In [1]:
```python
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import warnings
warnings.filterwarnings('ignore')
import seaborn as sns
import re
from matplotlib.gridspec import GridSpec
import nltk
from nltk.corpus import stopwords
import string
from wordcloud import WordCloud
from sklearn.preprocessing import LabelEncoder
from sklearn.model_selection import train_test_split
from sklearn.feature_extraction.text import TfidfVectorizer
from scipy.sparse import hstack
from sklearn.naive_bayes import MultinomialNB
from sklearn.multiclass import OneVsRestClassifier
from sklearn import metrics
from sklearn.metrics import accuracy_score
from pandas.plotting import scatter_matrix
from sklearn.neighbors import KNeighborsClassifier
from sklearn import metrics
```

In [2]:
```python
data = pd.read_csv('Resume.txt',encoding='utf-8')
data.head(5)
```

Out[2]:

	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...

In [3]:
```python
data['cleaned_resume'] = ''
data.head(5)
```

Out[3]:

	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...	

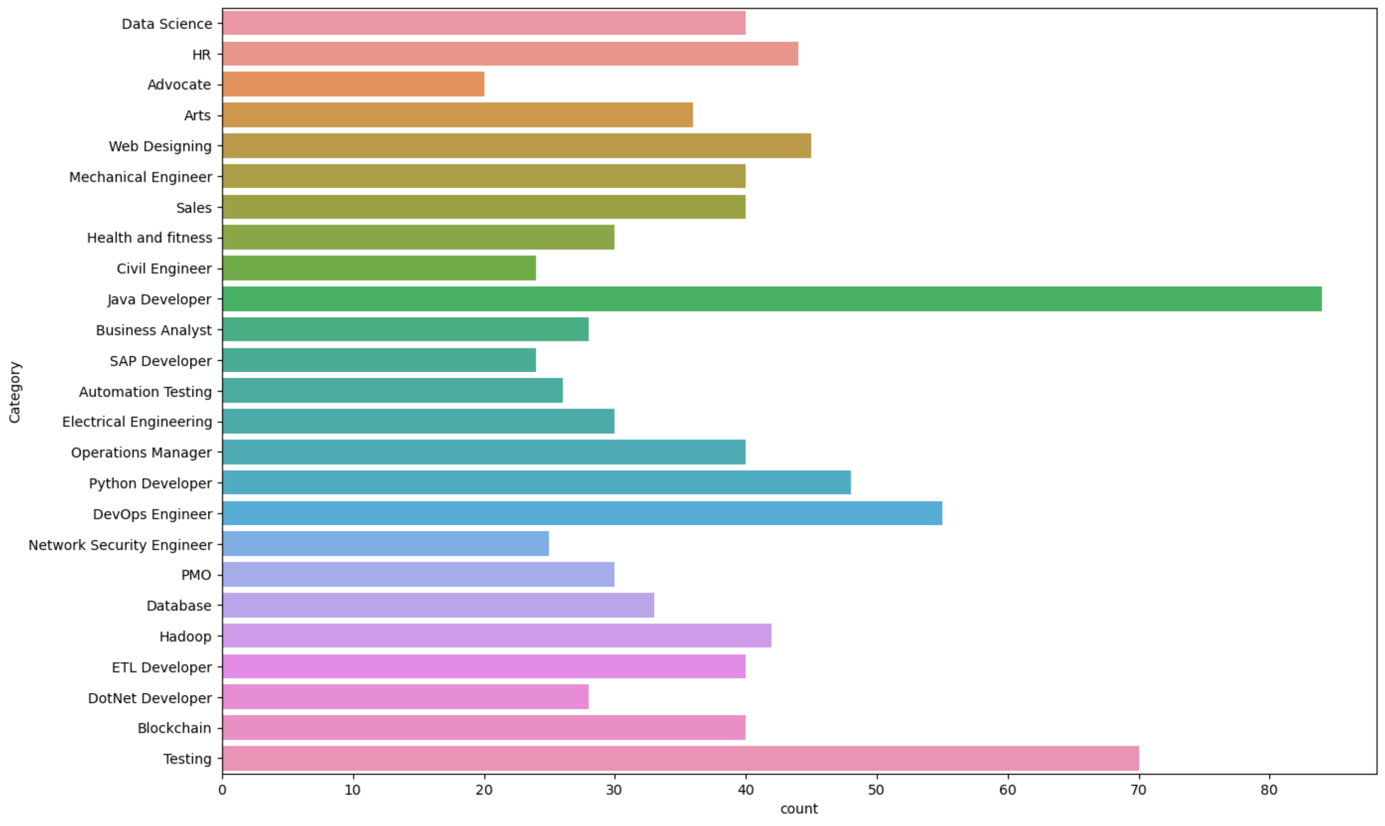
In [4]:
```python
print ("Displaying the distinct categories of resume :")
print (data['Category'].unique())
```

```
Displaying the distinct categories of resume :
['Data Science' 'HR' 'Advocate' 'Arts' 'Web Designing'
 'Mechanical Engineer' 'Sales' 'Health and fitness' 'Civil Engineer'
 'Java Developer' 'Business Analyst' 'SAP Developer' 'Automation Testing'
 'Electrical Engineering' 'Operations Manager' 'Python Developer'
 'DevOps Engineer' 'Network Security Engineer' 'PMO' 'Database' 'Hadoop'
 'ETL Developer' 'DotNet Developer' 'Blockchain' 'Testing']
```

In [5]:
```
print ("Displaying the distinct categories of resume and the number of records belonging
print (data['Category'].value_counts())
```

```
Displaying the distinct categories of resume and the number of records belonging to each
category -
Java Developer               84
Testing                      70
DevOps Engineer              55
Python Developer             48
Web Designing                45
HR                           44
Hadoop                       42
Blockchain                   40
ETL Developer                40
Operations Manager           40
Data Science                 40
Sales                        40
Mechanical Engineer          40
Arts                         36
Database                     33
Electrical Engineering       30
Health and fitness           30
PMO                          30
Business Analyst             28
DotNet Developer             28
Automation Testing           26
Network Security Engineer    25
SAP Developer                24
Civil Engineer               24
Advocate                     20
Name: Category, dtype: int64
```

In [6]:
```
plt.figure(figsize=(15,10))
sns.countplot(y="Category", data=data)
plt.show()
```

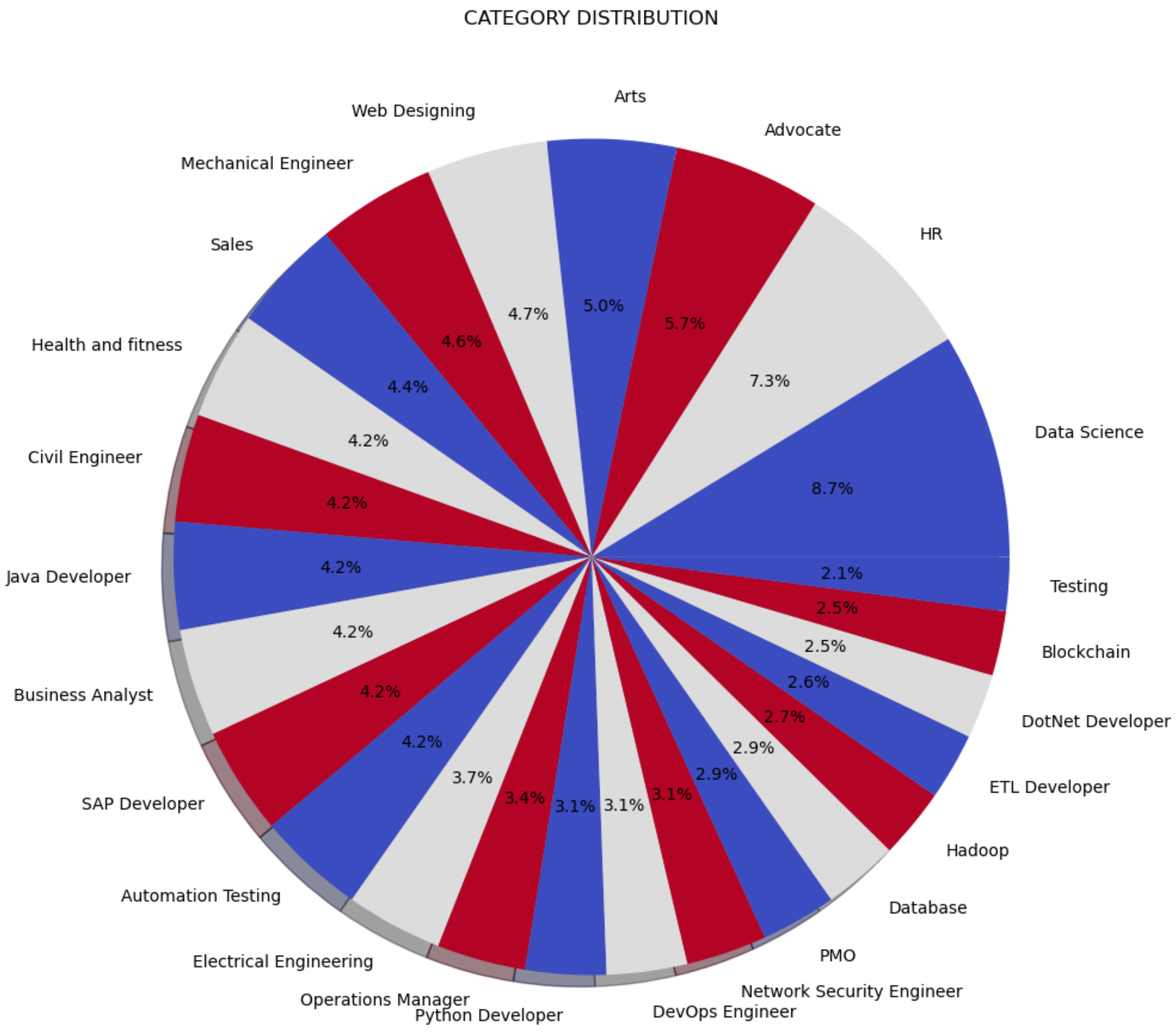


In [7]:
```
targetCounts = data['Category'].value_counts()
targetLabels  = data['Category'].unique()
```

```
# Make square figures and axes
plt.figure(1, figsize=(25,25))
the_grid = GridSpec(2, 2)

cmap = plt.get_cmap('coolwarm')
colors = [cmap(i) for i in np.linspace(0, 1, 3)]
plt.subplot(the_grid[0, 1], aspect=1, title='CATEGORY DISTRIBUTION')

source_pie = plt.pie(targetCounts, labels=targetLabels, autopct='%1.1f%%', shadow=True,
plt.show()
```



In [8]:
```
def cleanResume(resumeText):
    resumeText = re.sub('http\S+\s*', ' ', resumeText)  # remove URLs
    resumeText = re.sub('RT|cc', ' ', resumeText)  # remove RT and cc
    resumeText = re.sub('#\S+', '', resumeText)  # remove hashtags
    resumeText = re.sub('@\S+', '  ', resumeText)  # remove mentions
    resumeText = re.sub('[%s]' % re.escape("""!"#$%&'()*+,-./:;<=>?@[\]^_`{|}~"""), ' ',
    resumeText = re.sub(r'[^\x00-\x7f]',r' ', resumeText)
    resumeText = re.sub('\s+', ' ', resumeText)  # remove extra whitespace
    return resumeText

data['cleaned_resume'] = data.Resume.apply(lambda x: cleanResume(x))
```

In [9]:
```
>>> import nltk
>>> nltk.download('stopwords')
```

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

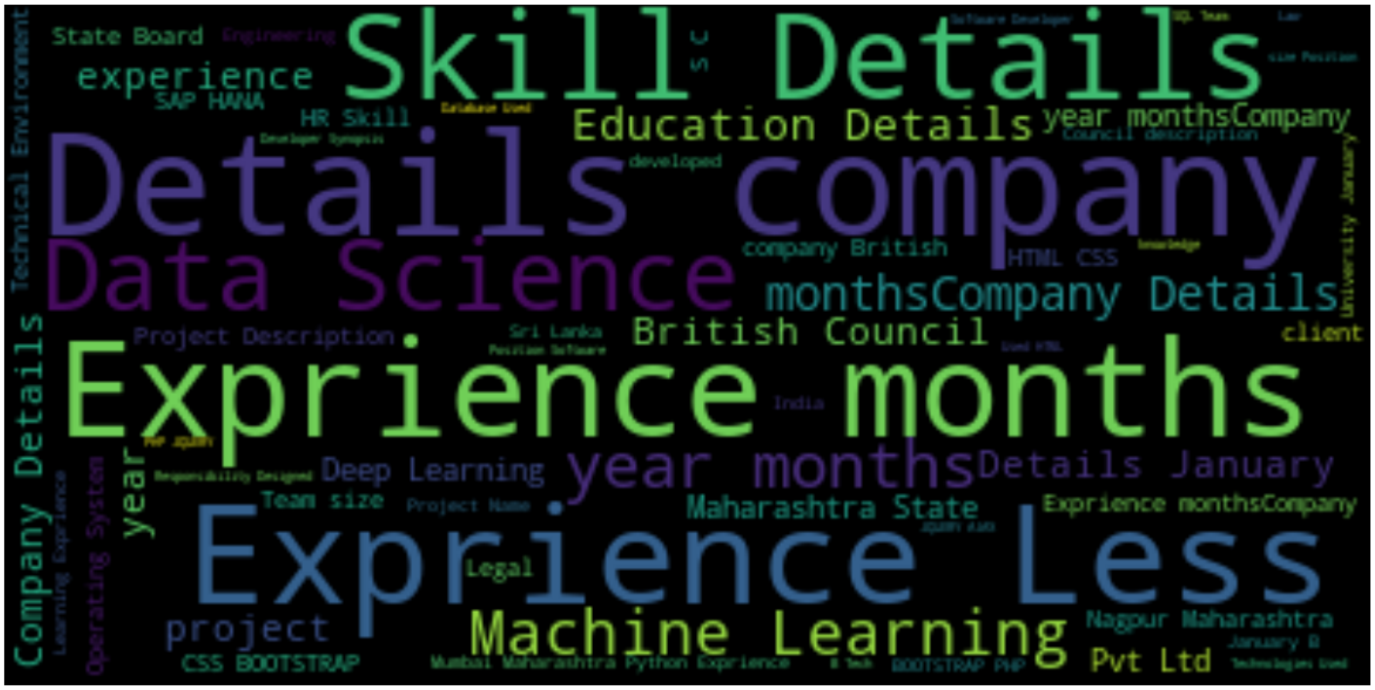
Out[9]:
```
True
```

In [10]:
```
oneSetOfStopWords = set(stopwords.words('english')+['``',"''"])
totalWords =[]
Sentences = data['Resume'].values
cleanedSentences = ""
for i in range(0,160):
    cleanedText = cleanResume(Sentences[i])
    cleanedSentences += cleanedText
    requiredWords = nltk.word_tokenize(cleanedText)
    for word in requiredWords:
        if word not in oneSetOfStopWords and word not in string.punctuation:
            totalWords.append(word)

wordfreqdist = nltk.FreqDist(totalWords)
mostcommon = wordfreqdist.most_common(50)
print(mostcommon)

wc = WordCloud().generate(cleanedSentences)
plt.figure(figsize=(15,15))
plt.imshow(wc, interpolation='bilinear')
plt.axis("off")
plt.show()
```

```
[('Details', 484), ('Exprience', 446), ('months', 376), ('company', 330), ('descriptio
n', 310), ('1', 290), ('year', 232), ('January', 216), ('Less', 204), ('Data', 200), ('d
ata', 192), ('Skill', 166), ('Maharashtra', 166), ('6', 164), ('Python', 156), ('Scienc
e', 154), ('I', 146), ('Education', 142), ('College', 140), ('The', 126), ('project', 12
6), ('like', 126), ('Project', 124), ('Learning', 116), ('India', 114), ('Machine', 11
2), ('University', 112), ('Web', 106), ('using', 104), ('monthsCompany', 102), ('B', 9
8), ('C', 98), ('SQL', 96), ('time', 92), ('learning', 90), ('Mumbai', 90), ('Pune', 9
0), ('Arts', 90), ('A', 84), ('application', 84), ('Engineering', 78), ('24', 76), ('var
ious', 76), ('Software', 76), ('Responsibilities', 76), ('Nagpur', 76), ('development',
74), ('Management', 74), ('projects', 74), ('Technologies', 72)]
```



In [11]:
```
var_mod = ['Category']
le = LabelEncoder()
```

```
for i in var_mod:
    data[i] = le.fit_transform(data[i])
```

In [12]:
```
requiredText = data['cleaned_resume'].values
requiredTarget = data['Category'].values

word_vectorizer = TfidfVectorizer(
    sublinear_tf=True,
    stop_words='english',
    max_features=1500)
word_vectorizer.fit(requiredText)
WordFeatures = word_vectorizer.transform(requiredText)

print ("Feature completed .....")

X_train,X_test,y_train,y_test = train_test_split(WordFeatures,requiredTarget,random_stat
print(X_train.shape)
print(X_test.shape)
```

```
Feature completed .....
(769, 1500)
(193, 1500)
```

In [13]:
```
clf = OneVsRestClassifier(KNeighborsClassifier())
clf.fit(X_train, y_train)
prediction = clf.predict(X_test)
print('Accuracy of KNeighbors Classifier on training set: {:.2f}'.format(clf.score(X_tra
print('Accuracy of KNeighbors Classifier on test set: {:.2f}'.format(clf.score(X_test, y

print("\n Classification report for classifier %s:\n%s\n" % (clf, metrics.classification
```

```
Accuracy of KNeighbors Classifier on training set: 0.99
Accuracy of KNeighbors Classifier on test set: 0.99

 Classification report for classifier OneVsRestClassifier(estimator=KNeighborsClassifier
()):
              precision    recall  f1-score   support

           0       1.00      1.00      1.00         3
           1       1.00      1.00      1.00         3
           2       1.00      0.80      0.89         5
           3       1.00      1.00      1.00         9
           4       1.00      1.00      1.00         6
           5       0.83      1.00      0.91         5
           6       1.00      1.00      1.00         9
           7       1.00      1.00      1.00         7
           8       1.00      0.91      0.95        11
           9       1.00      1.00      1.00         9
          10       1.00      1.00      1.00         8
          11       0.90      1.00      0.95         9
          12       1.00      1.00      1.00         5
          13       1.00      1.00      1.00         9
          14       1.00      1.00      1.00         7
          15       1.00      1.00      1.00        19
          16       1.00      1.00      1.00         3
          17       1.00      1.00      1.00         4
          18       1.00      1.00      1.00         5
          19       1.00      1.00      1.00         6
          20       1.00      1.00      1.00        11
          21       1.00      1.00      1.00         4
          22       1.00      1.00      1.00        13
          23       1.00      1.00      1.00        15
          24       1.00      1.00      1.00         8

    accuracy                           0.99       193
   macro avg       0.99      0.99      0.99       193
```

```
weighted avg       0.99      0.99      0.99       193
```

```
In [ ]:
```