

```

# Import necessary libraries
import numpy as np
import pandas as pd
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Embedding, Lambda, Dense
from tensorflow.keras.preprocessing.text import Tokenizer
from tensorflow.keras.preprocessing.sequence import pad_sequences

# Sample corpus
corpus = [
    "the cat sat on the mat",
    "the dog sat on the log",
    "cats and dogs are great pets", "the mat is soft and warm"
]

# Preprocess text: Tokenization and Lowercasing
tokenizer = Tokenizer()
tokenizer.fit_on_texts(corpus)
total_words = len(tokenizer.word_index) + 1 # +1 for padding

# Convert text to sequences
sequences = tokenizer.texts_to_sequences(corpus)

import numpy as np
from keras.preprocessing.sequence import pad_sequences

def generate_training_data(sequences, window_size=2):
    contexts = []
    targets = []
    for sequence in sequences:
        for i in range(window_size, len(sequence) - window_size):
            context = sequence[i - window_size:i] + sequence[i + 1:i + window
_size]
            target = sequence[i]
            contexts.append(context)
            targets.append(target)

    return np.array(contexts), np.array(targets)

# Example usage:
sequences = [[1, 2, 3, 4, 5], [2, 3, 4, 5, 6]] # Add your sequences here
X, y = generate_training_data(sequences)

# Pad sequences for consistent input shape
X = pad_sequences(X, maxlen=4)

# Define the CBOW model architecture
model = Sequential()
model.add(Embedding(input_dim=total_words, output_dim=10, input_length=4))
model.add(Lambda(lambda x: tf.reduce_mean(x, axis=1))) # Average embeddings

```

```
model.add(Dense(total_words, activation='softmax'))
```

```
# Compile the model
```

```
model.compile(loss='sparse_categorical_crossentropy', optimizer='adam', metrics=['accuracy'])
```

```
# Train the model
```

```
model.fit(X, y, epochs=30)
```

Epoch 1/30

/opt/anaconda3/lib/python3.12/site-packages/keras/src/layers/core/embedding.p

y:90: UserWarning: Argument `input\_length` is deprecated. Just remove it.

warnings.warn(

1/1 \_\_\_\_\_ 0s 264ms/step - accuracy: 0.5000 - loss: 2.8221

Epoch 2/30

1/1 \_\_\_\_\_ 0s 7ms/step - accuracy: 0.5000 - loss: 2.8175

Epoch 3/30

1/1 \_\_\_\_\_ 0s 6ms/step - accuracy: 0.5000 - loss: 2.8129

Epoch 4/30

1/1 \_\_\_\_\_ 0s 9ms/step - accuracy: 0.5000 - loss: 2.8083

Epoch 5/30

1/1 \_\_\_\_\_ 0s 7ms/step - accuracy: 0.5000 - loss: 2.8036

Epoch 6/30

1/1 \_\_\_\_\_ 0s 8ms/step - accuracy: 0.5000 - loss: 2.7990

Epoch 7/30

1/1 \_\_\_\_\_ 0s 7ms/step - accuracy: 0.5000 - loss: 2.7943

Epoch 8/30

1/1 \_\_\_\_\_ 0s 8ms/step - accuracy: 0.5000 - loss: 2.7896

Epoch 9/30

1/1 \_\_\_\_\_ 0s 7ms/step - accuracy: 0.5000 - loss: 2.7848

Epoch 10/30

1/1 \_\_\_\_\_ 0s 8ms/step - accuracy: 0.5000 - loss: 2.7801

Epoch 11/30

1/1 \_\_\_\_\_ 0s 8ms/step - accuracy: 0.5000 - loss: 2.7753

Epoch 12/30

1/1 \_\_\_\_\_ 0s 8ms/step - accuracy: 0.5000 - loss: 2.7705

Epoch 13/30

1/1 \_\_\_\_\_ 0s 7ms/step - accuracy: 0.5000 - loss: 2.7657

Epoch 14/30

1/1 \_\_\_\_\_ 0s 9ms/step - accuracy: 0.5000 - loss: 2.7609

Epoch 15/30

1/1 \_\_\_\_\_ 0s 8ms/step - accuracy: 0.5000 - loss: 2.7560

Epoch 16/30

1/1 \_\_\_\_\_ 0s 9ms/step - accuracy: 0.5000 - loss: 2.7511

Epoch 17/30

1/1 \_\_\_\_\_ 0s 7ms/step - accuracy: 0.5000 - loss: 2.7461

Epoch 18/30

1/1 \_\_\_\_\_ 0s 8ms/step - accuracy: 0.5000 - loss: 2.7411

Epoch 19/30  
1/1 \_\_\_\_\_ 0s 8ms/step - accuracy: 0.5000 - loss: 2.7361  
Epoch 20/30  
1/1 \_\_\_\_\_ 0s 8ms/step - accuracy: 0.5000 - loss: 2.7311  
Epoch 21/30  
1/1 \_\_\_\_\_ 0s 8ms/step - accuracy: 0.5000 - loss: 2.7260  
Epoch 22/30  
1/1 \_\_\_\_\_ 0s 8ms/step - accuracy: 0.5000 - loss: 2.7208  
Epoch 23/30  
1/1 \_\_\_\_\_ 0s 8ms/step - accuracy: 0.5000 - loss: 2.7157  
Epoch 24/30  
1/1 \_\_\_\_\_ 0s 7ms/step - accuracy: 0.5000 - loss: 2.7105  
Epoch 25/30  
1/1 \_\_\_\_\_ 0s 9ms/step - accuracy: 0.5000 - loss: 2.7052  
Epoch 26/30  
1/1 \_\_\_\_\_ 0s 7ms/step - accuracy: 0.5000 - loss: 2.6999  
Epoch 27/30  
1/1 \_\_\_\_\_ 0s 8ms/step - accuracy: 0.5000 - loss: 2.6946  
Epoch 28/30  
1/1 \_\_\_\_\_ 0s 7ms/step - accuracy: 0.5000 - loss: 2.6892  
Epoch 29/30  
1/1 \_\_\_\_\_ 0s 8ms/step - accuracy: 0.5000 - loss: 2.6837  
Epoch 30/30  
1/1 \_\_\_\_\_ 0s 7ms/step - accuracy: 0.5000 - loss: 2.6782

<keras.src.callbacks.history.History at 0x157ff93d0>