PG5: Use word embeddings to create meaningful sentences for creative tasks. Retrieve similar words for a seed word. Create a sentence or story using these words as a starting point. Write a program that: Takes a seed word. Generates similar words. Constructs a short paragraph using these words.

Soln:

```
!pip install sentence_transformers
```

```
!pip install langchain-huggingface
```

```
!pip install tf-keras --user
```

```
!pip install numpy==1.24.4 --user
```

```python
from sentence_transformers import SentenceTransformer, util

# Load a pretrained SentenceTransformer model
model = SentenceTransformer('all-MiniLM-L6-v2')

# Define an expanded finance-related corpus
corpus = [
    "The stock market saw significant gains today, driven by strong earnings reports.",
    "Investing in diversified portfolios helps mitigate risk and maximize returns.",
    "The Federal Reserve's decision to raise interest rates could impact market liquidity.",
    "Cryptocurrency has become an increasingly popular asset class among investors.",
    "Financial analysts predict that the global economy will face challenges in the coming years.",
    "Bonds are considered a safer investment option compared to stocks.",
    "Banks are adopting blockchain technology to improve the efficiency of financial transactions.",
    "The economic impact of the pandemic has been severe, but recovery is underway.",
    "Inflation rates have been rising steadily, leading to higher costs for consumers.",
    "Corporate governance and transparency are crucial for investor confidence.",
    "The real estate market is experiencing a boom as demand outstrips supply in many areas.",
```

```
    "Investors should be aware of market volatility and adjust their
strategies accordingly.",
    "Diversification is a key principle in reducing risk in investment
portfolios.",
    "Hedge funds use complex strategies to generate high returns, often
with higher risks.",
    "Stock buybacks are often seen as a sign of confidence by corporate
executives."
]

# Encode the corpus into embeddings
corpus_embeddings = model.encode(corpus, convert_to_tensor=True)
corpus_embeddings
```

Output:

```
tensor([[ 0.0129,  0.0182, -0.0129,  ..., -0.0351, -0.0190,  0.0443], [
0.0329,  0.0204, -0.0503,  ..., -0.0383, -0.0037,  0.0154], [-0.0168, -
0.0174, -0.0506,  ..., -0.0439,  0.0390, -0.0251],  ..., [ 0.0668, 0.0304,
-0.0115,  ..., -0.0700, -0.0742, -0.0177], [-0.0069, -0.0231, -0.0392,
...,  -0.0815,  0.0679,  0.0207], [-0.0347, -0.0332,  0.0320,  ..., -0.0874,
-0.0046,  0.0356]])
```

```
# Function to generate a story using contextual embeddings
def generate_paragraph(seed_word, corpus, corpus_embeddings, model,
top_n=5):
    # Encode the seed word as a sentence
    seed_sentence = f"Tell me more about {seed_word} in finance."
    seed_embedding = model.encode(seed_sentence,
convert_to_tensor=True)

    # Find the most similar sentences in the corpus to the seed
sentence
    similarities = util.pytorch_cos_sim(seed_embedding,
corpus_embeddings)[0]
    top_results = similarities.topk(top_n)
    print('top_results:',top_results)
    # Construct a more coherent story using the most similar sentences
    story = f"The topic of '{seed_word}' is crucial in the finance
industry. "

    for idx in top_results.indices:
        similar_sentence = corpus[idx]
        story += f"{similar_sentence} "

    story += f"These concepts highlight the importance of {seed_word}
in understanding financial markets and investment strategies."
```

```
    return story
```

```
# Example usage
seed_word = "bonds"
story = generate_paragraph(seed_word, corpus, corpus_embeddings, model,
top_n=5)
print(story)
```

Output:

```
top_results: torch.return_types.topk(
values=tensor([0.6597, 0.4536, 0.4218, 0.4031, 0.3689]),
indices=tensor([ 5,  3,  2, 13,  1]))
The topic of 'bonds' is crucial in the finance industry. Bonds are
considered a safer investment option compared to stocks. Cryptocurrency
has become an increasingly popular asset class among investors. The
Federal Reserve's decision to raise interest rates could impact market
liquidity. Hedge funds use complex strategies to generate high returns,
often with higher risks. Investing in diversified portfolios helps
mitigate risk and maximize returns. These concepts highlight the
importance of bonds in understanding financial markets and investment
strategies.
```