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Problem Statement :

Write a program for the Information Retrieval System using appropriate NLP tools (such as NLTK, Open NLP, ...) and perform following operations a. Text tokenization b. Count word frequency c. Remove stop words d. POS tagging

Neccessary Imports

In [8]:
```
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
```

In [9]:
```
nltk.download('wordnet')
```

```
[nltk_data] Downloading package wordnet to
[nltk_data]     C:\Users\akash\AppData\Roaming\nltk_data...
[nltk_data]   Unzipping corpora\wordnet.zip.
```

Out[9]: True

Importing the dataset

In [10]:
```
df = pd.read_csv(r'Resume_Data.csv', encoding = 'utf-8')
df['Cleaned_Resume'] = ''
```

Exploratory Data Analysis

In [11]:
```
df.head()
```

Out[11]:

	Category	Resume	Cleaned_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...	

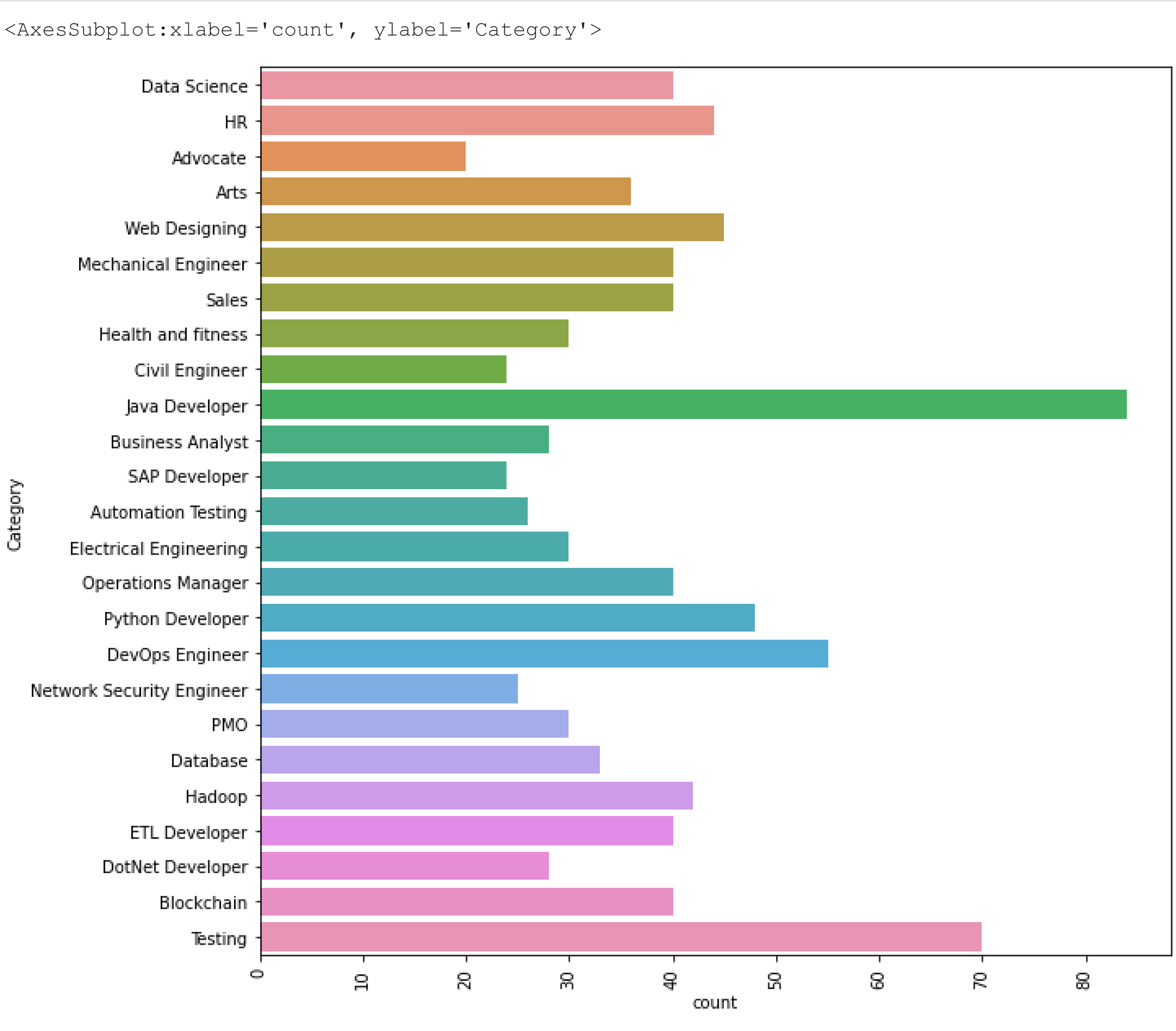
In [12]:
```
print("Resume Categories")
print(df['Category'].value_counts())
```

```
Resume Categories
Java Developer               84
Testing                      70
DevOps Engineer              55
Python Developer             48
Web Designing                45
HR                           44
Hadoop                       42
Sales                        40
Data Science                 40
Operations Manager           40
Mechanical Engineer          40
Blockchain                   40
ETL Developer                40
Arts                         36
Database                     33
PMO                          30
Electrical Engineering       30
Health and fitness           30
Business Analyst             28
DotNet Developer             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

In [13]:
```
plt.figure(figsize = (10, 10))                          # Setting size of plot
plt.xticks(rotation = 90)                               # Rotating plot to organize horizontal
sns.countplot(y = 'Category', data = df)                # Deciding which column of Dataframe w
```

Out[13]: <AxesSubplot:xlabel='count', ylabel='Category'>



Data Cleaning

In [14]:
```
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 express
    resumeText = re.sub('[%s]'%re.escape("""!"#$%&'_=-+()[];:,./?^*@{}|\~"""), ' ', resumeText)
    resumeText = re.sub(r'[^x00-x7f]', r' ', resumeText)

    return resumeText
```

In [15]:
```
df['Cleaned_Resume'] = df.Resume.apply(lambda x: Clean_Resume(x))
df.head()
```

Out[15]:

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

In [16]:
```
corpus = ''
for i in range(len(df)): corpus += df['Cleaned_Resume'][i]
corpus[450:1000]
```

Out[16]:
```
'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 lear
ning Education Details Data Science Assurance Associate Data Science Assurance Associate   Ernst   Young LLP Sk
ill 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

In [17]:
```
tokenizer = nltk.tokenize.RegexpTokenizer('\w+')
tokens = tokenizer.tokenize(corpus)                     # Tokenizing the text into individual w

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

```
423116
```

Fetching English Stop Words

In [18]:
```
nltk.download('stopwords')
stopwords = nltk.corpus.stopwords.words('english')
```

```
[nltk_data] Downloading package stopwords to
[nltk_data]     C:\Users\akash\AppData\Roaming\nltk_data...
[nltk_data]   Unzipping corpora\stopwords.zip.
```

Removing Stop words

In [19]:
```
words_new = [
    word
    for word in words
    if word not in stopwords
]
```

In [20]:
```
len(words_new)
```

Out[20]: 326374

Lemmatization

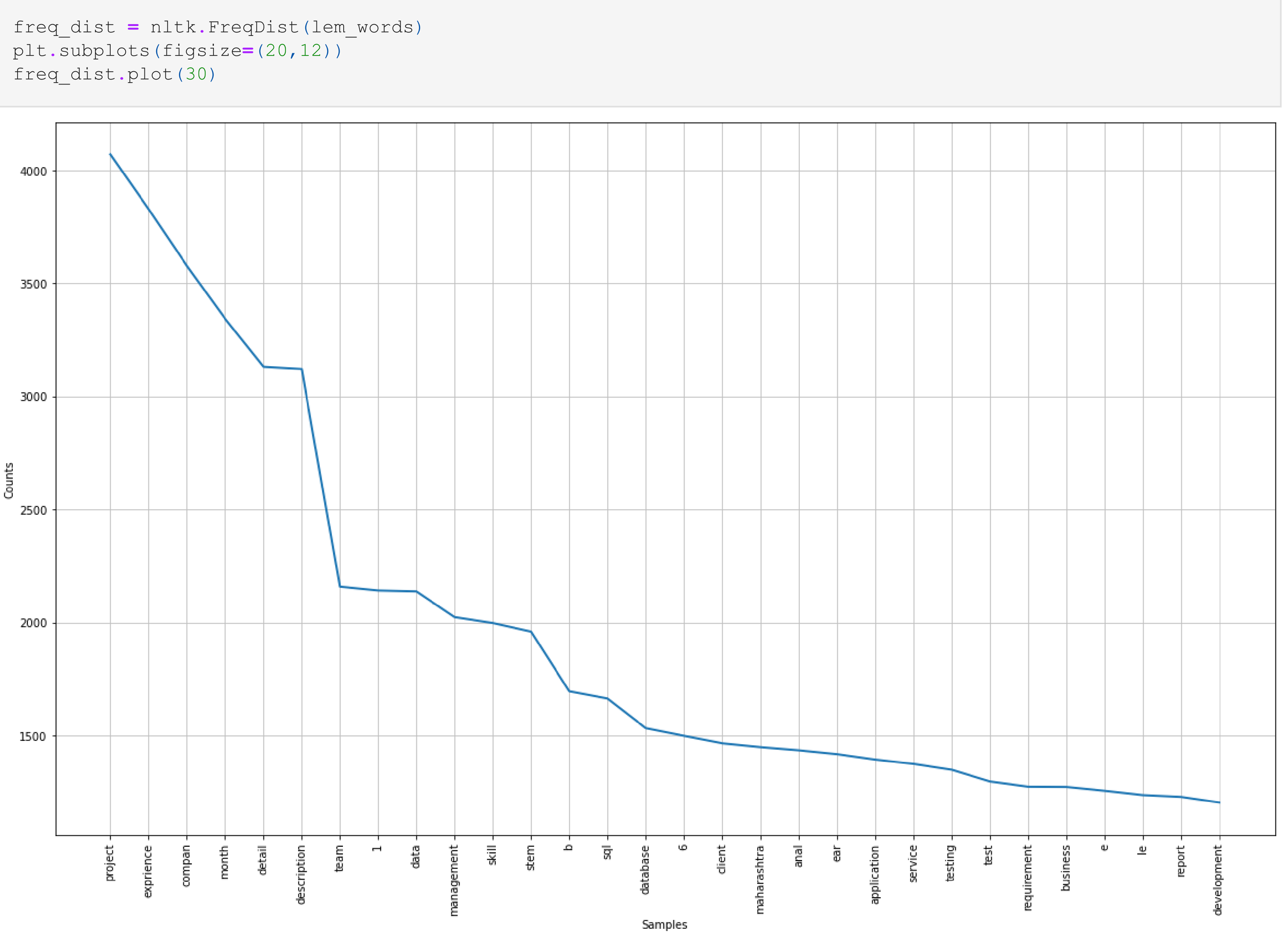
In [21]:
```
from nltk.stem import WordNetLemmatizer
wnl = WordNetLemmatizer()

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

In [22]:
```
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
```

In [23]:
```
freq_dist = nltk.FreqDist(lem_words)
plt.subplots(figsize=(20,12))
freq_dist.plot(30)
```



Out[23]: <AxesSubplot:xlabel='Samples', ylabel='Counts'>

In [24]:
```
mostcommon = freq_dist.most_common(50)
mostcommon
```

Out[24]:
```
[('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)]
```

In [25]:
```
res=' '.join([i for i in lem_words if not i.isdigit()])
```

In [26]:
```
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()
```

In [27]:
```
df
```

Out[27]:

	Category	Resume	Cleaned_Resume
0	Data Science	Skills * Programming Languages: Python (pandas...	Skills Programming Languages P thon pandas...
1	Data Science	Education Details \r\nMay 2013 to May 2017 B.E...	Education Details Ma 2013 to Ma 2017 B E UIT...
2	Data Science	Areas of Interest Deep Learning, Control Syste...	Areas of Interest Deep Learning Control S ste...
3	Data Science	Skills â¢ R â¢ Python â¢ SAP HANA â¢ Table...	Skills R P thon SAP HANA Table...
4	Data Science	Education Details \r\n MCA YMCAUST, Faridab...	Education Details MCA YMCAUST Faridabad Har ...
...	...	...	...
957	Testing	Computer Skills: â¢ Proficient in MS office (...	Computer Skills Proficient in MS office ...
958	Testing	â Willingness to accept the challenges. â ...	Willingness to a ept the challenges P...
959	Testing	PERSONAL SKILLS â¢ Quick learner, â¢ Eagerne...	PERSONAL SKILLS Quick learner Eagerne...
960	Testing	COMPUTER SKILLS & SOFTWARE KNOWLEDGE MS-Power ...	COMPUTER SKILLS SOFTWARE KNOWLEDGE MS Power ...
961	Testing	Skill Set OS Windows XP/7/8/8.1/10 Database MY...	Skill Set OS Windows XP 7 8 8 1 10 Database MY...

962 rows × 3 columns

In [ ]: