 'max', 'scherzer', 'baffles', 'mets', 'completing', 'a', 'sweep']
--------------------
http://www.nytimes.com/2016/06/30/nyregion/mayor-de-blasios-counsel-to-leave-next-month-to-lead-police-review-board.html
2016/06/30 (2016, 6, 30)
['nyregion'] nyregion
['mayor', 'de', 'blasios', 'counsel', 'to', 'leave', 'next', 'month', 'to', 'lead', 'police', 'review', 'board']
--------------------
http://www.nytimes.com/2016/06/30/nyregion/three-men-charged-in-killing-of-cuomo-administration-lawyer.html
2016/06/30 (2016, 6, 30)
['nyregion'] nyregion
['three', 'men', 'charged', 'in', 'killing', 'of', 'cuomo', 'administration', 'lawyer']
--------------------
http://www.nytimes.com/2016/06/30/nyregion/tekserve-precursor-to-the-apple-store-to-close-after-29-years.html
2016/06/30 (2016, 6, 30)
['nyregion'] nyregion
['tekserve', 'precursor', 'to', 'the', 'apple', 'store', 'to', 'close', 'after', '29', 'years']
--------------------
http://www.nytimes.com/2016/06/30/sports/olympics/once-at-michael-phelpss-feet-and-still-chasing-them.html
2016/06/30 (2016, 6, 30)
['sports', 'olympics'] sports
['once', 'at', 'michael', 'phelpss', 'feet', 'and', 'still', 'chasing', 'them']
```

Procesadores

```
def notes_main_categories():
    return list(set([note["main_category"] for note in notes]))

main_categories = notes_main_categories()

main_categories
```

```
['fashion',
 'realestate',
 'health',
 'education',
 'theater',
 'upshot',
 'automobiles',
 'technology',
 'travel',
 'your-money',
 'dining',
 'style',
 'jobs',
 'nyregion',
 'sports',
 'world',
 't-magazine',
 'movies',
 'science',
 'universal',
 'books',
 'us',
 'pageoneplus',
 'magazine',
 'business',
 'nytnow',
 'insider',
 'arts']
```

```
def notes_by_category(name):
    return list(filter(lambda note: note["main_category"] == name, notes))

for name in main_categories:
    print(name, len(notes_by_category(name)))
```

```
fashion 618
realestate 166
health 78
education 27
theater 145
upshot 130
automobiles 16
technology 232
travel 142
your-money 60
dining 210
style 32
jobs 17
nyregion 663
sports 1268
world 1210
t-magazine 198
movies 126
science 162
universal 8
books 85
us 1199
pageoneplus 70
magazine 156
business 1041
nytnow 70
insider 94
arts 661
```

```
def search_in_note(note, text):
    search = re.split("\s+", text.lower())
    matches = []
    for line in note["lines"]:
        for word in search:
            for match in re.finditer(word, line.lower()):
                start, end = match.span()
                left = line[:start]
                center = line[start:end]
                right = line[end:]
                matches.append((word, start, end, left, right, center, line))
    return matches

search_in_note(notes[0], "Washington")
```

```
[('washington',
  0,
  10,
  '',
  ' — Stellar pitching kept the Mets afloat in the first half of last season despite th
  'WASHINGTON',
  'WASHINGTON — Stellar pitching kept the Mets afloat in the first half of last season
 ('washington',
  28,
  38,
  'Wednesday’s 4-2 loss to the ',
  ' Nationals was cruel for the already-limping Mets. Pitching in Steven Matz’s place,
  'Washington',
  'Wednesday’s 4-2 loss to the Washington Nationals was cruel for the already-limping M
```

```
def search_in_note_text(note, text):
    search = re.split("\s+", text)
    matches = []
    for line in note["lines"]:
        match = re.search(text, line)
        if match:
            start, end = match.span()
            left = line[:start]
            center = line[start:end]
            right = line[end:]
            matches.append((text, start, end, left, right, center, line))
    return matches

search_in_note_text(notes[0], "Mets afloat")
```

```
[('Mets afloat',
  39,
  50,
  'WASHINGTON — Stellar pitching kept the ',
  ' in the first half of last season despite their offensive woes. But they cannot prod
  'Mets afloat',
  'WASHINGTON — Stellar pitching kept the Mets afloat in the first half of last season
```

```
def search_in_notes(notes, text, mode="word"):
    notes_filtered = []
    for note in notes:
        if mode == "text":
            matches = search_in_note_text(note, text)
        elif mode == "word":
            matches = search_in_note(note, text)
        if len(matches) > 0:
            notes_filtered.append((note, matches))
    return notes_filtered

notes_trump, notes_trump_matches = zip(*search_in_notes(notes_by_category("us"), "tru
mp"))

print("Notes about Trump", len(notes_trump))

for note in notes_trump[:5]:
    print("-" * 20)
    describe_note(note)
```

```
Notes about Trump 497
--------------------
http://www.nytimes.com/2016/06/30/us/politics/huma-abedin-hillary-clinton-emails.html
2016/06/30 (2016, 6, 30)
['us', 'politics'] us
['huma', 'abedin', 'hillary', 'clinton', 'emails']
--------------------
http://www.nytimes.com/2016/06/30/us/politics/bernie-sanders.html
2016/06/30 (2016, 6, 30)
['us', 'politics'] us
['bernie', 'sanders']
--------------------
http://www.nytimes.com/2016/06/30/us/politics/jay-faison-republicans-elections-climat
e-change.html
2016/06/30 (2016, 6, 30)
['us', 'politics'] us
['jay', 'faison', 'republicans', 'elections', 'climate', 'change']
--------------------
http://www.nytimes.com/2016/06/30/us/politics/donald-trump-us-chamber-of-commerce-tra
de.html
2016/06/30 (2016, 6, 30)
['us', 'politics'] us
['donald', 'trump', 'us', 'chamber', 'of', 'commerce', 'trade']
--------------------
http://www.nytimes.com/2016/06/30/us/politics/bill-clinton-mark-cuban.html
2016/06/30 (2016, 6, 30)
['us', 'politics'] us
['bill', 'clinton', 'mark', 'cuban']
```

```
def notes_timeline(notes):
    timeline = {}
    years = list(set([note["at_year"] for note in notes]))
    for year in years:
        notes_in_year = list(filter(lambda note: note["at_year"] == year, notes))
        months = list(set([note["at_month"] for note in notes_in_year]))
        for month in months:
            notes_in_month = list(filter(lambda note: note["at_month"] == month, notes_
            days = list(set([note["at_day"] for note in notes_in_month]))
            for day in days:
                notes_in_day = list(filter(lambda note: note["at_day"] == day, notes_in
                date = "{:04d}/{:02d}/{:02d}".format(year, month, day)
                #print(date)
                timeline[date] = notes_in_day
    return timeline

notes_trump_timeline = notes_timeline(notes_trump)

count = 0
for date in notes_trump_timeline:
    if count > 5:
        continue
    notes_in_date = notes_trump_timeline[date]
    print(date)
    print("-" * 10)
    for note in notes_in_date:
        print(note["link"])
        count += 1
    print()
```

```
2016/04/18
----------
http://www.nytimes.com/2016/04/18/us/politics/donald-trump-delegates-new-york.html
http://www.nytimes.com/2016/04/18/us/politics/ted-cruz-conservative.html
http://www.nytimes.com/2016/04/18/us/politics/battle-for-senate.html

2016/04/19
----------
http://www.nytimes.com/2016/04/19/us/carnivals-maiden-voyage-to-cuba-draws-ire-and-bi
as-charges.html
http://www.nytimes.com/2016/04/19/us/politics/pressure-on-donald-trump-and-hillary-cl
inton-to-shine-at-home.html
http://www.nytimes.com/2016/04/19/us/politics/potential-gop-convention-fight-puts-old
er-hands-in-sudden-demand.html
http://www.nytimes.com/2016/04/19/us/panel-would-make-insurers-help-contain-rising-dr
ug-costs.html
http://www.nytimes.com/2016/04/19/us/politics/donald-trump-central-park-south.html
http://www.nytimes.com/2016/04/19/us/politics/new-york-primary-trump-clinton-sanders.
html
http://www.nytimes.com/2016/04/19/us/politics/supreme-court-immigration.html
```

```
def note_extract_actors(note):
    actors = []
    for line in note["lines"]:
        for match in re.finditer("[A-Z][a-z'']+(\s+[A-Z][a-z'']+)*", line):
            actors.append(match.group(0))
    return list(set(actors))

trump_actors = []

for date in notes_trump_timeline:
    notes_in_date = notes_trump_timeline[date]
    for note in notes_in_date:
        note["actors"] = note_extract_actors(note)
        trump_actors.extend(note["actors"])

count = 0
for date in notes_trump_timeline:
    if count > 5:
        continue
    notes_in_date = notes_trump_timeline[date]
    print(date)
    print("-" * 10)
    for note in notes_in_date:
        count += 1
        print(note["link"])
        print(note["actors"][:10], "...")
    print()

trump_actors = list(set(trump_actors))

trump_actors = list(zip(trump_actors, map(lambda actor: len(actor), trump_actors)))

trump_actors.sort(reverse=True, key=lambda t: t[1])
```

```
2016/04/18
----------
http://www.nytimes.com/2016/04/18/us/politics/donald-trump-delegates-new-york.html
['Boeing', 'Brownsville', 'Sunday', 'During', 'And', 'Obama', 'In Mount Vernon', 'In
Brownsville', 'Baptist', 'Donald'] ...
http://www.nytimes.com/2016/04/18/us/politics/ted-cruz-conservative.html
['Texas', 'Frank Capra', 'Princeton University', 'Yet', 'There's', 'George', 'Barry G
oldwater', 'Being', 'And', 'Frank'] ...
http://www.nytimes.com/2016/04/18/us/politics/battle-for-senate.html
['She', 'Former Representative Tom Davis', 'In', 'Republicans', 'Reid', 'Joe Heck', '
Garland', 'But', 'There', 'President Obama's Supreme Court'] ...

2016/04/19
----------
http://www.nytimes.com/2016/04/19/us/carnivals-maiden-voyage-to-cuba-draws-ire-and-bi
as-charges.html
['She', 'Doral', 'In', 'Republicans', 'Tunisia', 'As', 'Americans', 'Last', 'Francisc
o Marty', 'In Miami'] ...
http://www.nytimes.com/2016/04/19/us/politics/pressure-on-donald-trump-and-hillary-cl
inton-to-shine-at-home.html
['Hillary Clinton', 'Tuesday', 'After', 'Texas', 'New York', 'Polls', 'There', 'Schen
ectady', 'Queens', 'But Donald'] ...
http://www.nytimes.com/2016/04/19/us/politics/potential-gop-convention-fight-puts-old
er-hands-in-sudden-demand.html
['Texas', 'Paul Manafort', 'John Kasich's', 'And', 'Cleveland', 'Rockefeller', 'That'
, 'Manafort', 'Maison Blanche', 'Those'] ...
http://www.nytimes.com/2016/04/19/us/panel-would-make-insurers-help-contain-rising-dr
ug-costs.html
['Hillary Clinton', 'She', 'Allyson Funk', 'Clare Krusing', 'The Obama', 'As', 'Dal',
 'But', 'Americans', 'July'] ...
http://www.nytimes.com/2016/04/19/us/politics/donald-trump-central-park-south.html
['She', 'Now', 'In', 'New York', 'Barbizon Plaza Hotel', 'Grand Hyatt New York', 'As'
, 'Rockettes', 'Grand Central Terminal', 'But'] ...
http://www.nytimes.com/2016/04/19/us/politics/new-york-primary-trump-clinton-sanders.
html
['Tuesday', 'Sunday', 'Finally', 'New York Times', 'And', 'Western New York', 'Donald
', 'Maryland', 'Staten Island', 'Vermont'] ...
http://www.nytimes.com/2016/04/19/us/politics/supreme-court-immigration.html
['Chief Justice Roberts', 'Texas', 'Republicans', 'In', 'Keller', 'But', 'Parents', '
Americans', 'Solicitor General Donald', 'But Justice Elena Kagan'] ...
```

```
trump_senators = [actor for actor, size in trump_actors if re.search("^senator\s", ac
tor.lower())]

trump_senators[:10]
```

```
['Senator Shelley Moore Capito',
 'Senator Sheldon Whitehouse',
 'Senator Kirsten Gillibrand',
 'Senator Richard Blumenthal',
 'Senator Bernie Sanders's',
 'Senator Elizabeth Warren',
 'Senator Dianne Feinstein',
 'Senator Everett Dirksen',
 'Senator Lamar Alexander',
 'Senator Barry Goldwater']
```

```
trump_senators_rate = [len(search_in_notes(notes_trump, senator.replace("Senator ", "
"), mode="text")) for senator in trump_senators]

trump_senators_rate[:10]
```

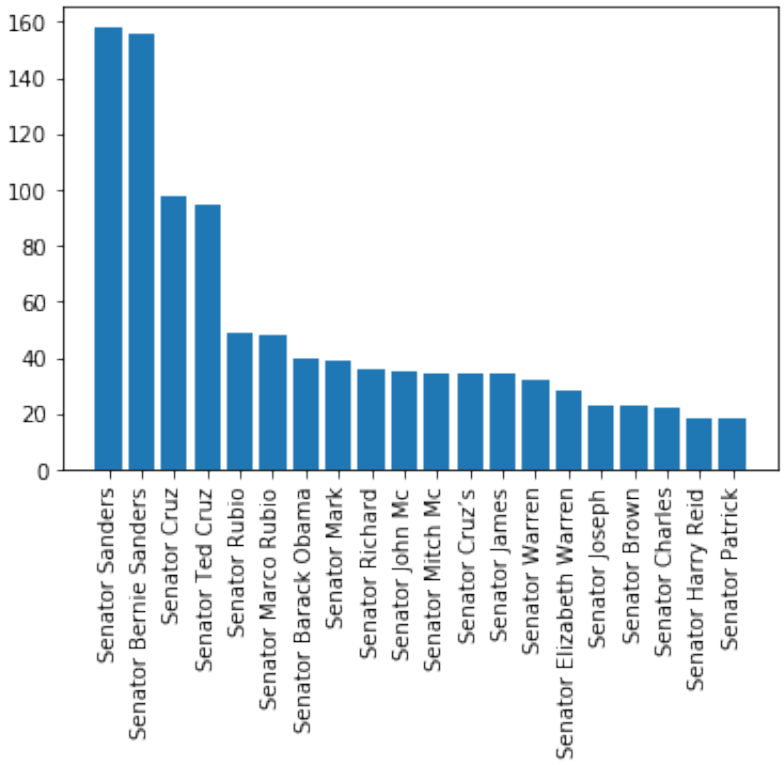
```
[2, 1, 1, 2, 7, 28, 8, 1, 3, 10]
```

```
trump_top_senators = list(zip(trump_senators, trump_senators_rate))

trump_top_senators.sort(reverse=True, key=lambda t: t[1])

trump_top_senators[:5]
```

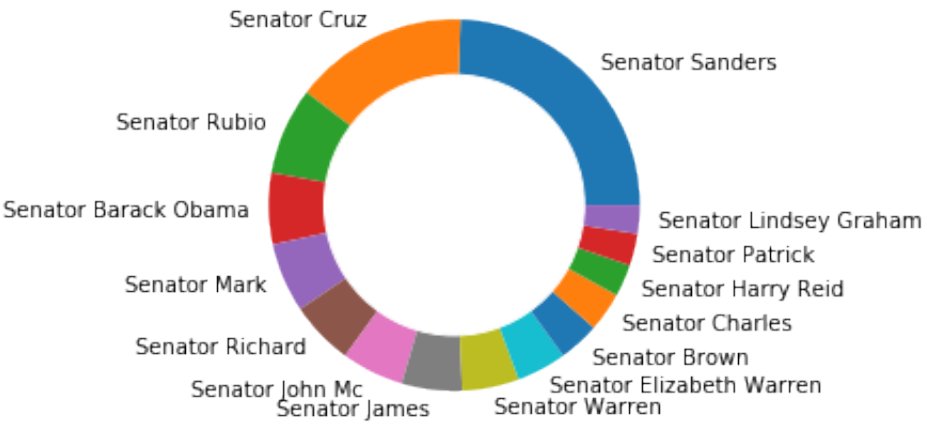
```
[('Senator Sanders', 158),
 ('Senator Bernie Sanders', 156),
 ('Senator Cruz', 98),
 ('Senator Ted Cruz', 95),
 ('Senator Rubio', 49)]
```

Visualización de datos

```
import matplotlib.pyplot as plt

x, y = zip(*trump_top_senators)

plt.bar(x[:20], y[:20])
plt.xticks(rotation="vertical")

plt.show()
```



```
senators_raw, rate_raw = zip(*trump_top_senators)

ix = [0, 2, 4, 6, 7, 8, 9, 12, 13, 14, 16, 17, 18, 19, 20]

senators = [senators_raw[i] for i in ix]
rate = [rate_raw[i] for i in ix]

weights = rate
labels = senators

plt.pie(weights, labels=labels)

my_circle=plt.Circle( (0,0), 0.7, color="white")

p = plt.gcf()
p.gca().add_artist(my_circle)

plt.show()
```



Automatización de datos

Tabla de datos

```
import pandas as pd

df = pd.DataFrame(list(zip(trump_senators, trump_senators_rate)), columns=["Senator",
 "Rate"])

df = df.sort_values(by=["Rate"], ascending=False)

df.head(10)
```

	Senator	Rate
76	Senator Sanders	158
12	Senator Bernie Sanders	156
89	Senator Cruz	98
68	Senator Ted Cruz	95
84	Senator Rubio	49
40	Senator Marco Rubio	48
26	Senator Barack Obama	40
87	Senator Mark	39
74	Senator Richard	36
72	Senator John Mc	35

Exportación a excel

```
writer = pd.ExcelWriter("trump_senators.xlsx", engine="xlsxwriter")

df.to_excel(writer, sheet_name="Senators Rate")

writer.save()
```

Reporte PDF

```
! pip install reportlab
```

```
Requirement already satisfied: reportlab in /Users/dragon/anaconda3/lib/python3.7/sit
e-packages (3.5.55)
Requirement already satisfied: pillow>=4.0.0 in /Users/dragon/anaconda3/lib/python3.7
/site-packages (from reportlab) (5.4.1)
```

```
! pip show reportlab
```

```
Name: reportlab
Version: 3.5.55
Summary: The Reportlab Toolkit
Home-page: http://www.reportlab.com/
Author: Andy Robinson, Robin Becker, the ReportLab team and the community
Author-email: reportlab-users@lists2.reportlab.com
License: BSD license (see license.txt for details), Copyright (c) 2000-2018, ReportLa
b Inc.
Location: /Users/dragon/anaconda3/lib/python3.7/site-packages
Requires: pillow
Required-by: svglib
```

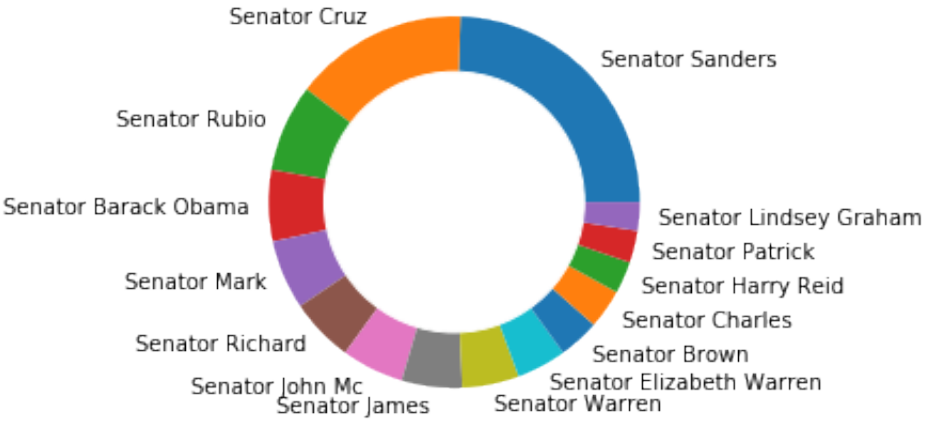
```
! pip install svglib
```

```
Requirement already satisfied: svglib in /Users/dragon/anaconda3/lib/python3.7/site-p
ackages (1.0.1)
Requirement already satisfied: reportlab in /Users/dragon/anaconda3/lib/python3.7/sit
e-packages (from svglib) (3.5.55)
Requirement already satisfied: cssselect2>=0.2.0 in /Users/dragon/anaconda3/lib/pytho
n3.7/site-packages (from svglib) (0.4.1)
Requirement already satisfied: lxml in /Users/dragon/anaconda3/lib/python3.7/site-pac
kages (from svglib) (4.3.2)
Requirement already satisfied: tinycss2>=0.6.0 in /Users/dragon/anaconda3/lib/python3
.7/site-packages (from svglib) (1.1.0)
Requirement already satisfied: pillow>=4.0.0 in /Users/dragon/anaconda3/lib/python3.7
/site-packages (from reportlab->svglib) (5.4.1)
Requirement already satisfied: webencodings in /Users/dragon/anaconda3/lib/python3.7/
site-packages (from cssselect2>=0.2.0->svglib) (0.5.1)
```

```
! pip show svglib
```

```
Name: svglib
Version: 1.0.1
Summary: A pure-Python library for reading and converting SVG
Home-page: https://github.com/deeplook/svglib
Author: Dinu Gherman
Author-email: gherman@darwin.in-berlin.de
License: LGPL 3
Location: /Users/dragon/anaconda3/lib/python3.7/site-packages
Requires: tinycss2, cssselect2, reportlab, lxml
Required-by:
```

```
import matplotlib.pyplot as plt
from io import BytesIO
from reportlab.pdfgen import canvas
from reportlab.graphics import renderPDF
from svglib.svglib import svg2rlg

senators_raw, rate_raw = zip(*trump_top_senators)

ix = [0, 2, 4, 6, 7, 8, 9, 12, 13, 14, 16, 17, 18, 19, 20]

senators = [senators_raw[i] for i in ix]
rate = [rate_raw[i] for i in ix]

weights = rate
labels = senators

plt.pie(weights, labels=labels)

my_circle=plt.Circle( (0,0), 0.7, color="white")

p = plt.gcf()
p.gca().add_artist(my_circle)

imgdata = BytesIO()
plt.savefig(imgdata, format="svg")
imgdata.seek(0)

drawing = svg2rlg(imgdata)

pdf = canvas.Canvas("Trump report.pdf")

renderPDF.draw(drawing, pdf, 10, 300)
pdf.drawString(210, 640, "Trump Report - Senator Rating")

pdf.showPage()

pdf.save()
```


Senator Cruz
Senator Sanders
Senator Rubio
Senator Barack Obama
Senator Lindsey Graham
Senator Patrick
Senator Harry Reid
Senator Mark
Senator Charles
Senator Richard
Senator Brown
Senator Elizabeth Warren
Senator John Mc
Senator James
Senator Warren