02 - Extra Data Preprocessing

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1 EA Assignment 02 - Data Preprocessing

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Warning: this Jupyter Notebook is a followup of the one available in `research/02 - Data Preprocessing` so on this just contains some extra features that have already been implemented in the previous Notebook, so on, the complete Data Preprocessing Notebook is the previous one.

1.1 Loading Initial Preprocessed Data

[1]:
```
import json

data = list()

with open('PreProcessedDocuments.jsonl', 'r') as f:
    for line in f.readlines():
        data.append(json.loads(line))
```

[2]:
```
import pandas as pd

data = pd.DataFrame(data)
data.head()
```

[2]:
```
  lang    context                                    preprocessed_text
0   en  wikipedia  watchmen twelve issue comic book limited serie…
1   en  wikipedia  citigroup center formerly citicorp center one …
2   en  wikipedia  birth_place death_date death_place party conse…
3   en  wikipedia  marbod maroboduus born died king marcomanni no…
4   en  wikipedia  sylvester medal bronze medal awarded every thr…
```

1.2 Finding Additional Stopwords using TF-IDF

Since we are handling documents from different contexts and different languages, we need to identify the stopwords for each unique pair of them so as to apply a TF-IDF Vectorizer so as to get the top terms and manually identify which of them are stopwords so as to include them into the Stopword Removal process of the `CustomPreProcessor`.

We start calculating all the possible combinations of context and language, so as to get to know how many TF-IDF Vectorizers we need to fit, since we will be using the tagged samples so as to detect stopwords for each context, trying not to drop words relevant in one context but irrelevant in another.

[3]:

```
combinations = data[['lang', 'context']].drop_duplicates()
combinations
```

[3]:

```
      lang            context
0       en          wikipedia
4000    es          wikipedia
8000    fr          wikipedia
13588   en  conference_papers
13951   fr  conference_papers
14193   en                apr
17733   fr                apr
20100   en              pan11
21847   es              pan11
```

Once we calculate all the possible unique context-lang combinations, we can proceed to apply the `sklearn.feature_extraction.text.TfidfVectorizer` over each slice of data using the preprocessed texts so as to later plot them as a bar plot with the words frequencies. For plotting we will be using both Python libraries: `matplotlib` and `seaborn`, as already mentioned in other Jupyter Notebooks.

[4]:

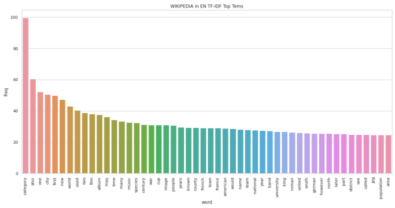
```
from sklearn.feature_extraction.text import TfidfVectorizer
```

[5]:

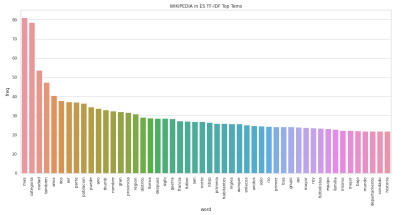
```
import matplotlib.pyplot as plt
%matplotlib inline

import seaborn as sns
sns.set(style='whitegrid')
```

[6]:

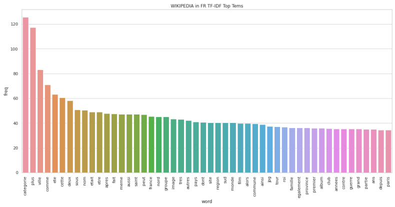
```
fig = plt.figure(figsize=(15,8*len(combinations)));

total_top_words = list()

for idx, (index, row) in enumerate(combinations.iterrows()):
    texts = data[(data['lang'] == row['lang']) & (data['context'] ==␣
 ↪row['context'])]['preprocessed_text']

    vect = TfidfVectorizer(min_df=5)
    sparse_mat = vect.fit_transform(texts)

    aux = pd.DataFrame(sparse_mat.sum(axis=0).T, columns=['freq'])
    aux['word'] = vect.get_feature_names()
    aux = aux.sort_values(by='freq', ascending=False)

    total_top_words += aux[:50]['word'].tolist()

    plt.subplot(len(combinations), 1, idx+1);
    plt.title(f"{row['context'].upper()} in {row['lang'].upper()} TF-IDF Top␣
 ↪Tems");
    chart = sns.barplot(x='word', y='freq', data=aux[:50]);
    chart.set_xticklabels(chart.get_xticklabels(), rotation=90);

fig.tight_layout();
```



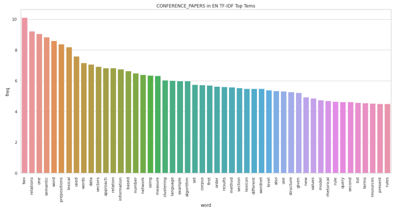
WIKIPEDIA in EN TF-IDF Top Tems



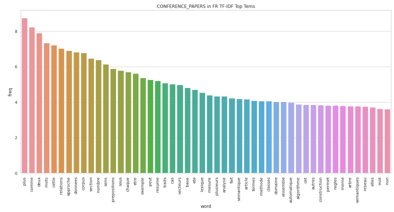
WIKIPEDIA in ES TF-IDF Top Tems



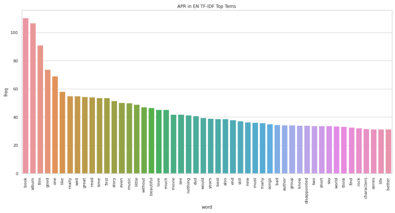
WIKIPEDIA in FR TF-IDF Top Tems



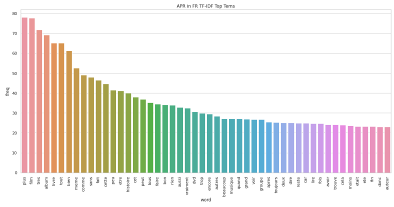
CONFERENCE_PAPERS in EN TF-IDF Top Tems



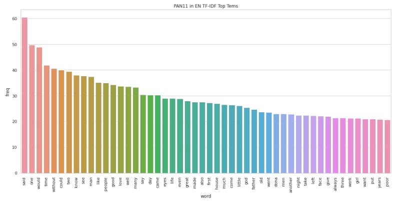
CONFERENCE_PAPERS in FR TF-IDF Top Tems



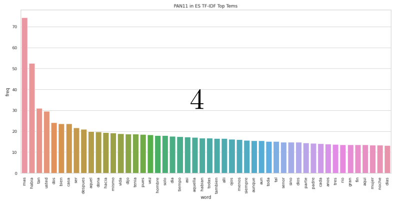
APR in EN TF-IDF Top Tems



APR in FR TF-IDF Top Tems



PAN11 in EN TF-IDF Top Tems



PAN11 in ES TF-IDF Top Tems

[7]:

```
from collections import Counter

total_top_words = Counter(total_top_words)
total_top_words = {key: value for key, value in total_top_words.items() if␣
 ↪value > 1}
```

So on, once we plotted all the top TF-IDF terms for every possible context-lang combination, we will just manually select which of those words are considered stopwords, so as to generate a listing which will be included in the `research/02 - Data Preprocessing.ipynb` Jupyter Notebook, into the `CustomPreProcessor` defined.

[8]:

```
ADDITIONAL_STOPWORDS = [
    'category', 'also', 'one', 'new', 'first', 'two', # Wikipedia English
    'mas', 'categoria', 'tambien', 'thumb', 'solo', 'asi', 'tras', # Wikipedia␣
 ↪Spanish
    # Wikipedia French
    'two', 'one', 'first', 'also', 'new', # Conference Papers English
    # Conference Papers French
    'one', 'well', 'even', 'also', 'still', 'would', 'two'# APR English
    # APR French
    'one', 'would', 'without', 'could', 'like', 'many', 'well', 'even', 'also',␣
 ↪'first', 'much', 'went', 'three', # PAN11 English
    'mas', 'tan', 'dos', 'despues', 'aquel', 'hacia', 'pues', 'asi', 'aquella',␣
 ↪'tambien', 'tal', 'tres', 'aqui' # PAN11 Spanish
]

len(ADDITIONAL_STOPWORDS)
```

[8]:

```
50
```

[9]:

```
ADDITIONAL_STOPWORDS = list(set(ADDITIONAL_STOPWORDS))
len(ADDITIONAL_STOPWORDS)
```

[9]:

```
35
```

[10]:

```
print(ADDITIONAL_STOPWORDS)
```

```
['tal', 'many', 'mas', 'without', 'category', 'three', 'twoone', 'dos', 'could',
'thumb', 'still', 'one', 'despues', 'new', 'aquella', 'much', 'asi', 'two',
'also', 'pues', 'would', 'even', 'aquel', 'tras', 'well', 'tres', 'categoria',
'tambien', 'went', 'tan', 'hacia', 'aqui', 'like', 'first', 'solo']
```