

LangChain 외부 데이터 연결

- LangChain: 문서, 데이터베이스, API 등 다양한 외부 소스와 쉽게 연결할 수 있습니다.
- ChatGPT API: 외부 데이터 통합을 위해서는 추가적인 개발이 필요합니다.

In [1]: `!pip install openai`

```
Collecting openai
  Downloading openai-1.44.1-py3-none-any.whl.metadata (22 kB)
Requirement already satisfied: anyio<5,>=3.5.0 in /usr/local/lib/python3.10/dist-packages (from openai) (3.7.1)
Requirement already satisfied: distro<2,>=1.7.0 in /usr/lib/python3/dist-packages (from openai) (1.7.0)
Collecting httpx<1,>=0.23.0 (from openai)
  Downloading httpx-0.27.2-py3-none-any.whl.metadata (7.1 kB)
Collecting jiter<1,>=0.4.0 (from openai)
  Downloading jiter-0.5.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (3.6 kB)
Requirement already satisfied: pydantic<3,>=1.9.0 in /usr/local/lib/python3.10/dist-packages (from openai) (2.8.2)
Requirement already satisfied: sniffio in /usr/local/lib/python3.10/dist-packages (from openai) (1.3.1)
Requirement already satisfied: tqdm>4 in /usr/local/lib/python3.10/dist-packages (from openai) (4.66.5)
Requirement already satisfied: typing-extensions<5,>=4.11 in /usr/local/lib/python3.10/dist-packages (from openai) (4.12.2)
Requirement already satisfied: idna>=2.8 in /usr/local/lib/python3.10/dist-packages (from anyio<5,>=3.5.0->openai) (3.8)
Requirement already satisfied: exceptiongroup in /usr/local/lib/python3.10/dist-packages (from anyio<5,>=3.5.0->openai) (1.2.2)
Requirement already satisfied: certifi in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->openai) (2024.8.30)
Collecting httpcore==1.* (from httpx<1,>=0.23.0->openai)
  Downloading httpcore-1.0.5-py3-none-any.whl.metadata (20 kB)
Collecting h11<0.15,>=0.13 (from httpcore==1.*->httpx<1,>=0.23.0->openai)
  Downloading h11-0.14.0-py3-none-any.whl.metadata (8.2 kB)
Requirement already satisfied: annotated-types>=0.4.0 in /usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1.9.0->openai) (0.7.0)
Requirement already satisfied: pydantic-core==2.20.1 in /usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1.9.0->openai) (2.20.1)
Downloading openai-1.44.1-py3-none-any.whl (373 kB)
_____ 373.5/373.5 kB 18.2 MB/s eta 0:00:00
Downloading httpx-0.27.2-py3-none-any.whl (76 kB)
_____ 76.4/76.4 kB 3.8 MB/s eta 0:00:00
Downloading httpcore-1.0.5-py3-none-any.whl (77 kB)
_____ 77.9/77.9 kB 4.1 MB/s eta 0:00:00
Downloading jiter-0.5.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (318 kB)
_____ 318.9/318.9 kB 13.3 MB/s eta 0:00:00
Downloading h11-0.14.0-py3-none-any.whl (58 kB)
_____ 58.3/58.3 kB 3.2 MB/s eta 0:00:00
Installing collected packages: jiter, h11, httpcore, httpx, openai
Successfully installed h11-0.14.0 httpcore-1.0.5 httpx-0.27.2 jiter-0.5.0 openai-1.44.1
```

```
In [2]: !pip install langchain_community  
        !pip install langchain
```

Collecting langchain_community

Downloading langchain_community-0.2.16-py3-none-any.whl.metadata (2.7 kB)

Requirement already satisfied: PyYAML>=5.3 in /usr/local/lib/python3.10/dist-packages (from langchain_community) (6.0.2)

Requirement already satisfied: SQLAlchemy<3,>=1.4 in /usr/local/lib/python3.10/dist-packages (from langchain_community) (2.0.32)

Requirement already satisfied: aiohttp<4.0.0,>=3.8.3 in /usr/local/lib/python3.10/dist-packages (from langchain_community) (3.10.5)

Collecting dataclasses-json<0.7,>=0.5.7 (from langchain_community)

Downloading dataclasses_json-0.6.7-py3-none-any.whl.metadata (25 kB)

Collecting langchain<0.3.0,>=0.2.16 (from langchain_community)

Downloading langchain-0.2.16-py3-none-any.whl.metadata (7.1 kB)

Collecting langchain-core<0.3.0,>=0.2.38 (from langchain_community)

Downloading langchain_core-0.2.39-py3-none-any.whl.metadata (6.2 kB)

Collecting langsmith<0.2.0,>=0.1.0 (from langchain_community)

Downloading langsmith-0.1.117-py3-none-any.whl.metadata (13 kB)

Requirement already satisfied: numpy<2,>=1 in /usr/local/lib/python3.10/dist-packages (from langchain_community) (1.26.4)

Requirement already satisfied: requests<3,>=2 in /usr/local/lib/python3.10/dist-packages (from langchain_community) (2.32.3)

Collecting tenacity!=8.4.0,<9.0.0,>=8.1.0 (from langchain_community)

Downloading tenacity-8.5.0-py3-none-any.whl.metadata (1.2 kB)

Requirement already satisfied: aiohappyeyeballs>=2.3.0 in /usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain_community) (2.4.0)

Requirement already satisfied: aiosignal>=1.1.2 in /usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain_community) (1.3.1)

Requirement already satisfied: attrs>=17.3.0 in /usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain_community) (24.2.0)

Requirement already satisfied: frozenlist>=1.1.1 in /usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain_community) (1.4.1)

Requirement already satisfied: multidict<7.0,>=4.5 in /usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain_community) (6.0.5)

Requirement already satisfied: yarl<2.0,>=1.0 in /usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain_community) (1.9.4)

Requirement already satisfied: async-timeout<5.0,>=4.0 in /usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain_community) (4.0.3)

Collecting marshmallow<4.0.0,>=3.18.0 (from dataclasses-json<0.7,>=0.5.7->langchain_community)

Downloading marshmallow-3.22.0-py3-none-any.whl.metadata (7.2 kB)

Collecting typing-inspect<1,>=0.4.0 (from dataclasses-json<0.7,>=0.5.7->langchain_community)

Downloading typing_inspect-0.9.0-py3-none-any.whl.metadata (1.5 kB)

Collecting langchain-text-splitters<0.3.0,>=0.2.0 (from langchain<0.3.0,>=0.2.16->langchain_community)

Downloading langchain_text_splitters-0.2.4-py3-none-any.whl.metadata (2.3 kB)

Requirement already satisfied: pydantic<3,>=1 in /usr/local/lib/python3.10/dist-packages (from langchain<0.3.0,>=0.2.16->langchain_community) (2.8.2)

Collecting jsonpatch<2.0,>=1.33 (from langchain-core<0.3.0,>=0.2.38->langchain_community)

Downloading jsonpatch-1.33-py2.py3-none-any.whl.metadata (3.0 kB)

Requirement already satisfied: packaging<25,>=23.2 in /usr/local/lib/python3.10/dist-packages (from langchain-core<0.3.0,>=0.2.38->langchain_community) (24.1)

Requirement already satisfied: typing-extensions>=4.7 in /usr/local/lib/python3.10/dist-packages (from langchain-core<0.3.0,>=0.2.38->langchain_community) (4.12.2)

Requirement already satisfied: httpx<1,>=0.23.0 in /usr/local/lib/python3.10/dist-packages (from langsmith<0.2.0,>=0.1.0->langchain_community) (0.27.2)

Collecting orjson<4.0.0,>=3.9.14 (from langsmith<0.2.0,>=0.1.0->langchain_community)

Downloading orjson-3.10.7-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64

4.whl.metadata (50 kB)

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Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langchain_community) (3.3.2)

Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langchain_community) (3.8)

Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langchain_community) (2.0.7)

Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langchain_community) (2024.8.30)

Requirement already satisfied: greenlet!=0.4.17 in /usr/local/lib/python3.10/dist-packages (from SQLAlchemy<3,>=1.4->langchain_community) (3.0.3)

Requirement already satisfied: anyio in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.0->langchain_community) (3.7.1)

Requirement already satisfied: httpcore==1.* in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.0->langchain_community) (1.0.5)

Requirement already satisfied: sniffio in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.0->langchain_community) (1.3.1)

Requirement already satisfied: h11<0.15,>=0.13 in /usr/local/lib/python3.10/dist-packages (from httpcore==1.*->httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.0->langchain_community) (0.14.0)

Collecting jsonpointer>=1.9 (from jsonpatch<2.0,>=1.33->langchain-core<0.3.0,>=0.2.38->langchain_community)

Downloading jsonpointer-3.0.0-py2.py3-none-any.whl.metadata (2.3 kB)

Requirement already satisfied: annotated-types>=0.4.0 in /usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1->langchain<0.3.0,>=0.2.16->langchain_community) (0.7.0)

Requirement already satisfied: pydantic-core==2.20.1 in /usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1->langchain<0.3.0,>=0.2.16->langchain_community) (2.20.1)

Collecting mypy_extensions>=0.3.0 (from typing-inspect<1,>=0.4.0->dataclasses-json<0.7,>=0.5.7->langchain_community)

Downloading mypy_extensions-1.0.0-py3-none-any.whl.metadata (1.1 kB)

Requirement already satisfied: exceptiongroup in /usr/local/lib/python3.10/dist-packages (from anyio->httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.0->langchain_community) (1.2.2)

Downloading langchain_community-0.2.16-py3-none-any.whl (2.3 MB)

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Downloading dataclasses_json-0.6.7-py3-none-any.whl (28 kB)

Downloading langchain-0.2.16-py3-none-any.whl (1.0 MB)

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Downloading langchain_core-0.2.39-py3-none-any.whl (396 kB)

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Downloading langsmith-0.1.117-py3-none-any.whl (290 kB)

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Downloading tenacity-8.5.0-py3-none-any.whl (28 kB)

Downloading jsonpatch-1.33-py2.py3-none-any.whl (12 kB)

Downloading langchain_text_splitters-0.2.4-py3-none-any.whl (25 kB)

Downloading marshmallow-3.22.0-py3-none-any.whl (49 kB)

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Downloading orjson-3.10.7-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (141 kB)

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Downloading typing_inspect-0.9.0-py3-none-any.whl (8.8 kB)

Downloading jsonpointer-3.0.0-py2.py3-none-any.whl (7.6 kB)

Downloading mypy_extensions-1.0.0-py3-none-any.whl (4.7 kB)

Installing collected packages: tenacity, orjson, mypy_extensions, marshmallow, jsonpointer, typing-inspect, jsonpatch, langsmith, dataclasses-json, langchain-core, langchain-text-splitters, langchain, langchain_community

```
Attempting uninstall: tenacity
  Found existing installation: tenacity 9.0.0
  Uninstalling tenacity-9.0.0:
    Successfully uninstalled tenacity-9.0.0
Successfully installed dataclasses-json-0.6.7 jsonpatch-1.33 jsonpointer-3.0.0 langchain-0.2.16 langchain-core-0.2.39 langchain-text-splitters-0.2.4 langchain_community-0.2.16 langsmith-0.1.117 marshmallow-3.22.0 mypy-extensions-1.0.0 orjson-3.10.7 tenacity-8.5.0 typing-inspect-0.9.0
Requirement already satisfied: langchain in /usr/local/lib/python3.10/dist-packages (0.2.16)
Requirement already satisfied: PyYAML>=5.3 in /usr/local/lib/python3.10/dist-packages (from langchain) (6.0.2)
Requirement already satisfied: SQLAlchemy<3,>=1.4 in /usr/local/lib/python3.10/dist-packages (from langchain) (2.0.32)
Requirement already satisfied: aiohttp<4.0.0,>=3.8.3 in /usr/local/lib/python3.10/dist-packages (from langchain) (3.10.5)
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Requirement already satisfied: langchain-text-splitters<0.3.0,>=0.2.0 in /usr/local/lib/python3.10/dist-packages (from langchain) (0.2.4)
Requirement already satisfied: langsmith<0.2.0,>=0.1.17 in /usr/local/lib/python3.10/dist-packages (from langchain) (0.1.117)
Requirement already satisfied: numpy<2,>=1 in /usr/local/lib/python3.10/dist-packages (from langchain) (1.26.4)
Requirement already satisfied: pydantic<3,>=1 in /usr/local/lib/python3.10/dist-packages (from langchain) (2.8.2)
Requirement already satisfied: requests<3,>=2 in /usr/local/lib/python3.10/dist-packages (from langchain) (2.32.3)
Requirement already satisfied: tenacity!=8.4.0,<9.0.0,>=8.1.0 in /usr/local/lib/python3.10/dist-packages (from langchain) (8.5.0)
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Requirement already satisfied: attrs>=17.3.0 in /usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain) (24.2.0)
Requirement already satisfied: frozenlist>=1.1.1 in /usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain) (1.4.1)
Requirement already satisfied: multidict<7.0,>=4.5 in /usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain) (6.0.5)
Requirement already satisfied: yarl<2.0,>=1.0 in /usr/local/lib/python3.10/dist-packages (from aiohttp<4.0.0,>=3.8.3->langchain) (1.9.4)
Requirement already satisfied: jsonpatch<2.0,>=1.33 in /usr/local/lib/python3.10/dist-packages (from langchain-core<0.3.0,>=0.2.38->langchain) (1.33)
Requirement already satisfied: packaging<25,>=23.2 in /usr/local/lib/python3.10/dist-packages (from langchain-core<0.3.0,>=0.2.38->langchain) (24.1)
Requirement already satisfied: typing-extensions>=4.7 in /usr/local/lib/python3.10/dist-packages (from langchain-core<0.3.0,>=0.2.38->langchain) (4.12.2)
Requirement already satisfied: httpx<1,>=0.23.0 in /usr/local/lib/python3.10/dist-packages (from langsmith<0.2.0,>=0.1.17->langchain) (0.27.2)
Requirement already satisfied: orjson<4.0.0,>=3.9.14 in /usr/local/lib/python3.10/dist-packages (from langsmith<0.2.0,>=0.1.17->langchain) (3.10.7)
Requirement already satisfied: annotated-types>=0.4.0 in /usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1->langchain) (0.7.0)
Requirement already satisfied: pydantic-core==2.20.1 in /usr/local/lib/python3.10/dist-packages (from pydantic<3,>=1->langchain) (2.20.1)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langchain) (3.3.2)
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Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langchain) (3.8)

Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langchain) (2.0.7)

Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests<3,>=2->langchain) (2024.8.30)

Requirement already satisfied: greenlet!=0.4.17 in /usr/local/lib/python3.10/dist-packages (from SQLAlchemy<3,>=1.4->langchain) (3.0.3)

Requirement already satisfied: anyio in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.17->langchain) (3.7.1)

Requirement already satisfied: httpcore==1.* in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.17->langchain) (1.0.5)

Requirement already satisfied: sniffio in /usr/local/lib/python3.10/dist-packages (from httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.17->langchain) (1.3.1)

Requirement already satisfied: h11<0.15,>=0.13 in /usr/local/lib/python3.10/dist-packages (from httpcore==1.*->httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.17->langchain) (0.14.0)

Requirement already satisfied: jsonpointer>=1.9 in /usr/local/lib/python3.10/dist-packages (from jsonpatch<2.0,>=1.33->langchain-core<0.3.0,>=0.2.38->langchain) (3.0.0)

Requirement already satisfied: exceptiongroup in /usr/local/lib/python3.10/dist-packages (from anyio->httpx<1,>=0.23.0->langsmith<0.2.0,>=0.1.17->langchain) (1.2.2)

ChatGPT API를 활용한 외부 데이터 연결

- 문서 로딩을 직접 구현이 필요.
- 문서 내용과 질문을 결합하여 프롬프트 생성이 필요.
- 토큰 제한으로 인해 긴 문서 처리가 어려울 수 있다.

```
In [9]: from openai import OpenAI
import os
from getpass import getpass
import chardet

# API 키를 안전하게 입력받음
# API_KEY = getpass.getpass("OpenAI API 키를 입력하세요: ")
os.environ["OPENAI_API_KEY"] = getpass("OpenAI API 키를 입력하세요: ")
```

OpenAI API 키를 입력하세요:

```
In [13]: # 문서 내용 로드 (여러 인코딩 시도)
def load_document(file_path):
    encodings = ['utf-8', 'ISO-8859-1', 'Windows-1252']
    for encoding in encodings:
        try:
            with open(file_path, 'r', encoding=encoding) as file:
                return file.read()
        except UnicodeDecodeError:
            continue
    raise ValueError("파일을 읽을 수 없습니다. 지원되는 인코딩이 없습니다.")

document_content = load_document('document.txt')
client = OpenAI(api_key=os.environ["OPENAI_API_KEY"])

# 질문-답변
def ask_question(document, question):
    prompt = f"다음 문서를 바탕으로 질문에 답하세요:\n\n{document}\n\n질문: {ques"
```

```

# completions: 단일 문자열 프롬프트
# 각 요청이 독립적이며, 이전 맥락을 자동으로 유지하지 않음.
# completions: 역할 지정 기능이 없음.
next = client.completions.create(
    model="gpt-3.5-turbo-instruct",
    prompt=prompt,
    max_tokens=100,
    n=3
)

ai_message = next.choices[0].text
return ai_message

query = "문서의 주요 내용은 무엇인가요?"
response = ask_question(document_content, query)
print(response)

```

인공지능(AI)의 발전과 미래에 대한 내용입니다. AI의 주요 분야와 응용 분야, 그리고 발전에 따른 윤리적, 사회적 문제까지 다양한 측면에서 다루고 있습니다. 또한, AI의 미래에 대한 전망과 적절한 관리

LangChain을 활용한 외부 데이터 통합 예제

- 외부 텍스트 파일을 쉽게 로드 가능.
- 문서의 벡터 인덱스를 자동으로 생성.
- 생성된 인덱스를 기반으로 질문에 답변.

In [14]: !pip install tiktoken

```

Collecting tiktoken
  Downloading tiktoken-0.7.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl.metadata (6.6 kB)
Requirement already satisfied: regex<=2022.1.18 in /usr/local/lib/python3.10/dist-packages (from tiktoken) (2024.5.15)
Requirement already satisfied: requests<=2.26.0 in /usr/local/lib/python3.10/dist-packages (from tiktoken) (2.32.3)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.10/dist-packages (from requests<=2.26.0->tiktoken) (3.3.2)
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.10/dist-packages (from requests<=2.26.0->tiktoken) (3.8)
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.10/dist-packages (from requests<=2.26.0->tiktoken) (2.0.7)
Requirement already satisfied: certifi<=2017.4.17 in /usr/local/lib/python3.10/dist-packages (from requests<=2.26.0->tiktoken) (2024.8.30)
Downloading tiktoken-0.7.0-cp310-cp310-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (1.1 MB)
----- 1.1/1.1 MB 28.9 MB/s eta 0:00:00
Installing collected packages: tiktoken
Successfully installed tiktoken-0.7.0

```

In [15]:

```

import os
from getpass import getpass
from langchain.document_loaders import TextLoader          # 텍스트 파일을 로드 하는
from langchain.indexes import VectorstoreIndexCreator     # 문서의 벡터 인덱스를 생
from langchain.embeddings.openai import OpenAIEmbeddings
from langchain.llms import OpenAI                         # OpenAI의 언어 모델을 사

```

```
# API 키 설정
os.environ["OPENAI_API_KEY"] = getpass("OpenAI API 키를 입력하세요: ")
```

OpenAI API 키를 입력하세요:

```
In [16]: # 문서 로드
loader = TextLoader('document.txt')

# 인덱스 생성
# VectorstoreIndexCreator를 사용하여 로드된 문서의 벡터 인덱스를 생성
# 이 과정에서 문서는 벡터로 변환되어 저장
embeddings = OpenAIEmbeddings() # 벡터 임베딩을 처리하기 위한 클래스
index = VectorstoreIndexCreator(embedding=embeddings).from_loaders([loader])

# OpenAI LLM 생성
llm = OpenAI(temperature=0, max_tokens=150)

# 질문-답변
query = "문서의 주요 내용은 무엇인가요?"
response = index.query(query, llm=llm)
print(response)
```

```
<ipython-input-16-9df72ad1a691>:7: LangChainDeprecationWarning: The class `OpenAI
Embeddings` was deprecated in LangChain 0.0.9 and will be removed in 1.0. An upda
ted version of the class exists in the langchain-openai package and should be use
d instead. To use it run `pip install -U langchain-openai` and import as `from la
ngchain_openai import OpenAIEmbeddings`.
```

```
embeddings = OpenAIEmbeddings() # 벡터 임베딩을 처리하기 위한 클래스
/usr/local/lib/python3.10/dist-packages/langchain/indexes/vectorstore.py:127: Use
rWarning: Using InMemoryVectorStore as the default vectorstore.This memory store
won't persist data. You should explicitlyspecify a vectorstore when using Vectors
toreIndexCreator
```

```
warnings.warn(
<ipython-input-16-9df72ad1a691>:11: LangChainDeprecationWarning: The class `OpenA
I` was deprecated in LangChain 0.0.10 and will be removed in 1.0. An updated vers
ion of the class exists in the langchain-openai package and should be used instea
d. To use it run `pip install -U langchain-openai` and import as `from langchain_
openai import OpenAI`.
```

```
llm = OpenAI(temperature=0, max_tokens=150)
```

문서의 주요 내용은 인공지능(AI)의 발전과 응용 분야, 그리고 AI 발전의 윤리적, 사회
적 문제에 대한 논의입니다.

In []: