In [1]:

```
import pandas as pd
import nltk
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from nltk.corpus import stopwords
from sklearn.tree import DecisionTreeClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.svm import SVC
from sklearn.naive_bayes import MultinomialNB
from sklearn.feature_extraction.text import TfidfVectorizer
from sklearn.feature_extraction.text import CountVectorizer
from collections import Counter
from nltk import word_tokenize
from sklearn.utils import shuffle
from sklearn.model_selection import train_test_split
from sklearn.model_selection import GridSearchCV
```

In [2]:

```
import pickle
from nltk.stem import  PorterStemmer
from nltk.stem import WordNetLemmatizer
from nltk import pos_tag
from nltk.corpus import wordnet
```

In [3]:

```
df=pd.read_csv('hm_train.csv')
df.isnull().sum()
```

Out[3]:

```
hmid                  0
reflection_period     0
cleaned_hm            0
num_sentence          0
predicted_category    0
dtype: int64
```

In [4]:

```
df.head()
```

Out[4]:

	hmid	reflection_period	cleaned_hm	num_sentence	predicted_category
0	27673	24h	I went on a successful date with someone I fel...	1	affection
1	27674	24h	I was happy when my son got 90% marks in his e...	1	affection
2	27675	24h	I went to the gym this morning and did yoga.	1	exercise
3	27676	24h	We had a serious talk with some friends of our...	2	bonding
4	27677	24h	I went with grandchildren to butterfly display...	1	affection

In [5]:

```
df.shape
```

Out[5]:

```
(60321, 5)
```

In [6]:

```
df.predicted_category.unique()
```

Out[6]:

```
array(['affection', 'exercise', 'bonding', 'leisure', 'achievement',
       'enjoy_the_moment', 'nature'], dtype=object)
```

In [7]:

```
df.predicted_category.value_counts()
```

Out[7]:

```
affection           20880
achievement         20274
bonding              6561
enjoy_the_moment     6508
leisure              4242
nature               1127
exercise              729
Name: predicted_category, dtype: int64
```

In [8]:

```
df.num_sentence.unique()
```

Out[8]:

```
array([ 1,  2,  3,  9,  6,  4, 53,  5, 12, 16,  7, 13, 11, 28,  8, 10, 14,
       17, 25, 27, 37, 34, 21, 23, 19, 26, 24, 22, 31, 18, 58, 32, 15, 29,
       35, 56, 51, 20, 46, 42, 30], dtype=int64)
```

In [9]:

```
df.reflection_period.value_counts()
```

Out[9]:

```
24h    30455
3m     29866
Name: reflection_period, dtype: int64
```

In [10]:

```
ps = PorterStemmer()
lemmatizer = WordNetLemmatizer()
```

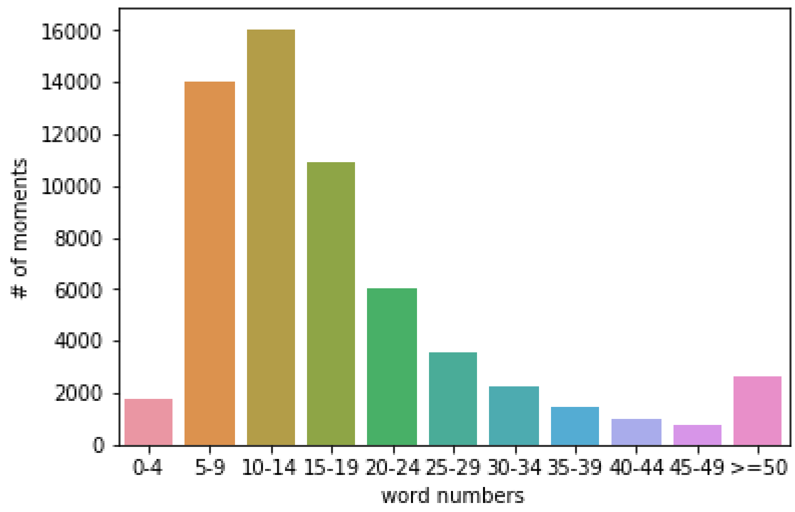
In [11]:

```
df_hm = df[df['cleaned_hm'].notnull()]
len_count = df_hm['cleaned_hm'].apply(lambda x: len(x.split()))
len_count.describe()
length_order = ["0-4", "5-9", "10-14", "15-19", "20-24", "25-29", "30-34", "35-39", \
                "40-44", "45-49", ">=50"]
length_category = len_count.apply(lambda x: length_order[min(10, int(x/5))])
length_counts = pd.DataFrame(length_category.value_counts()).reset_index()
length_counts.columns = ['word numbers', '# of moments']

sns.barplot(x='word numbers', y='# of moments', data=length_counts, order=length_order)
```

Out[11]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x1f2f10fc748>
```



In [12]:

```
df.head()
```

Out[12]:

	hmid	reflection_period	cleaned_hm	num_sentence	predicted_category
0	27673	24h	I went on a successful date with someone I fel...	1	affection
1	27674	24h	I was happy when my son got 90% marks in his e...	1	affection
2	27675	24h	I went to the gym this morning and did yoga.	1	exercise
3	27676	24h	We had a serious talk with some friends of our...	2	bonding
4	27677	24h	I went with grandchildren to butterfly display...	1	affection

In [13]:

```
def plt_count_freq(counts,title=None,_ylim=100000):
    freq = list(set(counts.values()))
    freq.sort()
    freq.reverse()
    plt.plot(freq)
    plt.xlabel('Terms')
    plt.ylabel('freq count')
    plt.ylim(0,_ylim)
    if(title!=None):
        plt.title(title)
    plt.show()
```

In [14]:

```
# function to clean data

stops = set(stopwords.words("english"))
def cleanData(text, lowercase = False, remove_stops = False, stemming = False):
    txt = str(text)
    txt = re.sub(r'[^A-Za-z0-9\s]',r'',txt)
    txt = re.sub(r'\n',r' ',txt)

    if lowercase:
        txt = " ".join([w.lower() for w in txt.split()])

    if remove_stops:
        txt = " ".join([w for w in txt.split() if w not in stops])

    if stemming:
        st = PorterStemmer()
        txt = " ".join([st.stem(w) for w in txt.split()])

    return txt
```

In [150]:

```
train=pd.read_csv('hm_train.csv')
#test=pd.read_csv('hm_test.csv')
```

In [151]:

```
#alldata = pd.concat([train, test]).reset_index(drop=True)
```

In [152]:

```
train.shape
```

Out[152]:

```
(60321, 5)
```

In [153]:

```
train['predicted_category'] = train['predicted_category'].map({'affection': 0, 'exercise':
                                                              'enjoy_the_moment': 5,'nature
```

In [154]:

```
train.head()
```

Out[154]:

	hmid	reflection_period	cleaned_hm	num_sentence	predicted_category
0	27673	24h	I went on a successful date with someone I fel...	1	0
1	27674	24h	I was happy when my son got 90% marks in his e...	1	0
2	27675	24h	I went to the gym this morning and did yoga.	1	1
3	27676	24h	We had a serious talk with some friends of our...	2	2
4	27677	24h	I went with grandchildren to butterfly display...	1	0

In [155]:

```
import re
train['cleaned_hm'] = train['cleaned_hm'].map(lambda x: cleanData(x, lowercase=True, remove
```

In [156]:

```

# initialise the functions - we'll create separate models for each type.
countvec = CountVectorizer(analyzer='word', ngram_range = (1,1), min_df=150, max_features=4
tfidfvec = TfidfVectorizer(analyzer='word', ngram_range = (1,1), min_df = 150, max_features
```

In [157]:

```

# create features
bagofwords = countvec.fit_transform(train['cleaned_hm'])
tfidfdata = tfidfvec.fit_transform(train['cleaned_hm'])
```

In [158]:

```

# create dataframe for features
bow_df = pd.DataFrame(bagofwords.todense())
tfidf_df = pd.DataFrame(tfidfdata.todense())
```

In [159]:

```
# set column names
bow_df.columns = ['col'+ str(x) for x in bow_df.columns]
tfidf_df.columns = ['col' + str(x) for x in tfidf_df.columns]
```

In [160]:

```
# create separate data frame for bag of words and tf-idf

bow_df_train = bow_df[:len(train)]
bow_df_test = bow_df[len(train):]

tfid_df_train = tfidf_df[:len(train)]
tfid_df_test = tfidf_df[len(train):]
```

In [161]:

```
train_1 = pd.concat([train, bow_df_train], axis = 1)
train_2 = pd.concat([train, tfid_df_train], axis=1)
```

In [162]:

```
# split the merged data file into train and test respectively
X = train_1.drop('predicted_category',1)
Y = train_1.predicted_category
x_train,x_test,y_train,y_test = train_test_split(X_1,Y,test_size=0.30,random_state=0)
```

In [163]:

```
X_1=X.drop(['hmid','reflection_period','cleaned_hm'],1)
```

In [164]:

```
X_1.head()
```

Out[164]:

	num_sentence	col0	col1	col2	col3	col4	col5	col6	col7	col8	...	col390	col391	col:
0	1	0	0	0	0	0	0	0	0	0	...	0	0	
1	1	0	0	0	0	0	0	0	0	0	...	0	0	
2	1	0	0	0	0	0	0	0	0	0	...	0	0	
3	2	0	0	0	0	0	0	0	0	0	...	0	0	
4	1	0	0	0	0	0	0	0	0	0	...	0	0	

5 rows × 401 columns

In [165]:

```
from lightgbm import LGBMClassifier
from sklearn.metrics import accuracy_score

LGBM = LGBMClassifier(objective='multiclass',num_class='7',n_estimators=2000,learning_rate=

LGBM.fit(x_train, y_train)

y_pred_LGBM_train = LGBM.predict(x_test)

print(accuracy_score(y_test,y_pred_LGBM_train))
```

```
0.8334530585179865
```

In [166]:

```
X_2 = train_2.drop('predicted_category',1)
X_2=X.drop(['hmid','reflection_period','cleaned_hm'],1)
Y_2 = train_2.predicted_category
X_train,X_test,Y_train,Y_test = train_test_split(X_2,Y_2,test_size=0.30,random_state=0)
from lightgbm import LGBMClassifier
from sklearn.metrics import accuracy_score

LGBM = LGBMClassifier(objective='multiclass',num_class='7',n_estimators=2000,learning_rate=

LGBM.fit(X_train, Y_train)

y_pred_LGBM_train = LGBM.predict(X_test)


print(accuracy_score(Y_test,y_pred_LGBM_train))
```

```
0.8339503785157761
```

test_data_set

In [167]:

```
test=pd.read_csv('hm_test.csv')
test.head()
```

Out[167]:

	hmid	reflection_period	cleaned_hm	num_sentence
0	88305	3m	I spent the weekend in Chicago with my friends.	1
1	88306	3m	We moved back into our house after a remodel. ...	2
2	88307	3m	My fiance proposed to me in front of my family...	1
3	88308	3m	I ate lobster at a fancy restaurant with some ...	1
4	88309	3m	I went out to a nice restaurant on a date with...	5

In [196]:

```
import re
test['cleaned_hm'] = test['cleaned_hm'].map(lambda x: cleanData(x, lowercase=True, remove_s
test['cleaned_hm'].head()
```

Out[196]:

```
0                          spent weekend chicago friend
1     move back hou remodel live hotel 9 month due h...
2                  fianc propo front famili begin march
3                      ate lobster fanci restaur friend
4     went nice restaur date wife popular restaur co...
Name: cleaned_hm, dtype: object
```

In [197]:

```
# initialise the functions - we'll create separate models for each type.
countvec = CountVectorizer(analyzer='word', ngram_range = (1,1), min_df=150, max_features=4
tfidfvec = TfidfVectorizer(analyzer='word', ngram_range = (1,1), min_df=150, max_features=4
```

In [198]:

```
# create features
bagofwords_test = countvec.fit_transform(test['cleaned_hm'])
tfidfdata_test = tfidfvec.fit_transform(test['cleaned_hm'])
bagofwords_test.shape
```

Out[198]:

```
(40213, 400)
```

In [199]:

```
# create dataframe for features
bow_test_df = pd.DataFrame(bagofwords_test.todense())
tfidf_test_df = pd.DataFrame(tfidfdata_test.todense())
bow_test_df.shape
```

Out[199]:

```
(40213, 400)
```

In [201]:

```
# set column names
bow_test_df.columns = ['col'+ str(x) for x in bow_test_df.columns]
tfidf_test_df.columns = ['col' + str(x) for x in tfidf_test_df.columns]
bow_test_df.shape
```

Out[201]:

```
(40213, 400)
```

In [202]:

```
test_1 = pd.concat([test, bow_test_df], axis = 1)
test_2 = pd.concat([test, tfidf_test_df], axis=1)
```

In [203]:

```
test_1.shape,train_1.shape
```

Out[203]:

```
((40213, 404), (60321, 405))
```

In [268]:

```
test_2.shape,train_2.shape
```

Out[268]:

```
((40213, 404), (60321, 405))
```

In [204]:

```
test_1=test_1.drop(['hmid','reflection_period','cleaned_hm'],1)
```

In [205]:

```
test_1.head()
```

Out[205]:

	num_sentence	colcol0	colcol1	colcol2	colcol3	colcol4	colcol5	colcol6	colcol7	colcol8
0	1	0	0	0	0	0	0	0	0	0
1	2	0	0	0	0	0	0	0	0	0
2	1	0	0	0	0	0	0	0	0	0
3	1	0	0	0	0	0	0	0	0	0
4	5	0	0	0	1	0	0	0	0	1

5 rows × 401 columns

Lgbm

In [269]:

```
X_2 = train_2.drop('predicted_category',1)
X_2=X.drop(['hmid','reflection_period','cleaned_hm'],1)
Y_2 = train_2.predicted_category
X_train,X_test,Y_train,Y_test = train_test_split(X_2,Y_2,test_size=0.30,random_state=0)
from lightgbm import LGBMClassifier
from sklearn.metrics import accuracy_score

LGBM = LGBMClassifier(objective='multiclass',num_class='7',n_estimators=2000,learning_rate=

LGBM.fit(X_train, Y_train)

y_pred_LGBM_train = LGBM.predict(test_1)
```

In [207]:

```
y_pred_LGBM_train.shape
```

Out[207]:

```
(40213,)
```

In [211]:

```
sub3 = pd.DataFrame({'hmid':test.hmid, 'predicted_category':y_pred_LGBM_train})
sub3['predicted_category'] = sub3['predicted_category'].map({0:'affection',1: 'exercise',2:
                                                             5: 'enjoy_the_moment',6:'natur
sub3 = sub3[['hmid','predicted_category']]
```

In [284]:

```
sub3.to_csv('sub3_lgb.csv', index=False)
```

In [285]:

```
sub3.head()
```

Out[285]:

	hmid	predicted_category
0	88305	achievement
1	88306	enjoy_the_moment
2	88307	achievement
3	88308	achievement
4	88309	affection

Random forest

In [242]:

```
X_2 = train_2.drop('predicted_category',1)
X_2=X.drop(['hmid','reflection_period','cleaned_hm'],1)
Y_2 = train_2.predicted_category
X_train,X_test,Y_train,Y_test = train_test_split(X_2,Y_2,test_size=0.30,random_state=0)
```

In [245]:

```
clf = RandomForestClassifier()
clf.fit(X_train, Y_train)
```

```
C:\ProgramData\Anaconda3\lib\site-packages\sklearn\ensemble\forest.py:246: F
utureWarning: The default value of n_estimators will change from 10 in versi
on 0.20 to 100 in 0.22.
  "10 in version 0.20 to 100 in 0.22.", FutureWarning)
```

Out[245]:

```
RandomForestClassifier(bootstrap=True, class_weight=None, criterion='gini',
            max_depth=None, max_features='auto', max_leaf_nodes=None,
            min_impurity_decrease=0.0, min_impurity_split=None,
            min_samples_leaf=1, min_samples_split=2,
            min_weight_fraction_leaf=0.0, n_estimators=10, n_jobs=None,
            oob_score=False, random_state=None, verbose=0,
            warm_start=False)
```

In [247]:

```
y_pred_RF_train = clf.predict(test_1)
```

In [249]:

```
y_pred_RF_train.shape
```

Out[249]:

```
(40213,)
```

In [257]:

```
sub_rf = pd.DataFrame({'hmid':test.hmid, 'predicted_category':y_pred_RF_train})
sub_rf['predicted_category'] = sub_rf['predicted_category'].map({0:'affection',1: 'exercise
                                                              5: 'enjoy_the_moment',6:'natur
sub_rf = sub_rf[['hmid','predicted_category']]
```

In [282]:

```
sub_rf.to_csv('sub_rf.csv', index=False)
```

In [283]:

```
sub_rf.head()
```

Out[283]:

	hmid	predicted_category
0	88305	achievement
1	88306	leisure
2	88307	achievement
3	88308	enjoy_the_moment
4	88309	affection

Extratree Classifier

In [260]:

```
from sklearn.ensemble import ExtraTreesClassifier

ETR=ExtraTreesClassifier(n_estimators=100)

ETR.fit(X_train, Y_train)

y_pred_ETR_train = ETR.predict(test_1)

#print(accuracy_score(y_test,y_pred_ETR_train))
```

In [256]:

```
sub_etr = pd.DataFrame({'hmid':test.hmid, 'predicted_category':y_pred_ETR_train})
sub_etr['predicted_category'] = sub_etr['predicted_category'].map({0:'affection',1: 'exerci
                                                             5: 'enjoy_the_moment',6:'natur
sub_etr = sub_etr[['hmid','predicted_category']]
```

In [278]:

```
sub_etr.to_csv('sub_etr.csv', index=False)
```

In [279]:

```
sub_etr.head()
```

Out[279]:

	hmid	predicted_category
0	88305	achievement
1	88306	leisure
2	88307	achievement
3	88308	enjoy_the_moment
4	88309	affection

gradientboostingclassifier

In [271]:

```
from sklearn.ensemble import GradientBoostingClassifier

GB=GradientBoostingClassifier(n_estimators=100)

GB.fit(X_train, Y_train)

y_pred_GB_train = GB.predict(test_1)

#print(accuracy_score(y_test,y_pred_ETR_train))
```

In [272]:

```
sub_gb = pd.DataFrame({'hmid':test.hmid, 'predicted_category':y_pred_GB_train})
sub_gb['predicted_category'] = sub_gb['predicted_category'].map({0:'affection',1: 'exercise
                                                              5: 'enjoy_the_moment',6:'natur
sub_gb = sub_gb[['hmid','predicted_category']]
```

In [280]:

```
sub_gb.to_csv('sub_gb.csv', index=False)
```

In [281]:

```
sub_gb.head()
```

Out[281]:

	hmid	predicted_category
0	88305	achievement
1	88306	achievement
2	88307	achievement
3	88308	achievement
4	88309	affection

In [ ]:

```
```

In [ ]:

```
```