LAB DIGITAL ASSIGNMENT 3

SUBJECT: NATURAL LANGUAGE PROCESSING LAB (PMDS606P)

CLASS ID - VL2025260105170

Name: Soumyadeep Ganguly

Reg No: 24MDT0082

Course: M.Sc Data Science

In [2]:
```
import requests
from bs4 import BeautifulSoup
import re
import nltk
import matplotlib.pyplot as plt
from collections import Counter
from nltk.corpus import words
from sklearn.decomposition import PCA
from gensim.models import Word2Vec
```

In [3]:
```
nltk.download('punkt')
nltk.download('words')
```

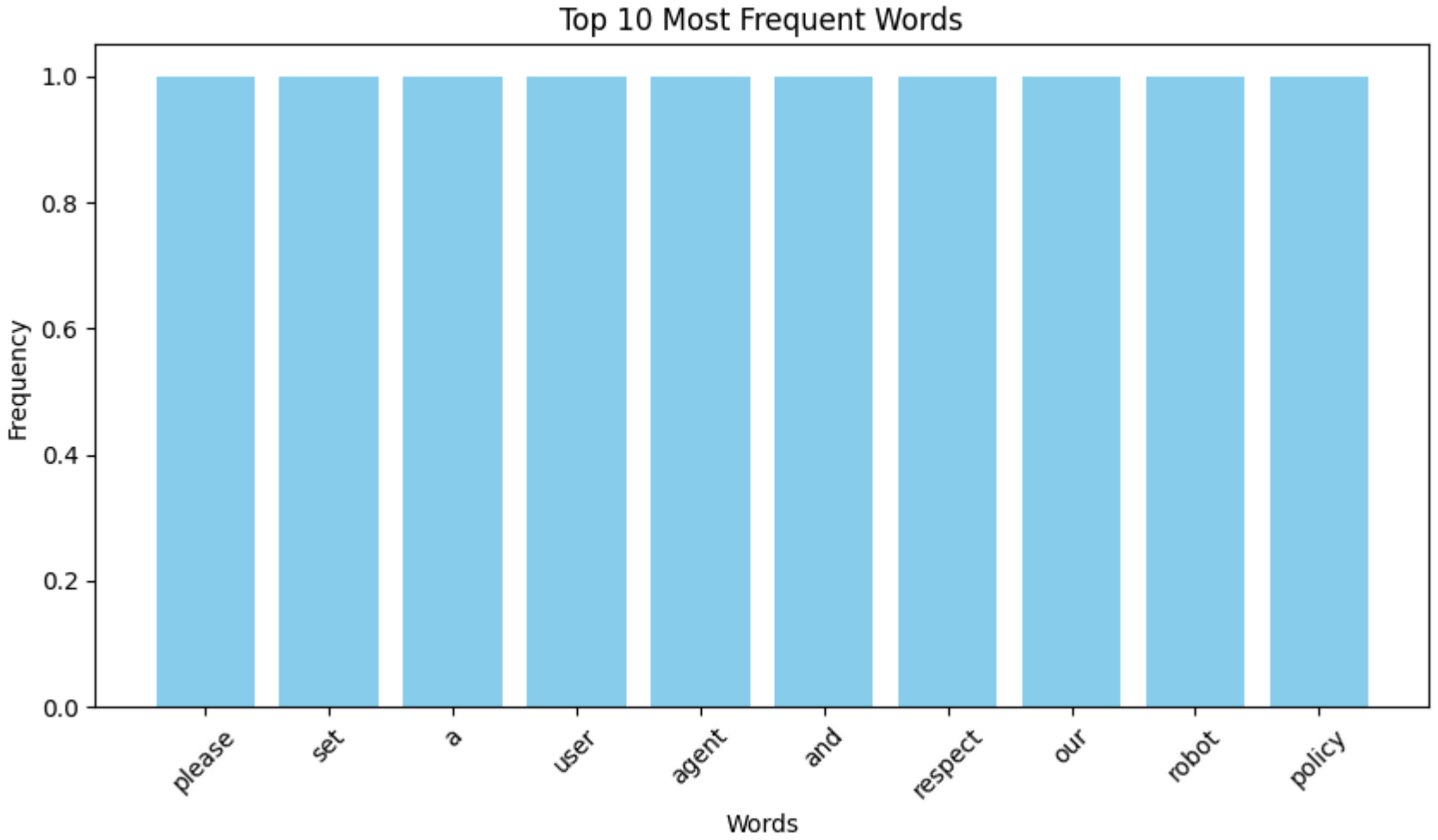
```
[nltk_data] Downloading package punkt to
[nltk_data]     C:\Users\sambh\AppData\Roaming\nltk_data...
[nltk_data]   Unzipping tokenizers\punkt.zip.
[nltk_data] Downloading package words to
[nltk_data]     C:\Users\sambh\AppData\Roaming\nltk_data...
[nltk_data]   Unzipping corpora\words.zip.
```

Out[3]: True

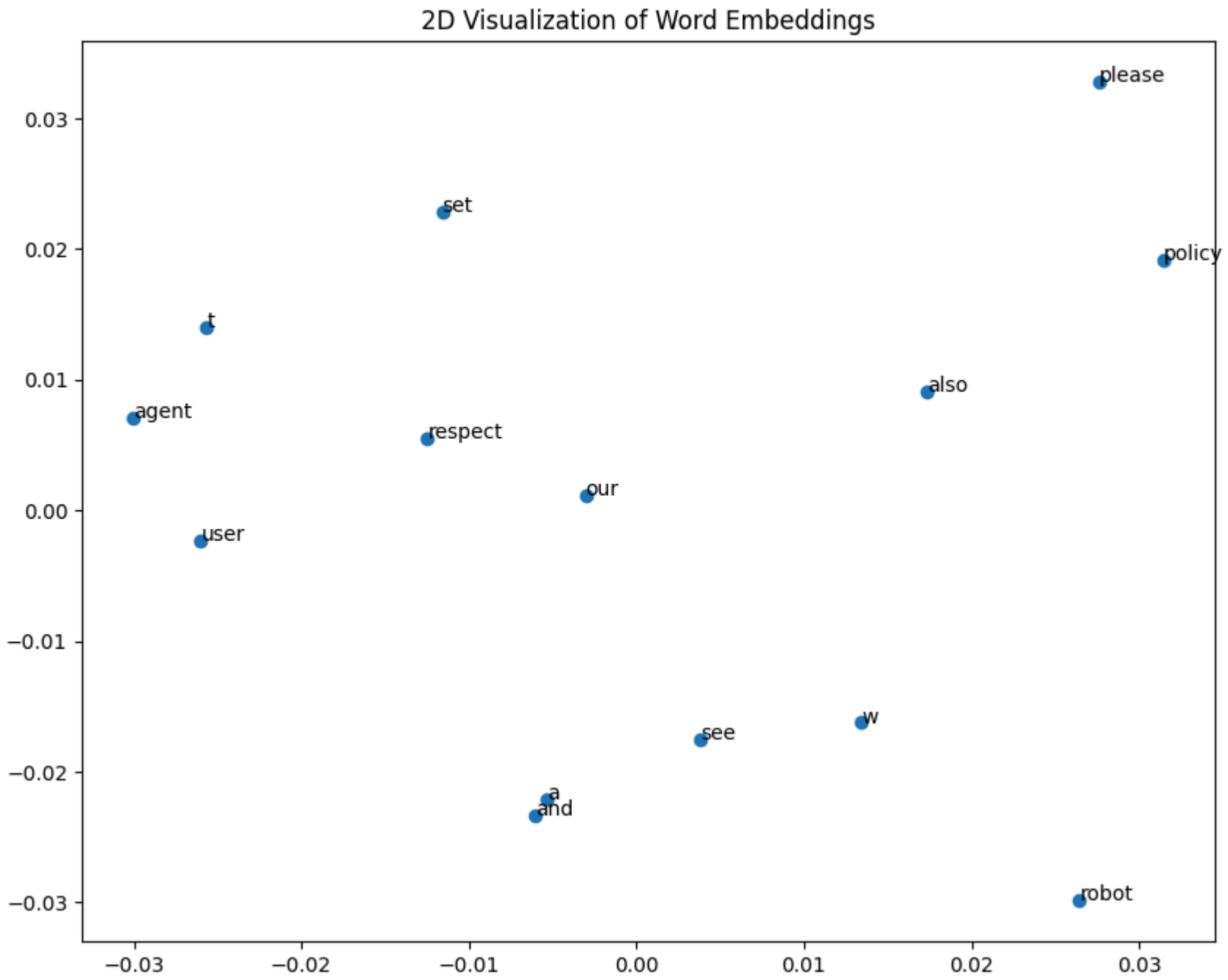
In [14]:
```python
def processURL(url):
    # 1. Read the text content from the given link and store the content in the variable textContent
    response = requests.get(url)
    soup = BeautifulSoup(response.text, 'html.parser')
    textContent = soup.get_text(separator=' ', strip=True)

    # 2. Preprocess the data in textContent and keep only valid English dictionary words.
    english_vocab = set(words.words())
    textContent = re.sub(r'[^A-Za-z\s]', ' ', textContent)
    tokens = nltk.word_tokenize(textContent)
    tokenizedWords = [w.lower() for w in tokens if w.lower() in english_vocab]

    # 3. Tokenize all the words and store them in tokenizedWords and convert them into lower case.
    numberOfWords = len(tokenizedWords)

    # 4. Find the total number of words in tokenizedWords and store the result in numberOfWords
    uniqueWords = set(tokenizedWords)
    numberOfUniqueWords = len(uniqueWords)

    # 5. Find the total number of unique words in tokenizedWords and store the result in
    # numberOfUniqueWords. Store all the unique words in uniqueWords.
    word_counts = Counter(tokenizedWords)

    maxFreq = word_counts.most_common(10)


    words_top = [w for w, _ in maxFreq]
    counts_top = [c for _, c in maxFreq]

    # Plot only top 10
    plt.figure(figsize=(10, 5))
    plt.bar(words_top, counts_top, color="skyblue")
```

```
    plt.title("Top 10 Most Frequent Words")
    plt.xlabel("Words")
    plt.ylabel("Frequency")
    plt.xticks(rotation=45)
    plt.show()

    # 6. Perform Histogram Analysis on uniqueWords.
    print("Top 10 frequent words:", maxFreq)

    # 7. Find the 10 most frequent words and store the result in the variable maxFreq.
    sentences = [tokenizedWords]
    model = Word2Vec(sentences, vector_size=100, window=5, min_count=1, workers=4)

    X = model.wv[uniqueWords]
    pca = PCA(n_components=2)
    result = pca.fit_transform(X)

    plt.figure(figsize=(10, 8))
    plt.scatter(result[:, 0], result[:, 1])
    for i, word in enumerate(uniqueWords):
        plt.annotate(word, xy=(result[i, 0], result[i, 1]))
    plt.title("2D Visualization of Word Embeddings")
    plt.show()

    # 8. Generate a word embedding for the web page using only uniqueWords (use 100 dimensions).
    print("\nMost similar words:")
    for word in list(uniqueWords)[:5]:
        try:
            print(word, ":", model.wv.most_similar(word, topn=3))
        except KeyError:
            pass

    return {
        "numberOfWords": numberOfWords,
        "numberOfUniqueWords": numberOfUniqueWords,
        "uniqueWords": list(uniqueWords),
        "maxFreq": maxFreq
    }
```

In [15]:
```
url = "https://en.wikipedia.org/wiki/Cricket"
result = processURL(url)
print(result)
```




```
Top 10 frequent words: [('please', 1), ('set', 1), ('a', 1), ('user', 1), ('agent', 1), ('and', 1), ('respect', 1), ('our', 1),
('robot', 1), ('policy', 1)]
```


2D Visualization of Word Embeddings
please
set
policy
t
also
agent
respect
our
user
w
see
a
and
robot
0.03
0.02
0.01
0.00
−0.01
−0.02
−0.03
−0.03
−0.02
−0.01
0.00
0.01
0.02
0.03

```
Most similar words:
also : [('please', 0.137244313955307), ('w', 0.06798267364501953), ('and', 0.03364057466387749)]
set : [('policy', 0.15016479790210724), ('user', 0.12813477218151093), ('t', 0.093101121485233 3)]
and : [('see', 0.19912345707416534), ('w', 0.07496878504753113), ('robot', 0.06059345230460167)]
a : [('see', 0.17293265461921692), ('robot', 0.16717541217803955), ('respect', 0.11115383356809616)]
please : [('policy', 0.25295141339302063), ('also', 0.1372442990541458), ('robot', 0.04443884640932083)]
{'numberOfWords': 14, 'numberOfUniqueWords': 14, 'uniqueWords': ['also', 'set', 'and', 'a', 'please', 'w', 't', 'agent', 'our',
'see', 'respect', 'robot', 'policy', 'user'], 'maxFreq': [('please', 1), ('set', 1), ('a', 1), ('user', 1), ('agent', 1), ('an
d', 1), ('respect', 1), ('our', 1), ('robot', 1), ('policy', 1)]}
```

In [ ]: