510 MBTI dataset- 1000 words RFECV

April 30, 2018

In [70]:
```
#import libraries
import numpy as np
import pandas as pd
import sklearn

from sklearn import preprocessing

from sklearn.feature_extraction.text import CountVectorizer

import matplotlib.pyplot as plt
plt.rc("font", size=14)
from sklearn.linear_model import LogisticRegression
from sklearn.cross_validation import train_test_split
import seaborn as sns
sns.set(style="white")
sns.set(style="whitegrid", color_codes=True)

import statsmodels.api as sm
```

In [71]:
```
#import dataset
data= pd.read_csv(r'C:\Users\Robert\Desktop\mbti_1.csv')
```

In [72]:
```
data.head()
```

Out[72]:

	type	posts
0	INFJ	'http://www.youtube.com/watch?v=qsXHcwe3krw|||...
1	ENTP	'I'm finding the lack of me in these posts ver...
2	INTP	'Good one _____ https://www.youtube.com/wat...
3	INTJ	'Dear INTP, I enjoyed our conversation the o...
4	ENTJ	'You're fired.|||That's another silly misconce...

In [73]:
```
#Add a column to specify if extroverted.
data['extroverted']= data.type.str[:1]
#df['New_Sample'] = df.Sample.str[:1]

data.head()
```

Out[73]:

	type	posts	extroverted
0	INFJ	'http://www.youtube.com/watch?v=qsXHcwe3krw|||...	I

```
1  ENTP  'I'm finding the lack of me in these posts ver...          E
2  INTP  'Good one  _____   https://www.youtube.com/wat...          I
3  INTJ  'Dear INTP,   I enjoyed our conversation the o...          I
4  ENTJ  'You're fired.|||That's another silly misconce...          E
```

In [74]:
```
#how many is I vs. E in dataset?
data.describe()
```

Out[74]:

	type	posts	extroverted
count	8675	8675	8675
unique	16	8675	2
top	INFP	'Afterburner your reasoning is EPIC!|||Patriot...	I
freq	1832	1	6676

In [75]:
```
#breakdown of types in survery
type_data = data.groupby('type')
type_data.describe()
```

Out[75]:

	extroverted				posts			top	freq
	count	unique	top	freq	count	unique			
type									
ENFJ	190	1	E	190	190	190		'There are some really awesome ENFJ facebook g...	1
ENFP	675	1	E	675	675	675		'What do you mean? What's changed? I feel a ...	1
ENTJ	231	1	E	231	231	231		'Usually when I am in a group consisting large...	1
ENTP	685	1	E	685	685	685		Haven't had time to think.|||Oh, christ. Now I...	1
ESFJ	42	1	E	42	42	42		Entj|||Esfp|||Entp|||Esfj|||Estp|||Infp|||Intj...	1
ESFP	48	1	E	48	48	48		'Good job! William I am!!!|||Yes to both. Sel...	1
ESTJ	39	1	E	39	39	39		hitler was what he was,and i am estj or esfj. ...	1
ESTP	89	1	E	89	89	89		'Class clown. I made a joke out of everything|...	1
INFJ	1470	1	I	1470	1470	1470			
INFP	1832	1	I	1832	1832	1832			
INTJ	1091	1	I	1091	1091	1091			
INTP	1304	1	I	1304	1304	1304			
ISFJ	166	1	I	166	166	166			
ISFP	271	1	I	271	271	271			
ISTJ	205	1	I	205	205	205			
ISTP	337	1	I	337	337	337			

```
INFJ  'desperately wish there was a moment every day...    1
INFP  'I can say if I was winked at I would be throw...    1
INTJ  'Afterburner your reasoning is EPIC!|||Patriot...    1
INTP  'I totally analyzed you a figured out who you ...    1
ISFJ  I would say Gayle is an INFP 4w5 so/sx, a very...    1
ISFP  'I was with an ENFJ, and this is extremely acc...    1
ISTJ  'http://www.youtube.com/watch?v=EOgfZHxTgts|||...    1
ISTP  'Lol. But hey, men can be gorgeous too.|||Nope...    1
```

In [76]:
```
data['extroverted'].replace(['I','E'],['0','1'],inplace=True)

data.head()
```

Out[76]:

	type	posts	extroverted
0	INFJ	'http://www.youtube.com/watch?v=qsXHcwe3krw|||...	0
1	ENTP	'I'm finding the lack of me in these posts ver...	1
2	INTP	'Good one _____ https://www.youtube.com/wat...	0
3	INTJ	'Dear INTP, I enjoyed our conversation the o...	0
4	ENTJ	'You're fired.|||That's another silly misconce...	1

In [77]:
```
data.dtypes
```

Out[77]:
```
type           object
posts          object
extroverted    object
dtype: object
```

In [78]:
```
data['extroverted'] = data['extroverted'].astype('int')
```

In [79]:
```
data.dtypes
```

Out[79]:
```
type           object
posts          object
extroverted     int32
dtype: object
```

In [80]:
```
from sklearn.feature_extraction import text
stop_words = text.ENGLISH_STOP_WORDS.union(['http', 'isfj', 'infp', 'intj', 'https',
                                            'infj', 'infp', 'intj','intp',
 'intp','istj', 'istp', '00', 'enfps', 'entps', 'infjs', 'enfjs', 'estps',
                                            'entj', 'esfjs', 'existence', 'infps', 'en

 '000',
 '01',
 '02',
 '03',
 '04',
 '05',
 '06',
 '07',
```

```
'08',
'09',
'10',
'100',
'1000',
'101',
'10th',
'11',
'110',
'11th',
'12',
'120',
'13',
'130',
'14',
'140',
'15',
'150',
'16',
'16personalities',
'17',
'18',
'180',
'19',
'1984',
'1995',
'1s',
'1st',
'1w2',
'1w9',
'20',
'200',
'2000',
'2001',
'2005',
'2006',
'2007',
'2008',
'2009',
'2010',
'2011',
'2012',
'2013',
'2014',
'2015',
'2016',
'2017',
'20s',
```

```
'20th',
'21',
'21st',
'22',
'23',
'24',
'25',
'26',
'27',
'28',
'29',
'2nd',
'2w1',
'2w3',
'30',
'300',
'30s',
'31',
'32',
'33',
'34',
'35',
'36',
'37',
'38',
'39',
'3D',
'3rd',
'3s',
'3w2',
'3w4',
'40',
'400',
'41',
'42',
'43',
'44',
'45',
'46',
'47',
'48',
'49',
'4s',
'4th',
'4w3',
'4w5',
'50',
'500',
```

```
'51',
'52',
'53',
'54',
'55',
'56',
'564x',
'57',
'58',
'59',
'5s',
'5th',
'5w4',
'5w6',
'60',
'600',
'60s',
'61',
'62',
'63',
'64',
'65',
'66',
'67',
'68',
'69',
'6s',
'6th',
'6w5',
'6w7',
'70',
'70s',
'71',
'72',
'73',
'736x',
'74',
'75',
'76',
'77',
'78',
'79',
'7s',
'7th',
'7w6',
'7w8',
'80',
'80s',
```

```
            '81',
            '82',
            '83',
            '84',
            '85',
            '86',
            '87',
            '88',
            '89',
            '8s',
            '8th',
            '8w7',
            '8w9',
            '90',
            '90s',
            '91',
            '92',
            '94',
            '95',
            '98',
            '99',
            '9s',
            '9th',
            '9w1',
            '9w8', '125',
            '160',
            '2003',
            '2004',])
```

In [93]:
```
#create our count vectorizer
count_vectorizer = CountVectorizer(analyzer='word', min_df=1, stop_words = stop_words

#Transform the list of strings
transform = count_vectorizer.fit_transform(data.posts).toarray()
```

In [94]:
```
#shows list of stopwords
#count_vectorizer.get_stop_words()
```

Out[94]:
```
frozenset({'00',
           '000',
           '01',
           '02',
           '03',
           '04',
           '05',
           '06',
           '07',
           '08',
```

```
'09',
'10',
'100',
'1000',
'101',
'10th',
'11',
'110',
'11th',
'12',
'120',
'125',
'13',
'130',
'14',
'140',
'15',
'150',
'16',
'160',
'16personalities',
'17',
'18',
'180',
'19',
'1984',
'1995',
'1s',
'1st',
'1w2',
'1w9',
'20',
'200',
'2000',
'2001',
'2003',
'2004',
'2005',
'2006',
'2007',
'2008',
'2009',
'2010',
'2011',
'2012',
'2013',
'2014',
'2015',
```

```
'2016',
'2017',
'20s',
'20th',
'21',
'21st',
'22',
'23',
'24',
'25',
'26',
'27',
'28',
'29',
'2nd',
'2w1',
'2w3',
'30',
'300',
'30s',
'31',
'32',
'33',
'34',
'35',
'36',
'37',
'38',
'39',
'3D',
'3rd',
'3s',
'3w2',
'3w4',
'40',
'400',
'41',
'42',
'43',
'44',
'45',
'46',
'47',
'48',
'49',
'4s',
'4th',
'4w3',
```

```
'4w5',
'50',
'500',
'51',
'52',
'53',
'54',
'55',
'56',
'564x',
'57',
'58',
'59',
'5s',
'5th',
'5w4',
'5w6',
'60',
'600',
'60s',
'61',
'62',
'63',
'64',
'65',
'66',
'67',
'68',
'69',
'6s',
'6th',
'6w5',
'6w7',
'70',
'70s',
'71',
'72',
'73',
'736x',
'74',
'75',
'76',
'77',
'78',
'79',
'7s',
'7th',
'7w6',
```

```
'7w8',
'80',
'80s',
'81',
'82',
'83',
'84',
'85',
'86',
'87',
'88',
'89',
'8s',
'8th',
'8w7',
'8w9',
'90',
'90s',
'91',
'92',
'94',
'95',
'98',
'99',
'9s',
'9th',
'9w1',
'9w8',
'a',
'about',
'above',
'across',
'after',
'afterwards',
'again',
'against',
'all',
'almost',
'alone',
'along',
'already',
'also',
'although',
'always',
'am',
'among',
'amongst',
'amoungst',
```

```
'amount',
'an',
'and',
'another',
'any',
'anyhow',
'anyone',
'anything',
'anyway',
'anywhere',
'are',
'around',
'as',
'at',
'back',
'be',
'became',
'because',
'become',
'becomes',
'becoming',
'been',
'before',
'beforehand',
'behind',
'being',
'below',
'beside',
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'between',
'beyond',
'bill',
'both',
'bottom',
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'call',
'can',
'cannot',
'cant',
'co',
'com',
'con',
'could',
'couldnt',
'cry',
'de',
'describe',
```

```
'detail',
'do',
'done',
'down',
'due',
'during',
'each',
'eg',
'eight',
'either',
'eleven',
'else',
'elsewhere',
'empty',
'enfj',
'enfjs',
'enfp',
'enfps',
'enough',
'entj',
'entjs',
'entp',
'entps',
'esfjs',
'estps',
'etc',
'even',
'ever',
'every',
'everyone',
'everything',
'everywhere',
'except',
'existence',
'few',
'fifteen',
'fifty',
'fill',
'find',
'fire',
'first',
'five',
'for',
'former',
'formerly',
'forty',
'found',
'four',
```

```
'from',
'front',
'full',
'further',
'get',
'give',
'go',
'had',
'has',
'hasnt',
'have',
'he',
'hence',
'her',
'here',
'hereafter',
'hereby',
'herein',
'hereupon',
'hers',
'herself',
'him',
'himself',
'his',
'how',
'however',
'http',
'https',
'hundred',
'i',
'ie',
'if',
'in',
'inc',
'indeed',
'infj',
'infjs',
'infp',
'infps',
'interest',
'intj',
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'intp',
'intps',
'is',
'isfj',
'istj',
'istp',
```

```
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'keep',
'last',
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'latterly',
'least',
'less',
'ltd',
'made',
'many',
'may',
'me',
'meanwhile',
'might',
'mill',
'mine',
'more',
'moreover',
'most',
'mostly',
'move',
'much',
'must',
'my',
'myself',
'name',
'namely',
'neither',
'never',
'nevertheless',
'next',
'nine',
'no',
'nobody',
'none',
'noone',
'nor',
'not',
'nothing',
'now',
'nowhere',
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'off',
'often',
'on',
'once',
```

```
'one',
'only',
'onto',
'or',
'other',
'others',
'otherwise',
'our',
'ours',
'ourselves',
'out',
'over',
'own',
'part',
'per',
'perhaps',
'please',
'put',
'rather',
're',
'same',
'see',
'seem',
'seemed',
'seeming',
'seems',
'serious',
'several',
'she',
'should',
'show',
'side',
'since',
'sincere',
'six',
'sixty',
'so',
'some',
'somehow',
'someone',
'something',
'sometime',
'sometimes',
'somewhere',
'still',
'such',
'system',
'take',
```

```
'ten',
'than',
'that',
'the',
'their',
'them',
'themselves',
'then',
'thence',
'there',
'thereafter',
'thereby',
'therefore',
'therein',
'thereupon',
'these',
'they',
'thick',
'thin',
'third',
'this',
'those',
'though',
'three',
'through',
'throughout',
'thru',
'thus',
'to',
'together',
'too',
'top',
'toward',
'towards',
'twelve',
'twenty',
'two',
'un',
'under',
'until',
'up',
'upon',
'us',
'very',
'via',
'was',
'we',
'well',
```

```
                    'were',
                    'what',
                    'whatever',
                    'when',
                    'whence',
                    'whenever',
                    'where',
                    'whereafter',
                    'whereas',
                    'whereby',
                    'wherein',
                    'whereupon',
                    'wherever',
                    'whether',
                    'which',
                    'while',
                    'whither',
                    'who',
                    'whoever',
                    'whole',
                    'whom',
                    'whose',
                    'why',
                    'will',
                    'with',
                    'within',
                    'without',
                    'would',
                    'yet',
                    'you',
                    'your',
                    'yours',
                    'yourself',
                    'yourselves',
                    'youtube'})
```

```
In [95]: transform
```

```
Out[95]: array([[0, 0, 0, ..., 0, 0, 0],
                [0, 1, 0, ..., 0, 0, 0],
                [2, 1, 2, ..., 0, 0, 0],
                ...,
                [0, 0, 0, ..., 0, 0, 1],
                [0, 2, 0, ..., 0, 0, 0],
                [0, 1, 0, ..., 1, 0, 0]], dtype=int64)
```

```
In [96]: transform.shape
```

```
Out[96]: (8675, 1000)
```

```
In [97]: count_vectorizer.get_feature_names()
```

```
Out[97]: ['ability',
          'able',
          'absolutely',
          'accept',
          'according',
          'accurate',
          'act',
          'action',
          'actions',
          'actual',
          'actually',
          'add',
          'admit',
          'advice',
          'afraid',
          'age',
          'ago',
          'agree',
          'ah',
          'albums',
          'alot',
          'alright',
          'amazing',
          'anger',
          'angry',
          'animals',
          'anime',
          'annoying',
          'answer',
          'answers',
          'anxiety',
          'anymore',
          'anyways',
          'apparently',
          'appreciate',
          'approach',
          'area',
          'aren',
          'argument',
          'art',
          'article',
          'ask',
          'asked',
          'asking',
          'ass',
          'assume',
```

```
'attention',
'attracted',
'attractive',
'avatar',
'average',
'avoid',
'aware',
'away',
'awesome',
'awkward',
'baby',
'bad',
'based',
'basically',
'beautiful',
'bed',
'beginning',
'behavior',
'believe',
'best',
'better',
'big',
'biggest',
'bit',
'black',
'blue',
'blushed',
'body',
'book',
'books',
'bored',
'boring',
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'bother',
'boy',
'boyfriend',
'brain',
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'bring',
'brother',
'btw',
'bunch',
'business',
'busy',
'buy',
'called',
'calm',
'came',
```

```
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'care',
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'caring',
'case',
'cat',
'cats',
'cause',
'certain',
'certainly',
'chance',
'change',
'changed',
'character',
'characters',
'check',
'child',
'childhood',
'children',
'choice',
'choose',
'city',
'class',
'classes',
'clear',
'clearly',
'close',
'closest',
'coffee',
'cognitive',
'cold',
'college',
'color',
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'comes',
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'coming',
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'comments',
'common',
'communication',
'company',
'complete',
'completely',
'computer',
'concept',
'confidence',
'confident',
```

```
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'constantly',
'contact',
'content',
'control',
'conversation',
'conversations',
'cool',
'correct',
'couldn',
'count',
'country',
'couple',
'course',
'crap',
'crazy',
'create',
'creative',
'crying',
'curious',
'current',
'currently',
'cut',
'cute',
'dad',
'damn',
'dark',
'date',
'dated',
'dating',
'day',
'days',
'dead',
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'death',
'debate',
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'deep',
```

```
'definitely',
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'despite',
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'did',
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'die',
'difference',
'different',
'difficult',
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'discussion',
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'dom',
'dominant',
'don',
'dont',
'door',
'double',
'doubt',
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'dream',
'dreams',
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'drive',
'drunk',
'dry',
'dude',
'earlier',
'early',
'earth',
'easier',
'easily',
'easy',
```

```
'eat',
'eating',
'edit',
'effort',
'emotion',
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'emotionally',
'emotions',
'end',
'ended',
'energy',
'english',
'enjoy',
'enneagram',
'entire',
'entirely',
'environment',
'esfj',
'esfp',
'especially',
'estj',
'estp',
'eventually',
'everybody',
'evil',
'ex',
'exact',
'exactly',
'example',
'excited',
'exist',
'expect',
'experience',
'experienced',
'experiences',
'explain',
'express',
'extremely',
'extrovert',
'extroverted',
'eye',
'eyes',
'face',
'facebook',
'fact',
'fair',
'fairly',
'fall',
```

```
'family',
'fan',
'far',
'fast',
'father',
'favorite',
'favourite',
'fe',
'fear',
'feature',
'feel',
'feeling',
'feelings',
'feels',
'fellow',
'felt',
'female',
'fi',
'fight',
'figure',
'figured',
'finally',
'finding',
'fine',
'fit',
'fits',
'fix',
'focus',
'follow',
'following',
'food',
'forever',
'forget',
'forgot',
'form',
'forum',
'forums',
'forward',
'free',
'friend',
'friendly',
'friends',
'friendship',
'frustrating',
'fuck',
'fucking',
'fully',
'fun',
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```
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'gender',
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'generally',
'gets',
'getting',
'gif',
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'god',
'goes',
'going',
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In [98]:
```
#deploy and evaluate model
X=transform
y= data.extroverted
LogReg = LogisticRegression()
log_model = LogReg.fit(X, y)
```

```
print(LogReg.score(X, y))
```

```
0.831469740634
```

```
In [99]: y_pred = LogReg.predict(X)
         from sklearn.metrics import classification_report
         #print(classification_report(y, y_pred))
         y_pred
```

```
Out[99]: array([0, 1, 0, ..., 0, 0, 0])
```

```
In [100]: #predict probability
          LogReg.predict_proba(X)
```

```
Out[100]: array([[ 0.98611172,  0.01388828],
                 [ 0.24652963,  0.75347037],
                 [ 0.9876008 ,  0.0123992 ],
                 ...,
                 [ 0.79772296,  0.20227704],
                 [ 0.58838976,  0.41161024],
                 [ 0.91377169,  0.08622831]])
```

```
In [101]: # Check trained model intercept
          print("Intercept is ",  log_model.intercept_)

          # Check trained model coefficients
          print("Coefficients are",  log_model.coef_)
```

```
Intercept is  [-0.87775154]
Coefficients are [[ -5.28997687e-02   2.86176034e-02   3.36041054e-02  -2.36611411e-02
    1.00055925e-02  -1.36921426e-01   2.17613577e-02  -1.52126704e-02
    2.30634796e-01   4.47117324e-02  -4.68193753e-05  -2.16254118e-03
    5.37954702e-02   1.87829004e-02  -2.01270984e-01  -8.77103720e-03
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    1.00810903e-01   4.05735170e-02   1.48017034e-02   1.34121369e-01
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-5.39729542e-02   1.04324060e-01  -2.95437526e-02  -8.87672460e-03
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-1.32443714e-01  -9.51262500e-03  -6.66672776e-02   1.74105195e-01
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```

```
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-8.44513455e-02  -5.96593286e-02   4.22946907e-02  -3.91376724e-02
-1.81618015e-01  -8.39978736e-03  -2.44834387e-02   1.58894406e-02
-1.08004283e-03  -5.50080540e-02   5.82458148e-02   4.06688104e-02
-9.03479712e-02  -1.56151110e-02   4.30672076e-02   2.55520622e-02
 1.24270145e-01   3.44759683e-02  -6.85284125e-02  -9.39562082e-02
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-4.54053365e-02   1.07477156e-01   1.92637653e-02   1.55891156e-01
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-1.79671742e-01  -7.60417275e-02   5.25447248e-03   2.08255012e-01
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```

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 2.46077587e-02  -5.59602070e-02   9.21090493e-02   9.58411534e-03
-1.69025182e-02   1.15292952e-01  -8.48786095e-02  -5.08668811e-02]]
```

In [102]:
```
#http://scikit-learn.org/stable/auto_examples/feature_selection/plot_rfe_with_cross_
from sklearn.model_selection import StratifiedKFold
from sklearn.feature_selection import RFECV
from sklearn.datasets import make_classification

# Create the RFE object and compute a cross-validated score.
```

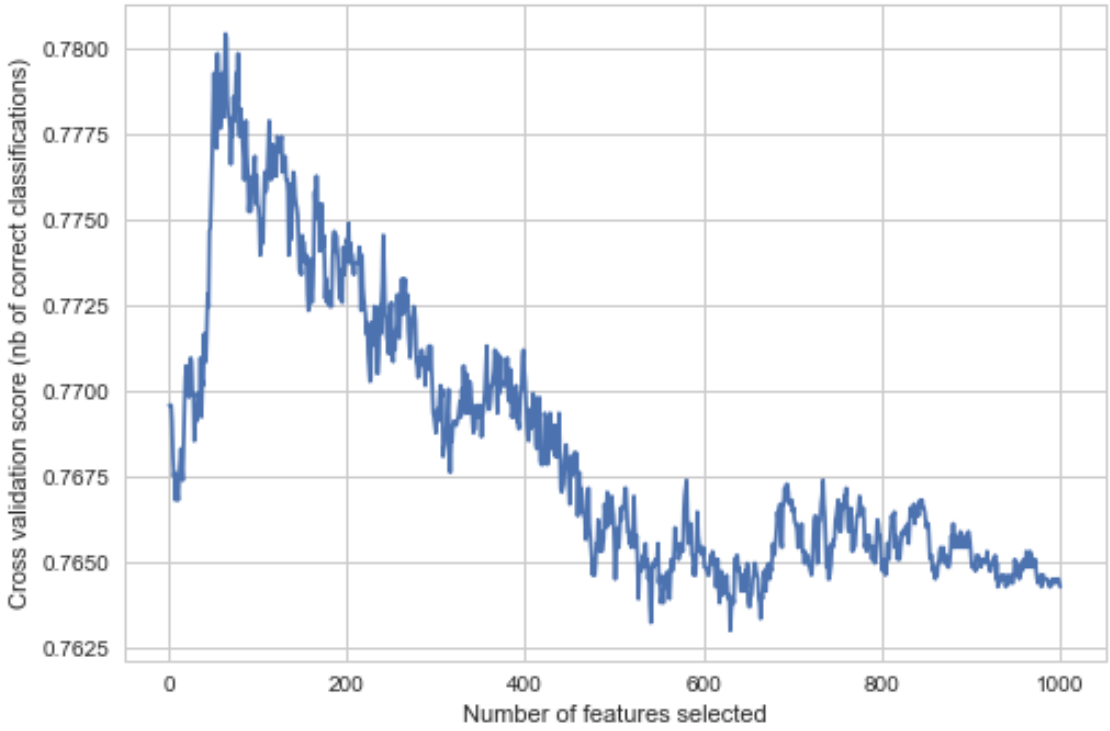
```
        # The "accuracy" scoring is proportional to the number of correct
        # classifications
        rfecv = RFECV(estimator=LogReg, step=1, cv=StratifiedKFold(10),
                      scoring='accuracy')
        rfecv.fit(X, y)

        print("Optimal number of features : %d" % rfecv.n_features_)
```

```
Optimal number of features : 64
```

In [ ]:

In [103]:
```
        # Plot number of features VS. cross-validation scores
        plt.figure()
        plt.xlabel("Number of features selected")
        plt.ylabel("Cross validation score (nb of correct classifications)")
        plt.plot(range(1, len(rfecv.grid_scores_) + 1), rfecv.grid_scores_)
        plt.show()
```



In [104]:
```
        logit_model=sm.Logit(y,rfecv.transform(X))
        result=logit_model.fit()
        print(result.summary())
```

```
Optimization terminated successfully.
         Current function value: 0.488907
         Iterations 6
                           Logit Regression Results
==============================================================================
Dep. Variable:            extroverted   No. Observations:                 8675
Model:                          Logit   Df Residuals:                     8611
Method:                           MLE   Df Model:                           63
Date:                Mon, 30 Apr 2018   Pseudo R-squ.:                0.09428
Time:                        01:25:08   Log-Likelihood:                -4241.3
converged:                       True   LL-Null:                       -4682.7
                                        LLR p-value:                6.310e-145
==============================================================================
                 coef    std err          z      P>|z|      [0.025      0.975]
------------------------------------------------------------------------------
x1            -0.2796      0.082     -3.409      0.001      -0.440      -0.119
x2            -0.4072      0.087     -4.685      0.000      -0.578      -0.237
x3            -0.3751      0.080     -4.679      0.000      -0.532      -0.218
x4             0.0964      0.034      2.821      0.005       0.029       0.163
x5             0.2167      0.053      4.112      0.000       0.113       0.320
x6            -0.3678      0.086     -4.258      0.000      -0.537      -0.199
x7             0.2101      0.061      3.450      0.001       0.091       0.329
x8            -0.3686      0.085     -4.331      0.000      -0.535      -0.202
x9            -0.3287      0.067     -4.915      0.000      -0.460      -0.198
x10           -0.3497      0.066     -5.303      0.000      -0.479      -0.220
x11            0.1480      0.065      2.280      0.023       0.021       0.275
x12           -0.3967      0.094     -4.223      0.000      -0.581      -0.213
x13           -0.3960      0.063     -6.256      0.000      -0.520      -0.272
x14            0.2166      0.063      3.436      0.001       0.093       0.340
x15           -0.3510      0.085     -4.143      0.000      -0.517      -0.185
x16            0.1404      0.066      2.116      0.034       0.010       0.270
x17           -0.3618      0.073     -4.946      0.000      -0.505      -0.218
x18           -0.3571      0.089     -4.005      0.000      -0.532      -0.182
x19           -0.3590      0.093     -3.879      0.000      -0.540      -0.178
x20           -0.3880      0.057     -6.767      0.000      -0.500      -0.276
x21           -0.4044      0.083     -4.875      0.000      -0.567      -0.242
x22           -0.4773      0.089     -5.351      0.000      -0.652      -0.303
x23            0.1700      0.023      7.545      0.000       0.126       0.214
x24            0.1203      0.072      1.681      0.093      -0.020       0.261
x25            0.1447      0.077      1.882      0.060      -0.006       0.295
x26           -0.3226      0.039     -8.346      0.000      -0.398      -0.247
x27            0.0697      0.067      1.037      0.300      -0.062       0.202
x28            0.1176      0.079      1.494      0.135      -0.037       0.272
x29            0.1237      0.028      4.380      0.000       0.068       0.179
x30           -0.3085      0.053     -5.781      0.000      -0.413      -0.204
x31           -0.3753      0.078     -4.827      0.000      -0.528      -0.223
x32            0.0636      0.077      0.824      0.410      -0.088       0.215
x33           -0.3482      0.086     -4.065      0.000      -0.516      -0.180
```

```
x34            0.1757      0.051      3.441      0.001      0.076      0.276
x35            0.1278      0.061      2.092      0.036      0.008      0.247
x36           -0.3251      0.060     -5.430      0.000     -0.442     -0.208
x37            0.0249      0.064      0.387      0.699     -0.101      0.151
x38           -0.4431      0.064     -6.899      0.000     -0.569     -0.317
x39            0.0856      0.079      1.077      0.281     -0.070      0.241
x40            0.0914      0.070      1.311      0.190     -0.045      0.228
x41            0.0864      0.073      1.182      0.237     -0.057      0.230
x42           -0.4092      0.063     -6.537      0.000     -0.532     -0.287
x43            0.2524      0.025     10.295      0.000      0.204      0.300
x44           -0.2935      0.030     -9.751      0.000     -0.353     -0.235
x45            0.1028      0.058      1.772      0.076     -0.011      0.216
x46            0.0927      0.063      1.472      0.141     -0.031      0.216
x47           -0.3401      0.070     -4.877      0.000     -0.477     -0.203
x48           -0.3800      0.093     -4.104      0.000     -0.561     -0.199
x49           -0.3784      0.079     -4.818      0.000     -0.532     -0.224
x50           -0.3356      0.086     -3.892      0.000     -0.505     -0.167
x51           -0.4486      0.065     -6.866      0.000     -0.577     -0.321
x52           -0.3551      0.073     -4.851      0.000     -0.499     -0.212
x53           -0.3911      0.090     -4.350      0.000     -0.567     -0.215
x54           -0.3786      0.079     -4.768      0.000     -0.534     -0.223
x55            0.1229      0.079      1.561      0.119     -0.031      0.277
x56            0.1349      0.046      2.963      0.003      0.046      0.224
x57            0.0607      0.056      1.084      0.279     -0.049      0.170
x58           -0.4425      0.096     -4.610      0.000     -0.631     -0.254
x59           -0.3022      0.074     -4.059      0.000     -0.448     -0.156
x60           -0.3740      0.084     -4.446      0.000     -0.539     -0.209
x61            0.1402      0.058      2.406      0.016      0.026      0.254
x62           -0.3147      0.069     -4.567      0.000     -0.450     -0.180
x63            0.0515      0.076      0.673      0.501     -0.098      0.201
x64            0.0571      0.068      0.841      0.400     -0.076      0.190
==============================================================================
```

```
In [106]: rfecv.get_support()
```

```
Out[106]: array([False, False, False, False, False, False, False, False, False,
                 False, False, False, False, False, False, False, False, False,
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       False, False, False, False, False, False, False, False, False,
       False, False, False, False, False, False, False, False, False, False], dtype=b
```

In [120]:
```
support = rfecv.get_support()
#Now support is an array, you can use that to efficiently extract the name of your s

feature_names = np.array(count_vectorizer.get_feature_names()) # transformed list to

feature_names_support = feature_names[support]
```

In [108]:
```
rfecv.score(X, y)
```

Out[108]:
```
0.7887031700288184
```

In [146]:
```
#change max rows to show
pd.options.display.max_rows =100
pd.options.display.max_rows
```

Out[146]:
```
100
```

In [148]:
```
final = pd.DataFrame({'feature name':feature_names_support, 'coefficient': result.par
#https://stackoverflow.com/questions/13148429/how-to-change-the-order-of-dataframe-c
def order(frame,var):
    if type(var) is str:
        var = [var] #let the command take a string or list
    varlist =[w for w in frame.columns if w not in var]
    frame = frame[var+varlist]
    return frame
final = order(final, ['feature name'])
final = final.sort_values('coefficient', ascending = False)
final
```

Out[148]:

	feature name	coefficient
x43	ne	0.252407
x5	bored	0.216664
x14	debate	0.216558
x7	business	0.210116
x34	hahaha	0.175742
x23	estp	0.170026
x11	dated	0.148015
x25	excited	0.144750
x16	developed	0.140425
x61	wanna	0.140193
x56	super	0.134935
x35	hot	0.127757
x29	fun	0.123675
x55	spot	0.122939
x24	exact	0.120324

x28	friendly	0.117644
x45	nt	0.102775
x4	awesome	0.096438
x46	omg	0.092722
x40	mad	0.091433
x41	match	0.086433
x39	loves	0.085567
x27	fight	0.069748
x32	goal	0.063616
x57	term	0.060655
x64	win	0.057083
x63	willing	0.051451
x37	line	0.024871
x1	animals	-0.279573
x44	ni	-0.293545
x59	videos	-0.302228
x30	games	-0.308529
x62	watched	-0.314680
x26	family	-0.322591
x36	inferior	-0.325118
x9	comfortable	-0.328738
x50	played	-0.335559
x47	particularly	-0.340056
x33	green	-0.348198
x10	computer	-0.349727
x15	details	-0.351033
x52	rarely	-0.355133
x18	door	-0.357116
x19	draw	-0.358962
x17	dislike	-0.361827
x6	boy	-0.367780
x8	cats	-0.368608
x60	walking	-0.374019
x3	average	-0.375111
x31	gender	-0.375306
x49	philosophy	-0.378426
x54	soul	-0.378604
x48	parts	-0.379960
x20	dream	-0.387978
x53	sign	-0.391099
x13	death	-0.396006
x12	dealing	-0.396716
x21	dry	-0.404414
x2	anime	-0.407223
x42	nature	-0.409219
x58	uncomfortable	-0.442473
x38	listening	-0.443149
x51	quiet	-0.448619

```
x22           earth     -0.477344
```