

LAB 1: Explore pre-trained word vectors. Explore word relationships using vector arithmetic. Perform arithmetic operations and analyze results.

Step 1: Import Required Libraries

```
import os
import gensim.downloader as api
import numpy as np
import matplotlib.pyplot as plt
from sklearn.decomposition import PCA
from gensim.models import KeyedVectors
from google.colab import drive
```

Step 2: Mount Google Drive

```
drive.mount('/content/drive')
```

Define model path in Google Drive

```
model_path = "/content/drive/My Drive/word2vec-google-news-300.model"
```

Step 3: Load or Download the Word2Vec Model

```
if os.path.exists(model_path):
```

```
print("Model found in Google Drive..Loading")
word_vectors = KeyedVectors.load(model_path)
else:
    print("Model not found. Downloading Word2Vec model...")
    word_vectors = api.load("word2vec-google-news-300")
    print("Saving model to Google Drive for future use...")
    word_vectors.save(model_path)
    print("Model saved successfully")

print("\nModel Loaded Successfully\n")
```

Step 4: Find Similar Words

```
print("Top 5 words similar to 'computer':")
similar_words = word_vectors.most_similar("computer", topn=5)
for word, similarity in similar_words:
    print(f"{word}: {similarity:.4f}")
```

Step 5: Word Vector Arithmetic

```
print("\nPerforming Vector Arithmetic: 'king - man + woman'")
# king - man + woman = ?
```

```
result = word_vectors.most_similar(positive=['king', 'woman'], negative=['man'], topn=1)
print(f"Result: {result[0][0]}") # Expected output: 'queen'
```

Step 6: More Arithmetic Operations

```
print("\n More Examples of Vector Arithmetic:")
```

```
examples = [
    ("Paris", "France", "Italy"),
    ("Einstein", "scientist", "painter")
]
```

```
for w1, w2, w3 in examples:
```

```
    result = word_vectors.most_similar(positive=[w1, w3], negative=[w2], topn=1)
```

```
    print(f"{w1} - {w2} + {w3} = {result[0][0]}")
```

OUTPUT

Mounted at /content/drive

Model found in Google Drive! Loading...

Model Loaded Successfully

Top 5 words similar to 'computer':

computers: 0.7979

laptop: 0.6640

laptop_computer: 0.6549

Computer: 0.6473

com_puter: 0.6082

Performing Vector Arithmetic: 'king - man + woman'

Result: queen

More Examples of Vector Arithmetic:

Paris - France + Italy = Milan

Einstein - scientist + painter = Picasso