Download Datasets

```
!wget -q -cO - https://zenodo.org/records/3941387/files/teaching_2018_features_tfidf_256.
!wget -q -cO -  https://zenodo.org/records/3941387/files/teaching_2019_features_tfidf_256
!wget -q -cO -  https://zenodo.org/records/3941387/files/mentalhealth_2018_features_tfidf
```

Import packages

```
import pandas as pd
from collections import Counter
from wordcloud import WordCloud, STOPWORDS
import matplotlib.pyplot as plt
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split
from sklearn.metrics import classification_report
from sklearn.decomposition import KernelPCA, PCA
```

Load data

```
teaching_2018 = pd.read_csv('teaching_2018.csv')
teaching_2019 = pd.read_csv('teaching_2019.csv')
mental = pd.read_csv('mental.csv')
```

```
teaching_2018#.head(2)
```

	subreddit	author	date	post	automated_readability_i
0	teaching	wdead	2018/01/01	Looking for BIG digital timers for my 7th grad...	6.20
1	teaching	tiger-bulldog1318	2018/01/02	School turnaround from the teacher’s perspecti...	7.19
2	teaching	PMcommenter	2018/01/02	Where on high school & college campuses ca...	6.96
3	teaching	amylizzie12	2018/01/02	What have you used to keep your students busy ...	7.13
4	teaching	ravensandcrowsohmy	2018/01/02	Flexible, Free Vocabulary App/Website with a F...	7.27
...	...	...	...	...	
544	teaching	Markenheimer15	2018/04/20	Looking for advice from someone who has switch...	6.40
545	teaching	ahoradevoar	2018/04/20	[UK] Another job interview with a teaching rec...	3.25
546	teaching	Amandamc2315	2018/04/20	Need Advice? I noticed a lot of people post he...	7.29
547	teaching	notwutiwantd	2018/04/20	Oh, you only want singles? OK! I posted this o	4.52

```
teaching_2019.head(2)
```

	subreddit	author	date	post	automated_readability_index	coleman_l
0	teaching	Nakatsukasa	2019/01/01	First time teaching class of 9-13 Hello, I'm c...	9.250539	
1	teaching	zdnewcomb	2019/01/01	How do I get my 6th graders to care about poet...	4.613466	

2 rows × 350 columns

```
mental.head(2)
```

	subreddit	author	date	post	automated_readability_index	cole
0	mentalhealth	LilUziVertsAutotune	2018/01/01	Any idea what this is? So I came here for awns...	1.198856	
1	mentalhealth	Kyzzen	2018/01/01	Advice, please. I've been getting so easily en...	3.750551	

2 rows × 350 columns

Combine data together

```
df = pd.concat([teaching_2018, teaching_2019, mental])
del teaching_2018, teaching_2019, mental
```

```
df
```

	subreddit	author	date	post	automated_readability
0	teaching	wdead	2018/01/01	Looking for BIG digital timers for my 7th grad...	6
1	teaching	tiger-bulldog1318	2018/01/02	School turnaround from the teacher’s perspecti...	7
2	teaching	PMcommenter	2018/01/02	Where on high school & college campuses ca...	6
3	teaching	amylizzie12	2018/01/02	What have you used to keep your students busy ...	7
4	teaching	ravensandcrowsohmy	2018/01/02	Flexible, Free Vocabulary App/Website with a F...	7
...	...	...	...	...	
3355	mentalhealth	riverisaberry	2018/04/20	Does Anyone Have Chronic Hyperventilation Synd...	-0
3356	mentalhealth	eshmaalfatin	2018/04/20	Psychiatrist in Dubai & Abu Dhabi - Genera...	18
3357	mentalhealth	themonstrumologist	2018/04/20	My best friend just brought this to my attenti...	0
3358	mentalhealth	scndplace	2018/04/20	Why do I get depressed instead of sad? i wanna...	1
3359	mentalhealth	anniehall330	2018/04/20	What are the events that made you traumatised ...	4

4736 rows × 350 columns

```
j = 0
for i in df.columns:
  if i[:5] == 'tfidf':
    print(j)
  j +=1
```

```
94
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```
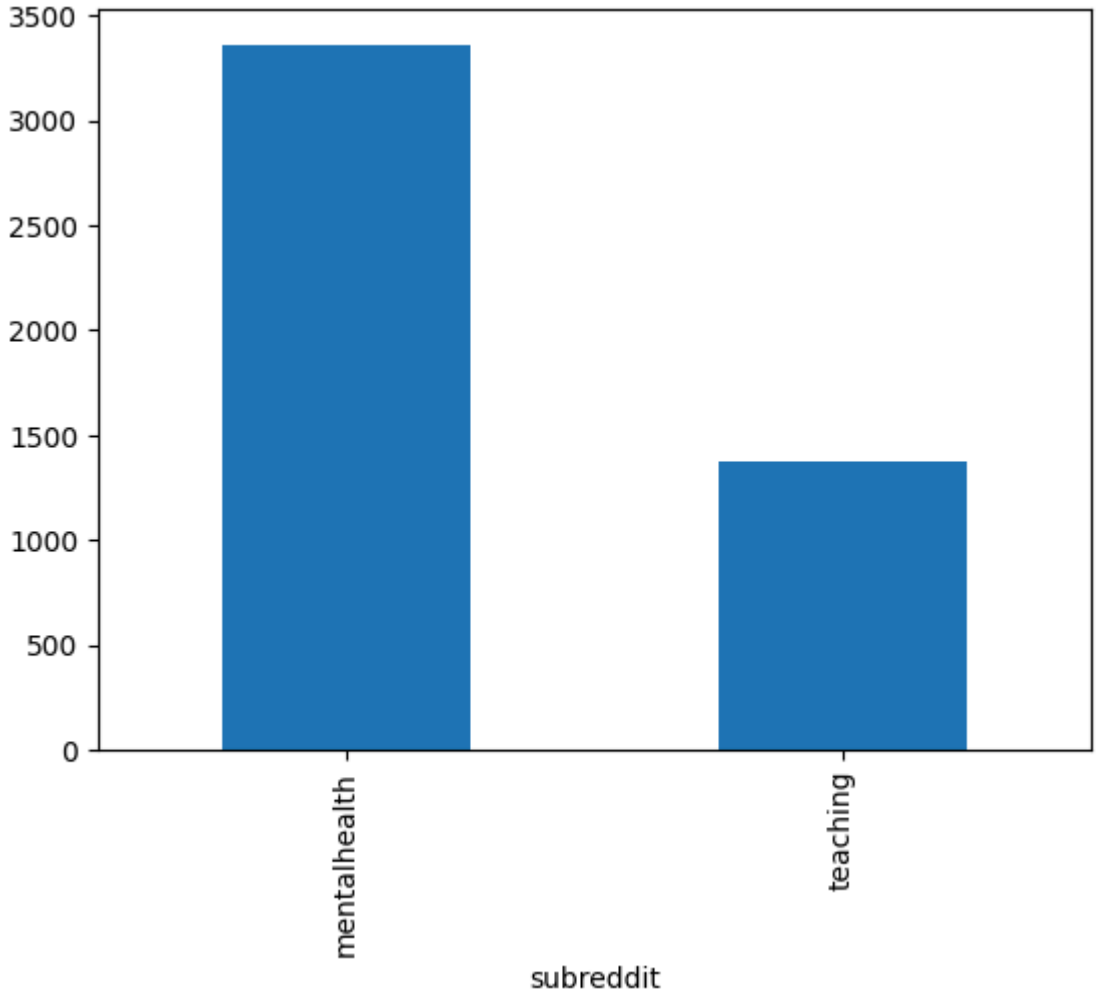

Data exploration

```
df.subreddit.value_counts().plot(kind='bar')
```

```
<Axes: xlabel='subreddit'>
```




```
df[df.subreddit == 'mentalhealth']
```

	subreddit	author	date	post	automated_readabilit
0	mentalhealth	LilUziVertsAutotune	2018/01/01	Any idea what this is? So I came here for awns...	
1	mentalhealth	Kyzzen	2018/01/01	Advice, please. I've been getting so easily en...	
2	mentalhealth	somerandomperson93	2018/01/01	Can aggressive behavior in humans be modified ...	
3	mentalhealth	121802	2018/01/01	I heard my parents having sex and i need serio...	
4	mentalhealth	Mewdot	2018/01/01	From the inside out This will probably be a lo...	
...	...	...	...	...	
3355	mentalhealth	riverisaberry	2018/04/20	Does Anyone Have Chronic Hyperventilation Synd...	-(
3356	mentalhealth	eshmaalfatin	2018/04/20	Psychiatrist in Dubai & Abu Dhabi - Genera...	18
3357	mentalhealth	themonstrumologist	2018/04/20	My best friend just brought this to my attenti...	(
3358	mentalhealth	scndplace	2018/04/20	Why do I get depressed instead of sad? i wanna...	
3359	mentalhealth	anniehall330	2018/04/20	What are the events that made you traumatised ...	

3360 rows × 350 columns

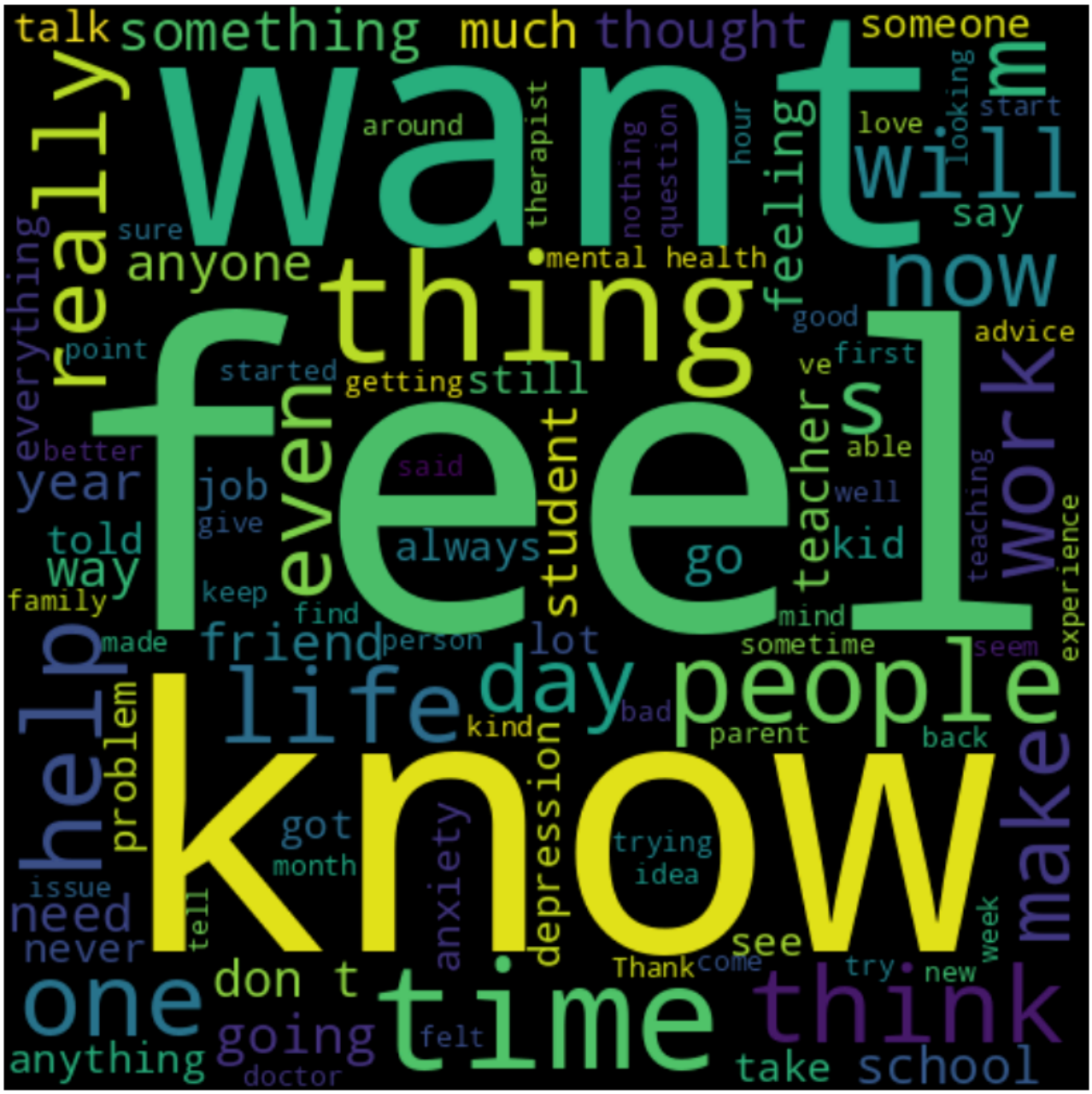
```
txt = ' '.join(df[df.subreddit == 'teaching'].post.values)
word_list = txt.split()
Counter(word_list).most_common()
```

```
[('I', 7943),
 ('to', 6939),
 ('the', 6099),
 ('and', 5863),
 ('a', 5715),
 ('in', 3447),
 ('of', 3422),
 ('my', 2788),
 ('for', 2679),
 ('that', 2127),
 ('is', 2076),
 ('have', 2004),
 ('with', 1628),
 ('this', 1399),
 ('be', 1352),
 ('but', 1347),
 ('on', 1323),
 ('it', 1298),
 ('you', 1246),
 ("I'm", 1083),
 ('was', 1070),
 ('are', 1038),
 ('at', 1038),
 ('me', 1036),
 ('as', 1031),
 ('or', 1024),
 ('not', 971),
 ('am', 969),
 ('do', 937),
 ('school', 892),
 ('teaching', 888),
 ('so', 875),
 ('about', 867),
 ('they', 823),
 ('an', 812),
 ('if', 751),
 ('just', 737),
 ('would', 733),
 ('like', 725),
 ('what', 695),
 ('teacher', 688),
 ('can', 666),
 ('students', 662),
 ('get', 660),
 ('from', 635),
 ('know', 632),
 ('any', 628),
 ('out', 582),
 ('all', 573),
 ('been', 570),
 ('some', 564),
 ('them', 545),
 ('I’m', 543),
 ('how', 536),
 ('their', 507),
 ('want', 503),
 ('will', 491),
 ('had', 470),
```

```
txt = ' '.join(df[df.subreddit == 'mentalhealth'].post.values)
word_list = txt.split()
Counter(word_list).most_common()[:20]
```

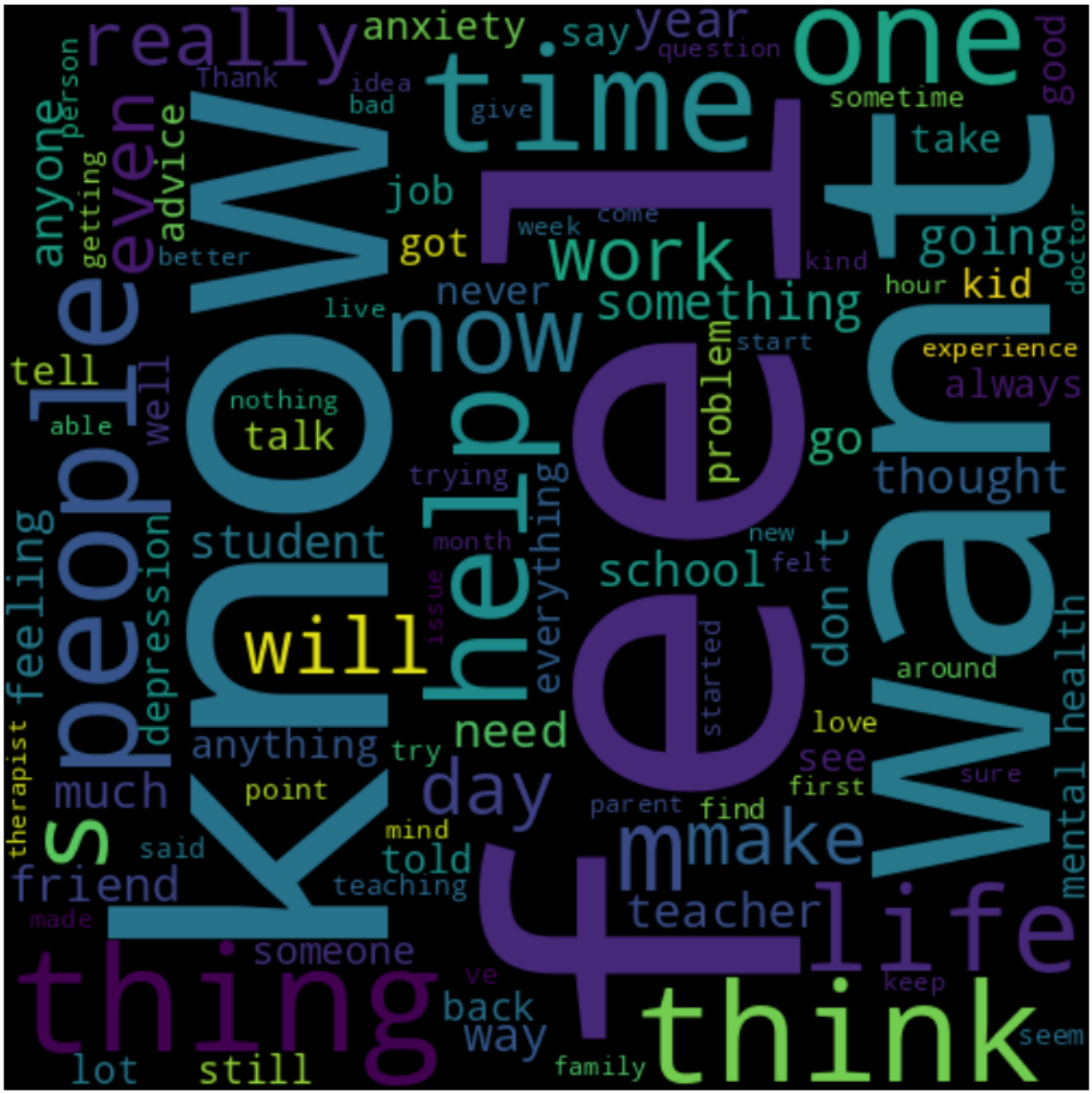
```
[('I', 40642),
 ('to', 25944),
 ('and', 24392),
 ('a', 17054),
 ('the', 16193),
 ('my', 13687),
 ('of', 12370),
 ('that', 8708),
 ('in', 8533),
 ('have', 7296),
 ('for', 7250),
 ('is', 7168),
 ('it', 6905),
 ('with', 6838),
 ('me', 6760),
 ('but', 6553),
 ('was', 5945),
 ('this', 5085),
 ('like', 5069),
 ("I'm", 4852)]
```

```
wordcloud = WordCloud(
        background_color = 'black',
        width = 500,
        height = 500,
        max_words=100,
        stopwords = set(STOPWORDS)).generate(str(' '.join(df.post.values)))

fig, ax = plt.subplots(1, 1, figsize=(10, 10))
ax.imshow(wordcloud, interpolation='bilinear')
ax.axis("off")
fig.show()
```



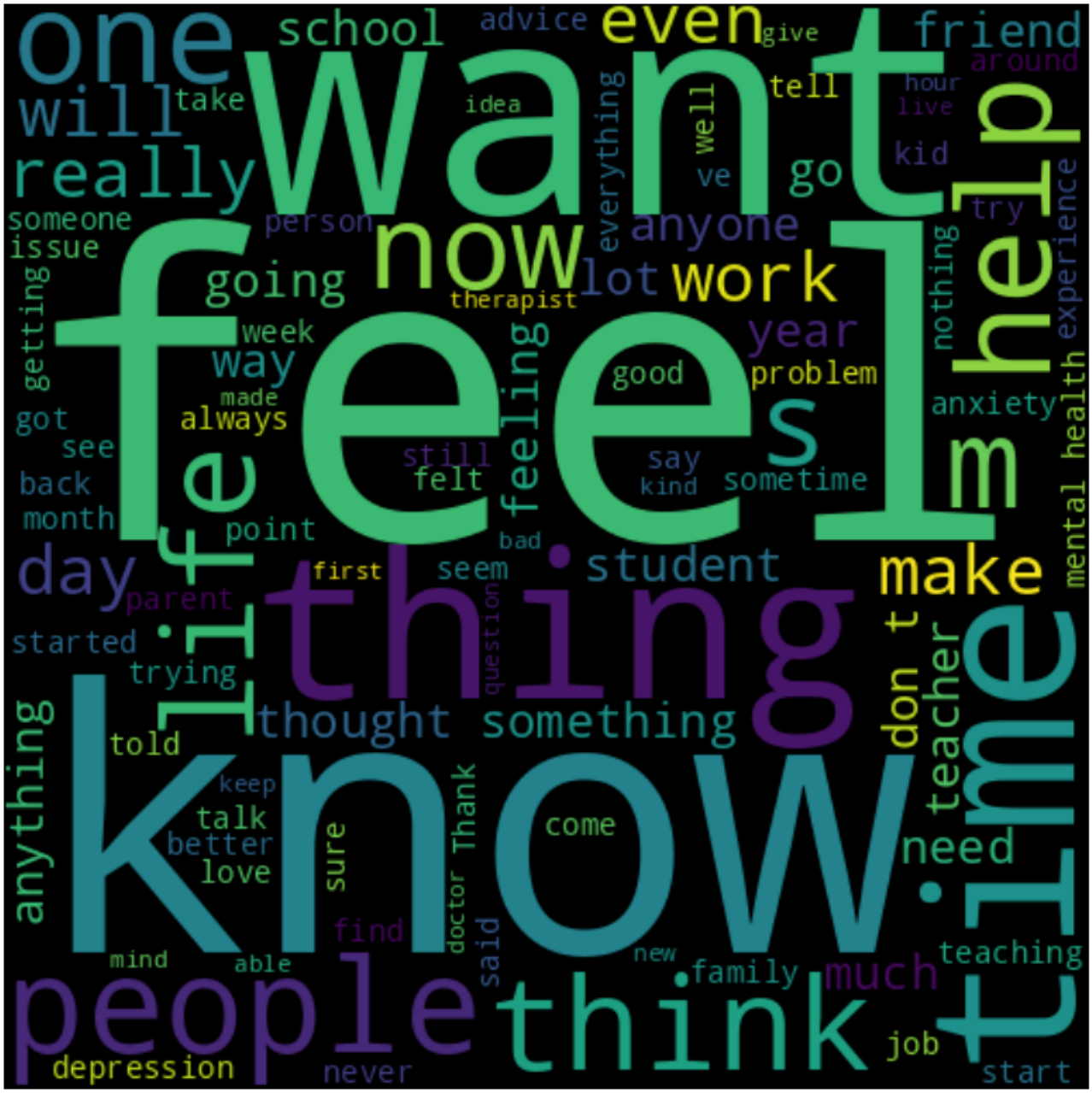

```
# สร้าง Wordcloud ประเภท Teaching ด้วยตนเอง
wordcloud = WordCloud(
        background_color = 'black',
        width = 500,
        height = 500,
        max_words=100,
        stopwords = set(STOPWORDS)).generate(str('Teaching'.join(df.post.values)))

fig, ax = plt.subplots(1, 1, figsize=(10, 10))
ax.imshow(wordcloud, interpolation='bilinear')
```

```
ax.axis("off")
fig.show()
```




```
# สร้าง Wordcloud ประเภท Mentalhealth ด้วยตนเอง
wordcloud = WordCloud(
        background_color = 'black',
        width = 500,
        height = 500,
        max_words=100,
        stopwords = set(STOPWORDS)).generate(str('Mentalhealth'.join(df.post.values)))
```

```
fig, ax = plt.subplots(1, 1, figsize=(10, 10))
ax.imshow(wordcloud, interpolation='bilinear')
ax.axis("off")
fig.show()
```



Feature extraction

```
vectorizer = CountVectorizer()
```

```
# ให้ทำการแปลงข้อความให้เป็น Feature โดยการระบุข้อมูลที่ใช้ในการแปลงให้ถูกต้อง

# X = vectorizer.fit_transform(_____)

X = vectorizer.fit_transform(df.post.values)


print(X.shape)
print(X.toarray())
print(vectorizer.get_feature_names_out())
```

```
(4736, 21793)
[[0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 ...
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]
 [0 0 0 ... 0 0 0]]
['00' '000' '00pm' ... 'مدرسة' 'محمد' 'ㄅㄆㄇㄈ']
```

Split Data into training and test sets

```
df['label'] = pd.Categorical(df.subreddit).codes


df
```

	subreddit	author	date	post	automated_readability
0	teaching	wdead	2018/01/01	Looking for BIG digital timers for my 7th grad...	6
1	teaching	tiger-bulldog1318	2018/01/02	School turnaround from the teacher’s perspecti...	7
2	teaching	PMcommenter	2018/01/02	Where on high school & college campuses ca...	6
3	teaching	amylizzie12	2018/01/02	What have you used to keep your students busy ...	7
4	teaching	ravensandcrowsohmy	2018/01/02	Flexible, Free Vocabulary App/Website with a F...	7
...	...	...	...	...	
3355	mentalhealth	riverisaberry	2018/04/20	Does Anyone Have Chronic Hyperventilation Synd...	-0
3356	mentalhealth	eshmaalfatin	2018/04/20	Psychiatrist in Dubai & Abu Dhabi - Genera...	18
3357	mentalhealth	themonstrumologist	2018/04/20	My best friend just brought this to my attenti...	0
3358	mentalhealth	scndplace	2018/04/20	Why do I get depressed instead of sad? i wanna...	1
3359	mentalhealth	anniehall330	2018/04/20	What are the events that made you traumatised ...	4

4736 rows × 351 columns

```
# ให้ระบุคอลัมน์ ที่จะใช้เป็น label เพื่อที่จะใช้ในการสอนและทำนาย

y = df.label
```

```
X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.30, random_state=42)
```

Modelling

```
log = LogisticRegression(random_state=0).fit(X_train, y_train)

print(log.predict(X_test[:10]))
print(log.predict_proba(X_test[:10]))
print(log.score(X_test, y_test))
```

```
[0 0 0 0 0 1 1 1 0 0]
[[1.00000000e+00 3.09881006e-11]
 [9.86735561e-01 1.32644392e-02]
 [9.45501761e-01 5.44982389e-02]
 [9.86729070e-01 1.32709295e-02]
 [9.16042616e-01 8.39573837e-02]
 [1.10372408e-03 9.98896276e-01]
 [5.20349080e-04 9.99479651e-01]
 [1.20955290e-03 9.98790447e-01]
 [9.99999873e-01 1.26532163e-07]
 [9.99999663e-01 3.37263137e-07]]
0.971850809289233
```

ให้ทดลองสร้างโมเดล ด้วย Algorithms อื่นๆ ด้วยตัวเอง อีก 2 โมเดล

```
from sklearn.ensemble import RandomForestClassifier

# RandomForestClassifier model
clf1 = RandomForestClassifier(random_state=0).fit(X_train, y_train)

print(clf1.predict(X_test[:10]))
print(clf1.predict_proba(X_test[:10]))
print(clf1.score(X_test, y_test))
```

```
[0 0 0 0 0 0 1 1 0 0]
[[0.93 0.07]
 [0.78 0.22]
 [0.8  0.2 ]
 [0.84 0.16]
 [0.81 0.19]
 [0.53 0.47]
 [0.46 0.54]
 [0.35 0.65]
 [0.96 0.04]
 [0.97 0.03]]
0.9268121041520057
```

```
from sklearn.ensemble import GradientBoostingClassifier

# GradientBoostingClassifier model
clf2 = GradientBoostingClassifier(random_state=0).fit(X_train, y_train)

print(clf2.predict(X_test[:10]))
print(clf2.predict_proba(X_test[:10]))
print(clf2.score(X_test, y_test))
```

```
[0 0 0 0 0 1 1 1 0 0]
[[0.98553097 0.01446903]
 [0.83825515 0.16174485]
 [0.76252921 0.23747079]
 [0.93679944 0.06320056]
 [0.91158509 0.08841491]
 [0.04204465 0.95795535]
 [0.04645257 0.95354743]
 [0.00929147 0.99070853]
 [0.98229542 0.01770458]
 [0.99032615 0.00967385]]
0.9422941590429276
```

Evaluation

```
# ระบุ y_true และ y_pred ด้วยตัวเองให้ถูกต้อง เพื่อใช้แสดงประสิทธิภาพของโมเดล


y_true = y_test
y_pred = log.predict(X_test)


target_names = ['MentalHealth', 'Teaching']
print(classification_report(y_true, y_pred, target_names=target_names))
```

```
              precision    recall  f1-score   support

 MentalHealth       0.97      0.99      0.98       993
     Teaching       0.98      0.93      0.95       428

     accuracy                           0.97      1421
    macro avg       0.97      0.96      0.97      1421
 weighted avg       0.97      0.97      0.97      1421
```

```
# ระบุ y_true และ y_pred ด้วยตัวเองให้ถูกต้อง เพื่อใช้แสดงประสิทธิภาพของโมเดล clf1


y_true = y_test
y_pred = clf1.predict(X_test)


target_names = ['MentalHealth', 'Teaching']
```

```
print(classification_report(y_true, y_pred, target_names=target_names))
```

```
              precision    recall  f1-score   support

 MentalHealth       0.91      1.00      0.95       993
     Teaching       0.99      0.77      0.86       428

     accuracy                           0.93      1421
    macro avg       0.95      0.88      0.91      1421
 weighted avg       0.93      0.93      0.92      1421
```

```
# ระบุ y_true และ y_pred ด้วยตัวเองให้ถูกต้อง เพื่อใช้แสดงประสิทธิภาพของโมเดล clf2
```

```
y_true = y_test
y_pred = clf2.predict(X_test)

target_names = ['MentalHealth', 'Teaching']
print(classification_report(y_true, y_pred, target_names=target_names))
```

```
              precision    recall  f1-score   support

 MentalHealth       0.93      0.99      0.96       993
     Teaching       0.98      0.82      0.90       428

     accuracy                           0.94      1421
    macro avg       0.95      0.91      0.93      1421
 weighted avg       0.94      0.94      0.94      1421
```

ให้สร้างโมเดลด้วยตัวเองโดยใช้ LIWC features ที่มีให้ใน Dataset เพื่อใช้ในการ Train และ Test โมเดลด้วยตัวเอง

```
# คอลัมน์ LIWC features จะอยู่ในคอลัมน์ที่ 4 ถึง 94

df.columns[4:94]
```

```
Index(['automated_readability_index', 'coleman_liau_index',
       'flesch_kincaid_grade_level', 'flesch_reading_ease', 'gulpease_index',
       'gunning_fog_index', 'lix', 'smog_index', 'wiener_sachtextformel',
       'n_chars', 'n_long_words', 'n_monosyllable_words',
       'n_polysyllable_words', 'n_sents', 'n_syllables', 'n_unique_words',
       'n_words', 'sent_neg', 'sent_neu', 'sent_pos', 'sent_compound',
       'economic_stress_total', 'isolation_total', 'substance_use_total',
       'guns_total', 'domestic_stress_total', 'suicidality_total',
       'punctuation', 'liwc_1st_pers', 'liwc_2nd_pers', 'liwc_3rd_pers',
       'liwc_achievement', 'liwc_adverbs', 'liwc_affective_processes',
       'liwc_anger', 'liwc_anxiety', 'liwc_articles_article', 'liwc_assent',
       'liwc_auxiliary_verbs', 'liwc_biological', 'liwc_body',
       'liwc_causation', 'liwc_certainty', 'liwc_cognitive',
       'liwc_common_verbs', 'liwc_conjunctions', 'liwc_death',
       'liwc_discrepancy', 'liwc_exclusive', 'liwc_family', 'liwc_feel',
```

```
       'liwc_fillers', 'liwc_friends', 'liwc_future_tense', 'liwc_health',
       'liwc_hear', 'liwc_home', 'liwc_humans', 'liwc_impersonal_pronouns',
       'liwc_inclusive', 'liwc_ingestion', 'liwc_inhibition', 'liwc_insight',
       'liwc_leisure', 'liwc_money', 'liwc_motion', 'liwc_negations',
       'liwc_negative_emotion', 'liwc_nonfluencies', 'liwc_numbers',
       'liwc_past_tense', 'liwc_perceptual_processes',
       'liwc_personal_pronouns', 'liwc_positive_emotion', 'liwc_prepositions',
       'liwc_present_tense', 'liwc_quantifiers', 'liwc_relativity',
       'liwc_religion', 'liwc_sadness', 'liwc_see', 'liwc_sexual',
       'liwc_social_processes', 'liwc_space', 'liwc_swear_words',
       'liwc_tentative', 'liwc_time', 'liwc_total_functional',
       'liwc_total_pronouns', 'liwc_work'],
      dtype='object')
```

```
df.iloc[:, 4:94]
```

	automated_readability_index	coleman_liau_index	flesch_kincaid_grade_level	f
0	6.205652	6.216433	6.272283	
1	7.191104	10.905849	6.144719	
2	6.961154	8.008078	7.135026	
3	7.132836	9.284230	5.662866	
4	7.278080	8.537186	6.422609	
...	...	...	...	
3355	-0.313579	1.816079	2.206408	
3356	18.585441	21.801888	14.813529	
3357	0.995289	3.198568	2.559184	
3358	1.554975	3.657596	3.223969	
3359	4.084419	5.502131	5.342527	

4736 rows × 90 columns

```
X = df.iloc[:, 4:94]

df['label'] = pd.Categorical(df.subreddit).codes
y = df['label']


X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.30, random_state=42)

log = LogisticRegression(random_state=0).fit(X_train, y_train)

print(log.predict(X_test[:10]))
print(log.predict_proba(X_test[:10]))
print(log.score(X_test, y_test))
```

```
[0 0 0 0 0 1 1 1 0 0]
[[9.99997891e-01 2.10869240e-06]
 [5.67882860e-01 4.32117140e-01]
 [6.43006119e-01 3.56993881e-01]
 [9.91066061e-01 8.93393940e-03]
 [8.26669573e-01 1.73330427e-01]
 [2.31554510e-02 9.76844549e-01]
 [3.82515020e-03 9.96174850e-01]
 [5.21654621e-03 9.94783454e-01]
 [9.99989076e-01 1.09237770e-05]
 [9.99696400e-01 3.03599767e-04]]
0.9176636171710063
/usr/local/lib/python3.10/dist-packages/sklearn/linear_model/_logistic.py:469: Conver
STOP: TOTAL NO. of ITERATIONS REACHED LIMIT.

Increase the number of iterations (max_iter) or scale the data as shown in:
    https://scikit-learn.org/stable/modules/preprocessing.html
Please also refer to the documentation for alternative solver options:
    https://scikit-learn.org/stable/modules/linear_model.html#logistic-regression
  n_iter_i = _check_optimize_result(
```

```
# ระบุ y_true และ y_pred ด้วยตัวเองให้ถูกต้อง เพื่อใช้แสดงประสิทธิภาพของโมเดล


y_true = y_test
y_pred = log.predict(X_test)



target_names = ['MentalHealth', 'Teaching']
print(classification_report(y_true, y_pred, target_names=target_names))
```

```
              precision    recall  f1-score   support

MentalHealth       0.93      0.95      0.94       993
    Teaching       0.88      0.84      0.86       428

    accuracy                           0.92      1421
   macro avg       0.91      0.89      0.90      1421
weighted avg       0.92      0.92      0.92      1421
```

ให้สร้างโมเดลด้วยตัวเองโดยใช้ TF-IDF features ที่มีให้ใน Dataset เพื่อใช้ในการ Train และ Test โมเดลด้วยตัวเอง

```
# คอลัมน์ LIWC features จะอยู่ในคอลัมน์ที่ 94 ถึง 350

df.columns[94:350]
```

```
Index(['tfidf_abl', 'tfidf_abus', 'tfidf_actual', 'tfidf_addict', 'tfidf_adhd',
       'tfidf_advic', 'tfidf_ago', 'tfidf_alcohol', 'tfidf_almost',
       'tfidf_alon',
```

```
            ...
            'tfidf_wish', 'tfidf_without', 'tfidf_wonder', 'tfidf_work',
            'tfidf_worri', 'tfidf_wors', 'tfidf_would', 'tfidf_wrong',
            'tfidf_x200b', 'tfidf_year'],
           dtype='object', length=256)
```

```
X = df.iloc[:, 94:350]
y = df['label']
```

```
X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.30, random_state=42)

log = LogisticRegression(random_state=0).fit(X_train, y_train)

print(log.predict(X_test[:10]))
print(log.predict_proba(X_test[:10]))
print(log.score(X_test, y_test))
```

```
[0 0 0 0 0 1 1 1 0 0]
[[0.99035168 0.00964832]
 [0.67261441 0.32738559]
 [0.67965393 0.32034607]
 [0.67705508 0.32294492]
 [0.85869157 0.14130843]
 [0.09668609 0.90331391]
 [0.3095809  0.6904191 ]
 [0.17407609 0.82592391]
 [0.9123111  0.0876889 ]
 [0.97088547 0.02911453]]
0.9289232934553132
```

```
# ระบุ y_true และ y_pred ด้วยตัวเองให้ถูกต้อง เพื่อใช้แสดงประสิทธิภาพของโมเดล
```

```
y_true = y_test
y_pred = log.predict(X_test)
```

```
target_names = ['MentalHealth', 'Teaching']
print(classification_report(y_true, y_pred, target_names=target_names))
```

```
              precision    recall  f1-score   support

 MentalHealth       0.93      0.97      0.95       993
     Teaching       0.92      0.84      0.88       428

     accuracy                           0.93      1421
    macro avg       0.93      0.90      0.91      1421
 weighted avg       0.93      0.93      0.93      1421
```

ให้สร้างโมเดลด้วยตัวเองโดยใช้ TF-IDF และ LIWC features ที่มีให้ใน Dataset เพื่อใช้ในการ Train และ Test โมเดลด้วยตัวเอง

```
X = df.iloc[:, 94:350]
y = df['label']



X_train, X_test, y_train, y_test = train_test_split(
    X, y, test_size=0.30, random_state=42)

log = LogisticRegression(random_state=0).fit(X_train, y_train)

print(log.predict(X_test[:10]))
print(log.predict_proba(X_test[:10]))
print(log.score(X_test, y_test))
```

```
[0 0 0 0 0 1 1 1 0 0]
[[0.99035168 0.00964832]
 [0.67261441 0.32738559]
 [0.67965393 0.32034607]
 [0.67705508 0.32294492]
 [0.85869157 0.14130843]
 [0.09668609 0.90331391]
 [0.3095809  0.6904191 ]
 [0.17407609 0.82592391]
 [0.9123111  0.0876889 ]
 [0.97088547 0.02911453]]
0.9289232934553132
```

```
# ระบุ y_true และ y_pred ด้วยตัวเองให้ถูกต้อง เพื่อใช้แสดงประสิทธิภาพของโมเดล



y_true = y_test
y_pred = log.predict(X_test)



target_names = ['MentalHealth', 'Teaching']
print(classification_report(y_true, y_pred, target_names=target_names))
```