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Summarize Large Documents or Text Using LLMs and LangChain

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Summarizing long texts can be quite a challenge, but with LangChain and Language Learning Model (LLM), it's made simple. Imagine you're reading a lengthy book or a detailed report, and you need to condense it into a short, easy-to-read summary.

LangChain(with LLM) provides several strategies to help you do just that. Let's dive into these strategies using real-world examples to make things clearer.

LangChain
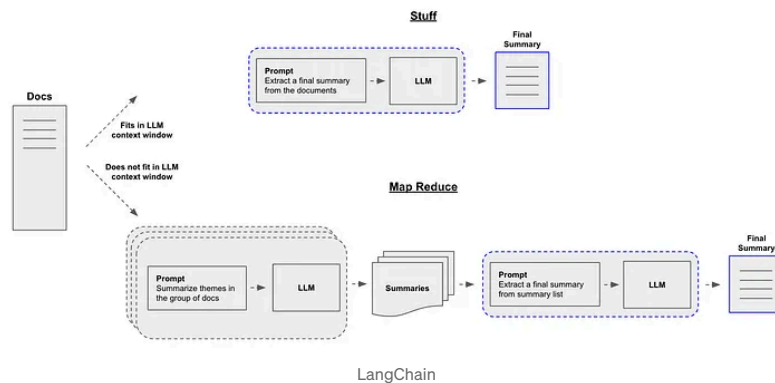
The "Stuff" Strategy

> *The simplest method is called the "stuff" strategy. If the entire text fits within the LLM's context window, you can directly input the raw text and get a summary.*

For example, suppose you have a short article about climate change:

Input Text:
"Climate change refers to long-term shifts and alterations in temperature and weather patterns, primarily due to human activities like burning fossil fuels, deforestation, and industrial processes. These activities increase levels of greenhouse gases in the atmosphere, leading to global warming and its

associated impacts, such as more frequent extreme weather events, rising sea levels, and changes in wildlife habitats."

Using the "stuff" strategy, you input the entire paragraph, and the LLM provides a summary:

Summary received from LLMs of your choice:
"Climate change is caused by human activities that increase greenhouse gases, leading to global warming and extreme weather."

The "Map-Reduce" Strategy

> *Often, texts are too long to fit into the context window. In such cases, LangChain's "map-reduce" strategy is useful. This strategy involves breaking the text into chunks, summarizing each chunk, and then summarizing those summaries.*

Step-by-Step Example:

1. **Creating Chunks of text extracted from documents/blogs/news:**

- "Climate change refers to long-term shifts and alterations in temperature and weather patterns, primarily due to human activities like burning fossil fuels, deforestation, and industrial processes."

- "These activities increase levels of greenhouse gases in the atmosphere, leading to global warming and its associated impacts, such as more frequent extreme weather events, rising sea levels, and changes in wildlife habitats."

2. **Summarize each chunks created based on given length and allowed limits of LLMs system:**

- "Climate change is caused by human activities altering weather patterns."

- "Increased greenhouse gases lead to global warming and extreme weather."

3. **Combine Summaries provided by LLMs:**

- "Human activities cause climate change by altering weather patterns and increasing greenhouse gases, leading to global warming and extreme weather."

The "Refine" Strategy

> *The "refine" strategy involves starting with an initial summary of the first chunk of text and gradually refining it with subsequent chunks. This approach allows for a more integrated and cohesive summary.*

Step-by-Step Example:

1. **Initial Summary:**

- "Climate change is caused by human activities."

2. **Refine with Additional Chunks:**

- After adding the second chunk: "Climate change is caused by human activities that increase greenhouse gases, leading to global warming."

- After adding the third chunk: "Climate change, driven by human activities, increases greenhouse gases and leads to global warming and extreme weather."

Summarizing Multiple Documents

Suppose you have a set of documents (PDFs, blogs , customer questions, etc.) and you want to summarize the content.

LLMs are a great tool for this given their proficiency in understanding and synthesizing text. In the context of retrieval-augmented generation, summarizing text can help distill the information in a large number of retrieved documents to provide context for a LLM.

Using LangChain for Multi-Document Summarization

LangChain simplifies summarizing content from multiple documents with a few straightforward steps. Here's a quick guide:

1. **Set Up Your Environment:**

- Use a **Jupyter Notebook** for an interactive learning experience.

- Install LangChain and its dependencies.

```
pip install langchain
```

2. **Load Your Documents:**

- Use document loaders, like the WebBaseLoader, to load content from various sources.

```
from langchain_community.document_loaders import WebBaseLoader

loader = WebBaseLoader("https://example.com/blog-post")

docs = loader.load()
```

3. **Choose Your Summarization Strategy:**

- **Stuff:** Concatenate documents into a single prompt.

- **Map-Reduce:** Split documents into batches, summarize those, and then summarize the summaries.

- **Refine:** Update a rolling summary by iterating over the documents in sequence.

```python
from langchain.chains.summarize import load_summarize_chain
from langchain_openai import ChatOpenAI

llm = ChatOpenAI(temperature=0, model_name="gpt-3.5-turbo-1106")

# Using Stuff
chain = load_summarize_chain(llm, chain_type="stuff")
result = chain.invoke(docs)
print(result["output_text"])

# Using Map-Reduce
chain = load_summarize_chain(llm, chain_type="map_reduce")
result = chain.invoke(docs)
print(result["output_text"])

# Using Refine
chain = load_summarize_chain(llm, chain_type="refine")
result = chain.invoke(docs)
print(result["output_text"])
```

To summarize

LangChain offers versatile strategies for summarizing text using LLMs, making it easier to handle texts of any length. Whether you use the **"stuff," "map-reduce," or "refine" strategy depends on the text's length and complexity**. By breaking down the text and refining summaries, you can achieve clear and concise summaries suitable for any purpose.

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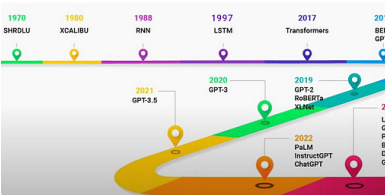
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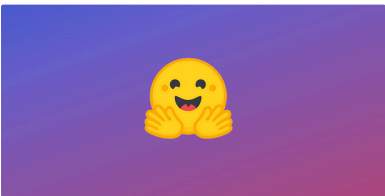
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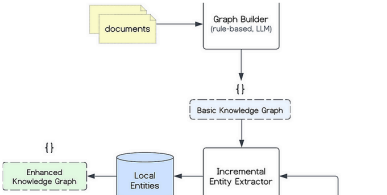
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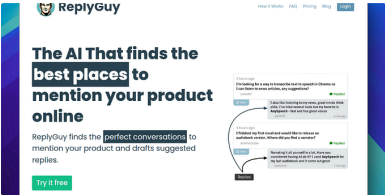In this post, I'll show you how to construct a basic document-centric knowledge graph...

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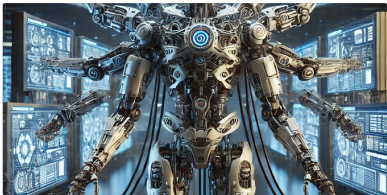AI agents are the future because they can replace all the manual work with automation...

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