

AI-Powered Text Summarizer using Generative AI

Aim:

To create a simple AI system using a pre-trained Generative AI model that summarizes long paragraphs of text into concise summaries using Python.

Objectives:

- To understand the working of AI and Generative AI in Natural Language Processing (NLP).
- To implement a text summarization system using Python.
- To use Hugging Face's `transformers` library to leverage a pre-trained GenAI model.
- To take input text and generate a summary with a few lines of code.

Theory:

What is AI?

Artificial Intelligence (AI) refers to the simulation of human intelligence in machines that are programmed to think and act like humans.

What is Generative AI?

Generative AI uses machine learning models to generate new content like text, images, audio, or code. In NLP, GenAI models like GPT, BERT, or T5 can generate meaningful sentences or summaries.

Text Summarization

Text summarization is the task of shortening a text document while preserving its most important information.

There are two types:

- Extractive: Selects key sentences from the text.
- Abstractive: Generates new sentences that represent the original content (what we use here).

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Tools & Libraries:

- Python 3.x
- Hugging Face Transformers
- Pre-trained model: T5-small (Text-To-Text Transfer Transformer)

Install required libraries:

```
pip install transformers
```

```
pip install torch
```

Python Code:

```
from transformers import T5Tokenizer, T5ForConditionalGeneration

model = T5ForConditionalGeneration.from_pretrained("t5-small")
tokenizer = T5Tokenizer.from_pretrained("t5-small")

def summarize_text(text):
    input_text = "summarize: " + text
    input_ids = tokenizer.encode(input_text, return_tensors="pt", max_length=512, truncation=True)
    output_ids = model.generate(input_ids, max_length=100, min_length=30, length_penalty=2.0,
num_beams=4, early_stopping=True)
    summary = tokenizer.decode(output_ids[0], skip_special_tokens=True)
    return summary

text = """
Artificial Intelligence is transforming the world at a rapid pace. From self-driving cars to
virtual assistants,
AI systems are becoming an essential part of modern technology. These systems can learn from data,
make decisions,
and improve over time without explicit programming.
"""

summary = summarize_text(text)
print("Original Text:\n", text)
print("\nSummary:\n", summary)
```

Output Example:

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Original Text:

Artificial Intelligence is transforming the world at a rapid pace...

Summary:

AI is transforming the world with systems that learn from data, make decisions, and improve without explicit programming.

Conclusion:

This project demonstrates how AI and GenAI models can be used to create powerful NLP tools like text summarizers with minimal code. It introduces core AI concepts and builds hands-on experience using pre-trained models in Python.