Resume Cleaning using NLP Techniques

Neccessary Imports

```
import numpy as np
import pandas as pd
import re
import nltk
from nltk.corpus import stopwords
import string
from wordcloud import WordCloud
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline

nltk.download('wordnet')
```

```
[nltk_data] Downloading package wordnet to
[nltk_data]     C:\Users\hp\AppData\Roaming\nltk_data...
[nltk_data]   Package wordnet is already up-to-date!

True
```

Importing the dataset

```
df = pd.read_csv(r'Resume_Data.csv', encoding = 'utf-8')
df['Cleaned_Resume'] = ''
```

Exploratory Data Analysis

```
df.head()
```

```
       Category                                             Resume  \
0  Data Science  Skills * Programming Languages: Python (pandas...
1  Data Science  Education Details \r\nMay 2013 to May 2017 B.E...
2  Data Science  Areas of Interest Deep Learning, Control Syste...
3  Data Science  Skills â¢ R â¢ Python â¢ SAP HANA â¢ Table...
4  Data Science  Education Details \r\n MCA   YMCAUST,  Faridab...

  Cleaned_Resume
0
1
2
3
4
```

```
print("Resume Categories")
print(df['Category'].value_counts())
```

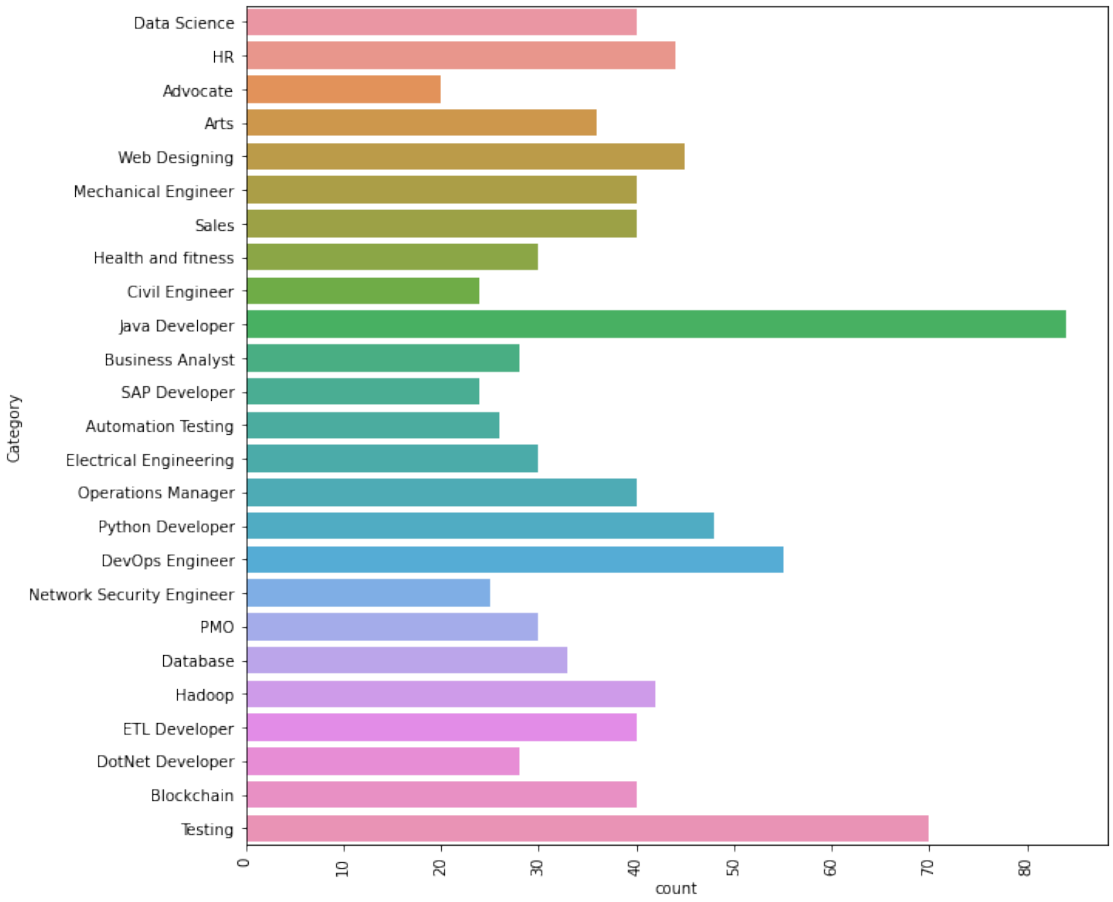
```
Resume Categories
Java Developer               84
Testing                      70
```

```
DevOps Engineer               55
Python Developer              48
Web Designing                 45
HR                            44
Hadoop                        42
Data Science                  40
Blockchain                    40
ETL Developer                 40
Operations Manager            40
Mechanical Engineer           40
Sales                         40
Arts                          36
Database                      33
Electrical Engineering        30
PMO                           30
Health and fitness            30
DotNet Developer              28
Business Analyst              28
Automation Testing            26
Network Security Engineer     25
Civil Engineer                24
SAP Developer                 24
Advocate                      20
Name: Category, dtype: int64
```

Visualizing types of people who have given the resume

```
plt.figure(figsize = (10, 10))
# Setting size of plot
plt.xticks(rotation = 90)
# Rotating plot to organize horizontally
sns.countplot(y = 'Category', data = df)
# Deciding which column of Dataframe will the source for plot
```

```
<AxesSubplot:xlabel='count', ylabel='Category'>
```



Data Cleaning

```
def Clean_Resume(resumeText):
    Removals = [
# Deciding weeds in resume
        'http\S+\s*',
# Web URLs
        'RT|cc',
# Regular characters
        '#\S+',
# Hashtags
        '@\S+',
# Emails
        '\s+'
    ]

    for weed in Removals: resumeText = re.sub(weed, ' ', resumeText)
# Removing weeds using regular expression
    resumeText = re.sub('[%s]'%re.escape("""!"#$%&'_=-+()[];:,./?
^*@{}|\~"""), ' ', resumeText)
    resumeText = re.sub(r'[^x00-x7f]', r' ', resumeText)

    return resumeText
```

```
df['Cleaned_Resume'] = df.Resume.apply(lambda x: Clean_Resume(x))
df.head()
```

```
       Category                                             Resume  \
0  Data Science  Skills * Programming Languages: Python (pandas...
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                                      Cleaned_Resume
0  Skills   Programming Languages  P thon  pandas...
1  Education Details Ma  2013 to Ma  2017 B E UIT...
2  Areas of Interest Deep Learning  Control S ste...
3  Skills     R     P thon     SAP HANA     Table...
4  Education Details MCA YMCAUST  Faridabad  Har ...
```

```
corpus = ''
for i in range(len(df)): corpus += df['Cleaned_Resume'][i]
corpus[450:1000]
```

```
'ticSearch D3 js  DC js  Plotl   kibana  matplotlib  ggplot  Tableau
Others  Regular Expression  HTML  CSS  Angular 6  Logstash  Kafka  P
thon Flask  Git  Docker  computer vision   Open CV and understanding
of Deep learning Education Details Data Science Assurance Associate
Data Science Assurance Associate   Ernst   Young LLP Skill Details
JAVASCRIPT  Exprience   24 months jQuer   Exprience   24 months P thon
Exprience   24 monthsCompan  Details compan    Ernst   Young LLP
description   Fraud Investigations and Dispute Services Assurance TEC'
```

Creating the Tokenizer and Tokenizing

```
tokenizer = nltk.tokenize.RegexpTokenizer('\w+')
tokens = tokenizer.tokenize(corpus)
# Tokenizing the text into individual words

words = [word.lower() for word in tokens]
# Transforming all words to lowercase
print(len(words))
```

```
423116
```

Fetching English Stop Words

```
stopwords = nltk.corpus.stopwords.words('english')
```

Removing Stop words

```
words_new = [
    word
    for word in words
    if word not in stopwords
]
```

```
len(words_new)
```

```
326374
```

Lemmatization

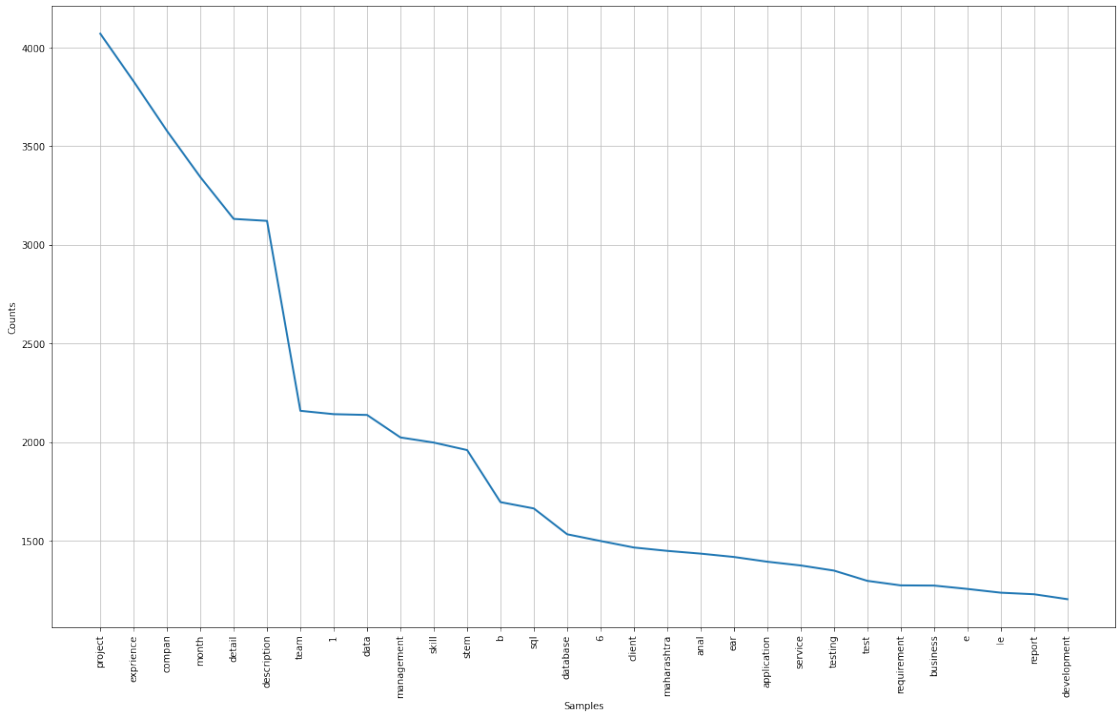
```
from nltk.stem import WordNetLemmatizer
wnl = WordNetLemmatizer()

lem_words = [
    wnl.lemmatize(word)
    for word in words_new
]

same=0
diff=0
for i in range(0,1832):
    if(lem_words[i]==words_new[i]):
        same=same+1
    elif(lem_words[i]!=words_new[i]):
        diff=diff+1
print('Number of words Lemmatized=', diff)
print('Number of words not Lemmatized=', same)
```

```
Number of words Lemmatized= 311
Number of words not Lemmatized= 1521
```

```
freq_dist = nltk.FreqDist(lem_words)
plt.subplots(figsize=(20,12))
freq_dist.plot(30)
```



```
<AxesSubplot:xlabel='Samples', ylabel='Counts'>
```

```
mostcommon = freq_dist.most_common(50)
mostcommon
```

```
[('project', 4071),
 ('exprience', 3829),
 ('compan', 3578),
 ('month', 3344),
 ('detail', 3132),
 ('description', 3122),
 ('team', 2159),
 ('1', 2142),
 ('data', 2138),
 ('management', 2024),
 ('skill', 1998),
 ('stem', 1960),
 ('b', 1696),
 ('sql', 1664),
 ('database', 1533),
 ('6', 1499),
 ('client', 1466),
 ('maharashtra', 1449),
 ('anal', 1435),
 ('ear', 1418),
 ('application', 1394),
 ('service', 1375),
 ('testing', 1349),
 ('test', 1297),
 ('requirement', 1274),
 ('business', 1273),
 ('e', 1256),
 ('le', 1237),
 ('report', 1229),
 ('development', 1204),
 ('server', 1196),
 ('developer', 1194),
 ('customer', 1178),
 ('ltd', 1177),
 ('process', 1163),
 ('using', 1124),
 ('c', 1088),
 ('januar', 1086),
 ('java', 1076),
 ('engineering', 1055),
 ('work', 1038),
 ('pune', 1026),
 ('role', 969),
 ('ing', 925),
 ('user', 916),
 ('operation', 895),
```

```
 ('software', 886),
 ('pvt', 879),
 ('responsibility', 866),
 ('sale', 845)]
```

```
res=' '.join([i for i in lem_words if not i.isdigit()])
```

```
import os
os.system('pip install wordcloud')
```

```
0
```

```
plt.subplots(figsize=(16,10))
wordcloud = WordCloud(
                          background_color='black',
                          max_words=200,
                          width=1400,
                          height=1200
                         ).generate(res)
plt.imshow(wordcloud)
plt.title('Resume Text WordCloud (100 Words)')
plt.axis('off')
plt.show()
```

Resume Text WordCloud (100 Words)

df

	Category	Resume
0	Data Science	Skills * Programming Languages: Python (pandas...
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4	Data Science	Education Details \r\n MCA YMCAUST, Faridab...
..	...	...
957	Testing	Computer Skills: â¢ Proficient in MS office (...
958	Testing	â Willingness to accept the challenges. â ...
959	Testing	PERSONAL SKILLS â¢ Quick learner, â¢ Eagerne...

```
960       Testing  COMPUTER SKILLS & SOFTWARE KNOWLEDGE MS-Power ...

961       Testing  Skill Set OS Windows XP/7/8/8.1/10 Database MY...


                                          Cleaned_Resume
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..                                                 ...
957  Computer Skills      Proficient in MS office  ...
958      Willingness to a ept the challenges      P...
959  PERSONAL SKILLS     Quick learner      Eagerne...
960  COMPUTER SKILLS   SOFTWARE KNOWLEDGE MS Power ...
961  Skill Set OS Windows XP 7 8 8 1 10 Database MY...

[962 rows x 3 columns]
```