DNS lab
Data and Network Science Lab

UFAM

Análise de Sentimento em Redes Sociais Utilizando Scikit-learn+NLTK

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DNS lab - Pesquisadores

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Contextualização

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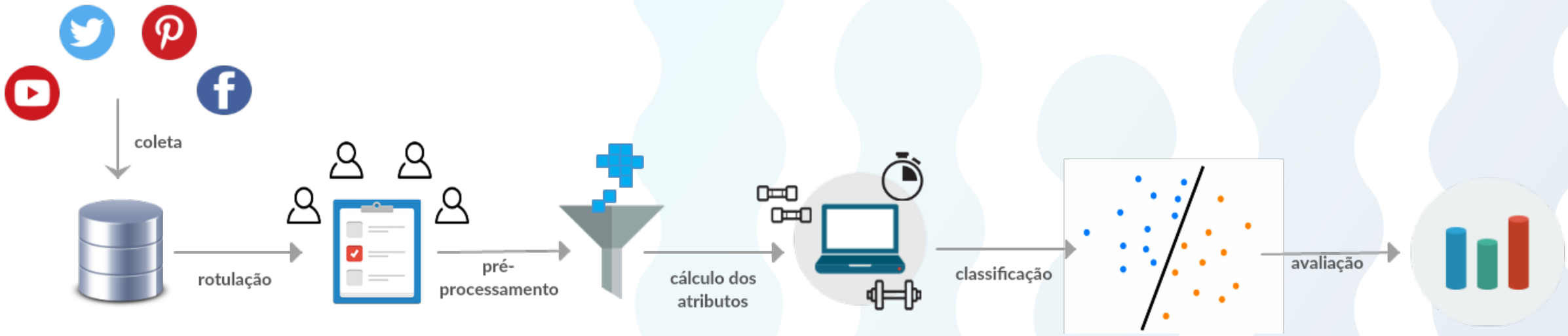
Aprendizagem de Máquina Supervisionada

"Um conjunto de exemplos de **treinamento** com as **respostas corretas** (alvos) é fornecido e, com base neste conjunto de treinamento, o algoritmo geral consegue responder corretamente a todas as entradas possíveis." (Herbrich e Graepel, 2014)

Arquitetura Clássica de Aprendizagem Supervisionada



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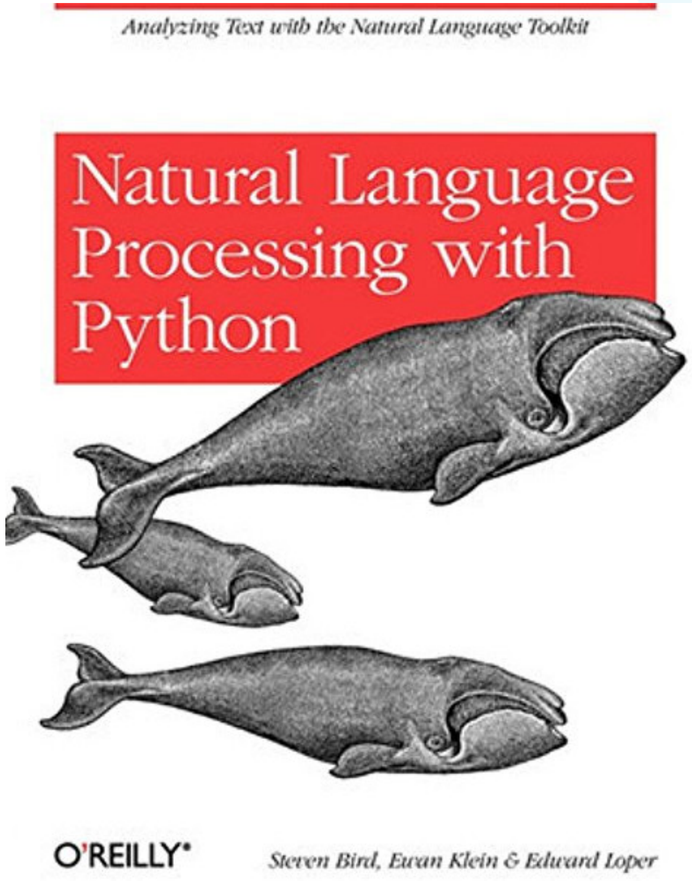
Natural Language Toolkit - NLTK



- Atualmente na **versão 3.4.2**;
- Torna ágil operações como ***tokenization***, ***stemming***, ***lemmatization***;
- Possui implementações de métodos supervisionados e de Reconhecimento de Entidade Nomeda;

NLTK: Pré-Processamento

```
list_docs = []
list_label = []

with open('dataset_foursquare_tips.csv') as csvfile:
    dataset = csv.reader(csvfile, delimiter=',')
    for line in dataset:
        # pre-precess considering words
        tips_text = remove_ulr_corpus(line[0])
        tips_text = remove_mention_corpus(tips_text)
        tips_text = tokenize_words_corpus(tips_text)
        tips_text = remove_stopwords_corpus(tips_text)
        document = ' '.join(tips_text)

        list_docs.append(document)
        list_label.append(line[1])
```

NLTK: Pré-Processamento

```
list_docs = []
list_label = re.sub(r'^https?:\/\/.*[\r\n]*', '', text)

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```

```
re.sub(r'@\w+ ?','',text)
```

NLTK: Pré-Processamento

```python
from nltk.tokenize import RegexpTokenizer
from nltk.corpus import stopwords

def tokenize_words_corpus(text):
    tokenizer = RegexpTokenizer(r'\w+')
    tokens = tokenizer.tokenize(text)
    return tokens


from nltk.stem import RSLPStemmer
from nltk.tokenize import word_tokenize

def tokenize_words_corpus(text):
    tokens = word_tokenize(text)
    porter =  RSLPStemmer()
    tokens = [porter.stem(t) for t in tokens]
    tokens = [t for t in tokens
                    if len(t)> 2 and not t.isdigit()]
    return tokens
```

NLTK: Pré-Processamento

```python
from nltk.corpus import stopwords

def remove_stopwords_corpus(tip_text):
    content = []
    for word in tip_text:
        if word.lower().strip() not in stopwords.words('portuguese'):
            content.append(word.lower().strip())
    return content

```

NLTK: Pré-Processamento

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2  list_label = []
3
4  with open('dataset_foursquare_tips.csv') as csvfile:
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11         tips_text = remove_stopwords_corpus(tips_text)
12         document = ' '.join(tips_text)
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14         list_docs.append(document)
15         list_label.append(line[1])
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Scikit-learn

- Atualmente na **versão 0.19 (julho 17)**;
- Está integrado com o **SciPy + NumPy**;
- Contém métodos de classificação, regressão, agrupamento...e muito mais!;

Scikit-learn

```
from sklearn.model_selection import StratifiedKFold, cross_val_predict
from sklearn.neighbors import KNeighborsClassifier
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.metrics import recall_score,precision_score,f1_score

#data representation
vectorizer = TfidfVectorizer(use_idf=True, sublinear_tf=False)
X = vectorizer.fit_transform(list_docs)
Y = list_label

#text classifier
knn = KNeighborsClassifier(n_neighbors=5)

#training
stratified_fold = StratifiedKFold(n_splits=10, shuffle=True)
predict_list = cross_val_predict(knn, X,Y, cv = stratified_fold)

#evaluate training performance
precision = precision_score(Y, predict_list, average=None)
recall = recall_score(Y, predict_list, average=None)
f1 = f1_score(Y, predict_list, average=None)
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$$w_{i,j} = \begin{cases} (1 + \log f_{i,j}) \times \log \frac{N}{n_i} & \text{se } f_{i,j} > 0 \\ 0 & \text{caso contrário} \end{cases}$$

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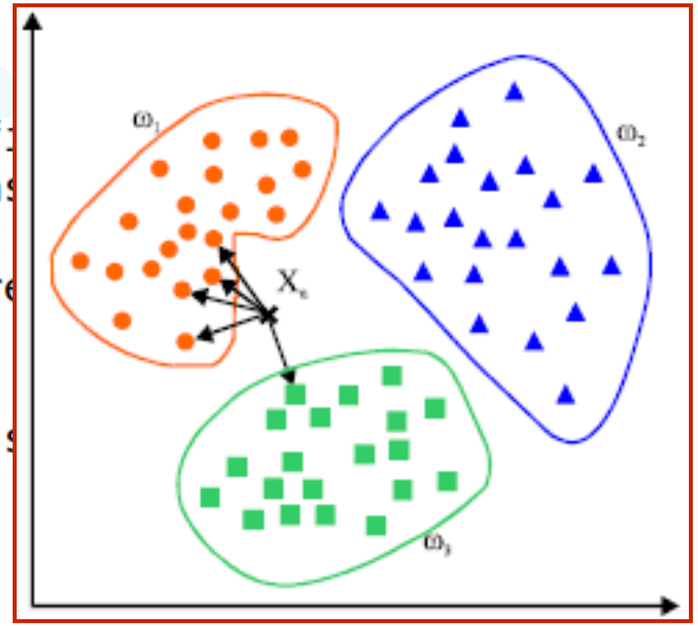

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Considerações Finais

NumPy

matplotlib

NLTK

scikit learn

Referências Bibliográficas

- Baeza-Yates, Ricardo, and Berthier Ribeiro-Neto. Recuperação de Informação-: Conceitos e Tecnologia das Máquinas de Busca. Bookman Editora, 2013.

- Marsland, Stephen. Machine learning: an algorithmic perspective. CRC press, 2015.

- Bird, Steven, Edward Loper and Ewan Klein (2009), Natural Language Processing with Python. O'Reilly Media Inc;

Obrigada!

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