stylo

June 7, 2019

0.1 Exploration of Stylometry Algorithms

Based on the Programming Historian guide here

0.1.1 Data

The class corpus. TODO: fill in more detail here. Also, we focus on the Eddard and Joffrey authored texts later. These refer to Muller's and Trump's tweets respectively.

[1]:
```
import os
```

[2]:
```
os.getcwd()
```

[2]:
```
'/Users/ratan/personal/ms/dhsi/data/class_corpus'
```

0.1.2 Get Corpus Metadata

- All texts are in files names `<author>_<name>.txt`
- Extract this author name and filename from this list

[159]:
```
def get_all():
    for filename in filter(lambda x: not x.startswith('.'), os.
 ↪listdir('corpus')):
        with open(os.path.join('corpus', filename), 'r') as f:
            yield (filename, "\n".join(f))
```

[160]:
```
all_files = dict(get_all())
```

0.1.3 Tokenize And Count

- Tokenize the texts in the corpus
- Get the frequency distribution of the word counts

[5]:
```
import nltk
%matplotlib inline
```

[93]:
```
tokens_by_filename = dict()
token_sizes_by_filename = dict()
for key in all_files:
    tokens = nltk.word_tokenize(all_files[key])
```

```
    token_sizes_by_filename[key] = [len(t) for t in tokens if any(c.isalpha()␣
↪for c in t)]
    tokens_by_filename[key] = [t for t in tokens if any(c.isalpha() for c in t)]
```

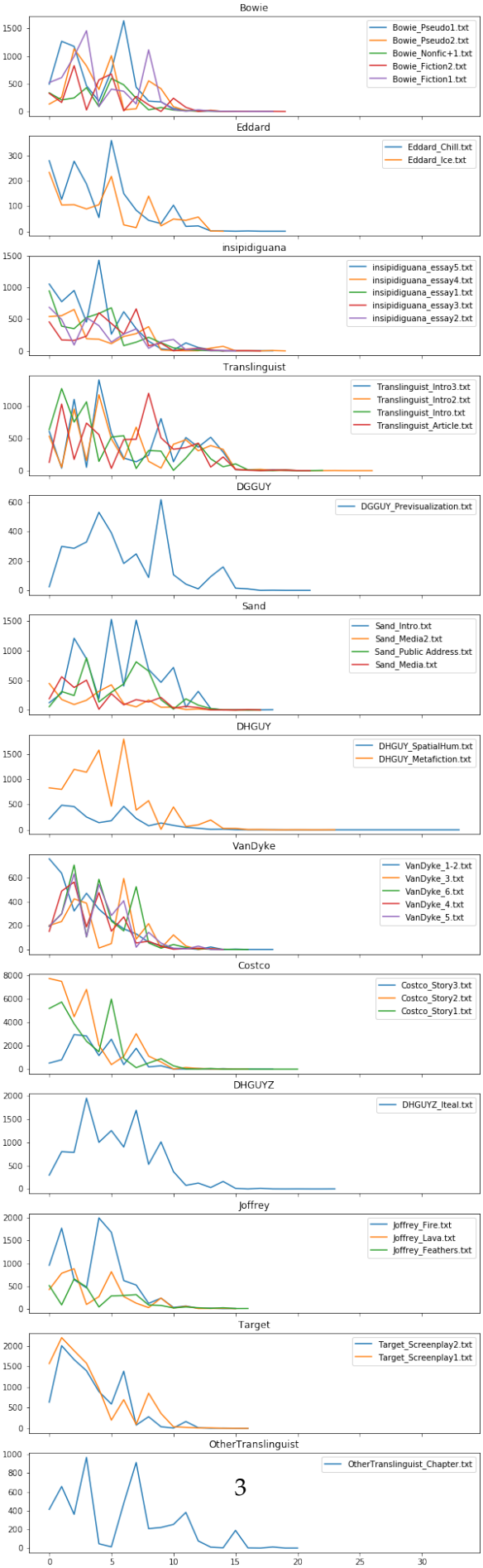
[86]:
```
filenames_by_author = dict()
for k in all_files:
    if filenames_by_author.get(k.split('_')[0]):
        filenames_by_author[k.split('_')[0]].append(k)
    else:
        filenames_by_author[k.split('_')[0]] = [k]
```

0.1.4 Meddenhall's Characteristic Curves of Composition

Plot the frequency distribution of word lengths.

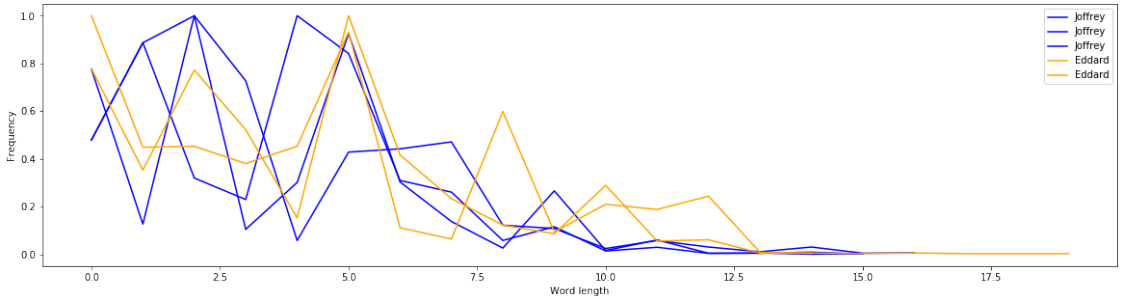
Are word lengths characteristic of composers/composition?

[161]:
```
import matplotlib.pyplot as plt
import numpy as np

num_authors = 3

from random import shuffle

all_authors = list(filenames_by_author.keys())

fig, axes = plt.subplots(
    len(all_authors), 1,
    figsize=(10, 35),
    sharex=True)

for i, (ax, author) in enumerate(zip(axes, all_authors)):
    for title in filenames_by_author[author]:
        xy = np.array(list(enumerate(
            nltk.FreqDist(token_sizes_by_filename[title]).values())))
        x=xy[:, 0]
        y=xy[:, 1]
        ax.plot(x, y, label=title)
        ax.legend()
        ax.set_title(author)
```


Bowie
Bowie_Pseudo1.txt
Bowie_Pseudo2.txt
Bowie_Nonfic+1.txt
Bowie_Fiction2.txt
Bowie_Fiction1.txt
Eddard
Eddard_Chill.txt
Eddard_Ice.txt
insipidiguana
insipidiguana_essay5.txt
insipidiguana_essay4.txt
insipidiguana_essay1.txt
insipidiguana_essay3.txt
insipidiguana_essay2.txt
Translinguist
Translinguist_Intro3.txt
Translinguist_Intro2.txt
Translinguist_Intro.txt
Translinguist_Article.txt
DGGUY
DGGUY_Previsualization.txt
Sand
Sand_Intro.txt
Sand_Media2.txt
Sand_Public Address.txt
Sand_Media.txt
DHGUY
DHGUY_SpatialHum.txt
DHGUY_Metafiction.txt
VanDyke
VanDyke_1-2.txt
VanDyke_3.txt
VanDyke_6.txt
VanDyke_4.txt
VanDyke_5.txt
Costco
Costco_Story3.txt
Costco_Story2.txt
Costco_Story1.txt
DHGUYZ
DHGUYZ_Iteal.txt
Joffrey
Joffrey_Fire.txt
Joffrey_Lava.txt
Joffrey_Feathers.txt
Target
Target_Screenplay2.txt
Target_Screenplay1.txt
OtherTranslinguist
OtherTranslinguist_Chapter.txt

[162]:
```
joffrey_and_eddard_files = [('Joffrey', 'blue'), ('Eddard', 'orange')]

fig, ax = plt.subplots(1,1,figsize=(20,5))

for (author, color) in joffrey_and_eddard_files:
    for file in filenames_by_author[author]:
        xy = np.array(list(enumerate(
            nltk.FreqDist(token_sizes_by_filename[file]).values())))
        x=xy[:, 0]
        y=xy[:, 1]
        y = y / np.max(y)
        ax.plot(x, y, label=author, color=color)
        ax.set_xlabel('Word length')
        ax.set_ylabel('Frequency')

ax.legend()
```

[162]:
```
<matplotlib.legend.Legend at 0x12cd326d8>
```



0.1.5 Kilgariff's Chi-Squared Method

Text similarity characterized by chi-square distance between word count frequencies (normalized by total word count).

[163]:
```
def joint_vocabulary(authors, size=500):
    tokens = []
    for author in authors:
        for file in filenames_by_author[author]:
            tokens += tokens_by_filename[file]
    vocab = nltk.FreqDist(tokens)
    return vocab

interesting_authors = ['Joffrey', 'Eddard']
voc = joint_vocabulary(interesting_authors, 500)
```

[164]:
```
distribution_in_full_corpus = voc.most_common(500)
codebook = [i for (i, _) in distribution_in_full_corpus]
```

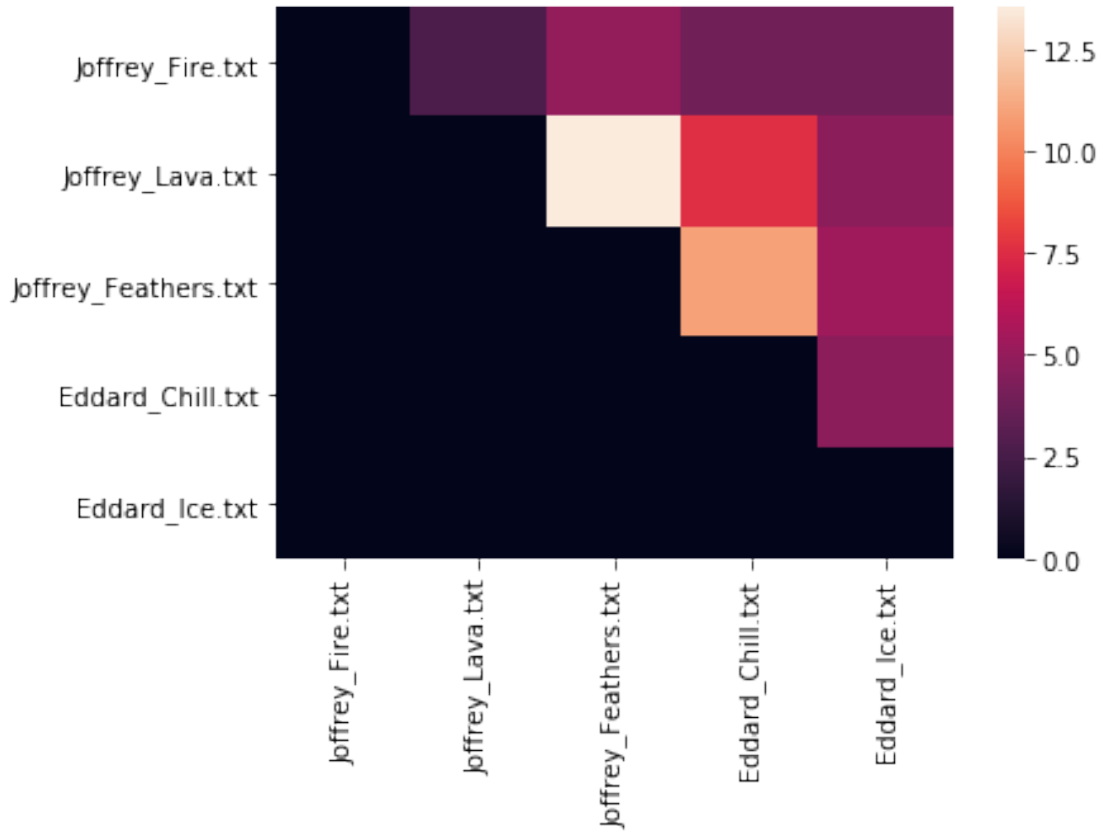
[165]:
```
def feature_vector(title, codebook_):
    tokens = tokens_by_filename[title]
    freq_dist = nltk.FreqDist(tokens)
    total_tokens = len(tokens)
    for tok in codebook_:
        yield freq_dist[tok]/total_tokens if freq_dist[tok] > 0 else 0.01
```

[166]:
```
feature_vectors = dict()

for author in interesting_authors:
    for title in filenames_by_author[author]:
        feature_vectors[title] = list(feature_vector(title, codebook))
```

[167]:
```
import scipy

csqs = np.zeros((len(list(feature_vectors.keys())),
                 len(list(feature_vectors.keys()))))
for i, x_title in enumerate(feature_vectors):
    for j, y_title in enumerate(feature_vectors):
        fv1 = feature_vectors[x_title]
        fv2 = feature_vectors[y_title]
        csq, _ = scipy.stats.chisquare(fv1, fv2)
        csqs[i, j] = csq
```

[168]:
```
import seaborn as sns

sns.heatmap(np.triu(csqs),
            xticklabels=list(feature_vectors.keys()),
            yticklabels=list(feature_vectors.keys()))
```

[168]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x12ce82908>
```



0.1.6 Conclusion

- Mendenhall's Curves:
  - show a distinction between Trump's speeches and tweets.
  - do not show much of difference between Trump and Muller's texts
  - problematic because asessing curve symmetry is subjective
- Kilgariff's Method:
  - provides an easy way to compare
  - doesn't seem very effective at distinguishing authors

[ ]: