

chat-over-docs-with-chat-memory

June 6, 2023

The difference between this chain and a QA and a retrieval QA chain is that this allows for passing in a chat history which can be used to allow for follow up questions

```
[3]: from langchain.embeddings.openai import OpenAIEmbeddings
     from langchain.vectorstores import Chroma
     from langchain.text_splitter import CharacterTextSplitter
     from langchain.llms import OpenAI
     from langchain.chains import ConversationalRetrievalChain
```

1 loading in documents

```
[82]: from langchain.document_loaders import TextLoader
     from langchain.document_loaders import UnstructuredFileLoader
     from langchain.document_loaders import PyPDFLoader
```

```
[81]: file_1="../input/state_of_the_union.txt"
     file_2="../input/CELEX_32022L2464_EN_TXT.pdf"
     file_3="../input/CELEX_32022L2464_EN_TXT.pdf"
```

```
[83]: %%time

     loader_1=TextLoader(file_1)
     loader_2=PyPDFLoader(file_2)
     loader_3=PyPDFLoader(file_3)
```

CPU times: user 230 μ s, sys: 2.29 ms, total: 2.52 ms

Wall time: 2.33 ms

```
[84]: %%time

     loaders=[loader_1, loader_2, loader_3]
     docs=[]

     for loader in loaders:
         docs.extend(loader.load())
```

```
CPU times: user 17.7 s, sys: 796 ms, total: 18.5 s
Wall time: 19.6 s
```

2 Chunking the docs

Now that the documents were created (using the loaders), we need to split them and create a new object 'documents'

```
[85]: %%time

text_splitter=CharacterTextSplitter(chunk_size=2000, chunk_overlap=0)
documents=text_splitter.split_documents(docs)
```

```
CPU times: user 25.1 ms, sys: 32.5 ms, total: 57.5 ms
Wall time: 74.8 ms
```

3 Putting the docs in a vectorstore

Which will allow to do semantic search over them

```
[87]: %%time

embeddings=OpenAIEmbeddings()
vectorstore=Chroma.from_documents(documents, embeddings)
```

Using embedded DuckDB without persistence: data will be transient

```
CPU times: user 2.34 s, sys: 214 ms, total: 2.56 s
Wall time: 13.4 s
```

4 Create the memory object

Which is necessary to track the inputs/outputs and hold a conversation

```
[88]: from langchain.memory import ConversationBufferMemory
memory=ConversationBufferMemory(memory_key="chat_history", return_messages=True)
```

5 Initialise the conversation retrieval chain

```
[89]: qa=ConversationalRetrievalChain.from_llm(OpenAI(temperature=0),vectorstore.
      ↪as_retriever(),memory=memory)
```

```
[90]: query="what did biden say about Ketanji Brown Jackson"
```

6 using different language models to condense and answer the chat

```
[21]: from langchain.chat_models import ChatOpenAI
```

```
[ ]: qa=ConversationalRetrievalChain.from_llm(  
    ChatOpenAI(model='gpt-4', temperature=0),  
    vectorstore.as_retriever(),  
    condense_question_llm=ChatOpenAI(temperature=0, model='gpt-3.5-turbo'),  
)
```

7 return sources

```
[91]: qa=ConversationalRetrievalChain.from_llm(  
    OpenAI(temperature=0),  
    vectorstore.as_retriever(),  
    return_source_documents=True)
```

```
[92]: chat_history=[]  
query="what did the president say about ecology"  
result = qa({'question':query, 'chat_history':chat_history})  
  
print('-----')  
print('----- answer -----')  
print('-----')  
print(result['answer'])  
print('-----')  
print('----- page content -----')  
print('-----')  
print(result['source_documents'][0].page_content)  
print('-----')  
print('----- source -----')  
print('-----')  
print(result['source_documents'][0].metadata['source'])  
print('-----')
```

```
-----  
----- answer -----  
-----
```

The president did not mention ecology in this context.

```
-----  
----- page content -----  
-----
```

Provide a pathway to citizenship for Dreamers, those on temporary status, farm workers, and essential workers.

Revise our laws so businesses have the workers they need and families don't wait

decades to reunite.

It's not only the right thing to do-it's the economically smart thing to do.

That's why immigration reform is supported by everyone from labor unions to religious leaders to the U.S. Chamber of Commerce.

Let's get it done once and for all.

Advancing liberty and justice also requires protecting the rights of women.

The constitutional right affirmed in Roe v. Wade-standing precedent for half a century-is under attack as never before.

If we want to go forward-not backward-we must protect access to health care. Preserve a woman's right to choose. And let's continue to advance maternal health care in America.

And for our LGBTQ+ Americans, let's finally get the bipartisan Equality Act to my desk. The onslaught of state laws targeting transgender Americans and their families is wrong.

As I said last year, especially to our younger transgender Americans, I will always have your back as your President, so you can be yourself and reach your God-given potential.

While it often appears that we never agree, that isn't true. I signed 80 bipartisan bills into law last year. From preventing government shutdowns to protecting Asian-Americans from still-too-common hate crimes to reforming military justice.

And soon, we'll strengthen the Violence Against Women Act that I first wrote three decades ago. It is important for us to show the nation that we can come together and do big things.

So tonight I'm offering a Unity Agenda for the Nation. Four big things we can do together.

First, beat the opioid epidemic.

There is so much we can do. Increase funding for prevention, treatment, harm reduction, and recovery.

```
-----  
----- source -----  
-----  
../input/state_of_the_union.txt  
-----
```

8 define a chat history function

```
[93]: def get_chat_history(inputs)->str:
      res=[]
      for human,ai in inputs:
          res.append(f'Human:{human}\nAI:{ai}')
      return '\n'.join(res)
```

```
[94]: get_chat_history([("a","b"),("c","d")])
```

```
[94]: 'Human:a\nAI:b\nHuman:c\nAI:d'
```

```
[95]: qa=ConversationalRetrievalChain.from_llm(
      OpenAI(temperature=0),
      vectorstore.as_retriever(),
      get_chat_history=get_chat_history)
```

```
[96]: chat_history=[]
      query = "What did the president say about Ketanji Brown Jackson"
      result=qa({'question':query,'chat_history':chat_history})
      result
```

Retrying

langchain.llms.openai.completion_with_retry.<locals>._completion_with_retry in 4.0 seconds as it raised RateLimitError: The server had an error while processing your request. Sorry about that!.

```
[96]: {'question': 'What did the president say about Ketanji Brown Jackson',
      'chat_history': [],
      'answer': " The president said that Ketanji Brown Jackson is one of our
nation's top legal minds, a former top litigator in private practice, a former
federal public defender, and from a family of public school educators and police
officers. He also said that she is a consensus builder and has received a broad
range of support from the Fraternal Order of Police to former judges appointed
by Democrats and Republicans."}
```

```
[98]: chat_history.append((result['question'],result['answer']))
```

```
[99]: chat_history
```

```
[99]: [('in which document (or file) did you find this answer',
      ' This answer can be found in the GRI Standards, specifically in the sections
on GRI 407: Freedom of Association and Collective Bargaining 2016, GRI 308:
Supplier Environmental Assessment 2016, GRI 406: Non-Discrimination 2016, and
GRI 402: Labor/Management Relations 2016.')] ]
```

```
[100]: get_chat_history(chat_history)
```

[100]: 'Human:in which document (or file) did you find this answer\nAI: This answer can be found in the GRI Standards, specifically in the sections on GRI 407: Freedom of Association and Collective Bargaining 2016, GRI 308: Supplier Environmental Assessment 2016, GRI 406: Non-Discrimination 2016, and GRI 402: Labor/Management Relations 2016.'

```
[101]: query="in which document (or file) did you find this answer"
result=qa({'question':query,'chat_history':chat_history})
result
```

Retrying
langchain.llms.openai.completion_with_retry.<locals>._completion_with_retry in 4.0 seconds as it raised RateLimitError: The server had an error while processing your request. Sorry about that!.

Retrying
langchain.llms.openai.completion_with_retry.<locals>._completion_with_retry in 4.0 seconds as it raised RateLimitError: The server had an error while processing your request. Sorry about that!.

```
[101]: {'question': 'in which document (or file) did you find this answer',
       'chat_history': [('in which document (or file) did you find this answer',
                          ' This answer can be found in the GRI Standards, specifically in the sections on GRI 407: Freedom of Association and Collective Bargaining 2016, GRI 308: Supplier Environmental Assessment 2016, GRI 406: Non-Discrimination 2016, and GRI 402: Labor/Management Relations 2016.')]},
       'answer': ' You can find the answer to this question in Requirement 6 in GRI 1: Foundation 2021.'}]
```

```
[104]: chat_history=[]

query="please define high-potential work-related incident"
qa=ConversationalRetrievalChain.from_llm(
    OpenAI(temperature=0),
    vectorstore.as_retriever(),
    return_source_documents=True)

result=qa({'question':query,'chat_history':chat_history})
```

```
[105]: result
```

```
[105]: {'question': 'please define high-potential work-related incident',
       'chat_history': [],
       'answer': ' A high-potential work-related incident is an occurrence arising out of or in the course of work that has the potential to result in injury or ill health. Examples of high-potential incidents include electrical problems, explosions, fires, overflows, overturning, leakage, flow, breakage, bursting, splitting, loss of control, slipping, stumbling and falling, body movement
```


time', in contrast, refers to the time needed for a worker to recover fully to pre-injury health status; it does not refer to the time needed for a worker to return to work. In some cases, a worker might return to work before full recovery.

In addition to reporting information on high-consequence work-related injuries based on recovery time as required by this disclosure, the organization can also report the number and rate of work-related injuries that resulted in lost-workday cases, the average number of lost days per lost-workday case, the number of lost workdays, and the absentee rate.

Guidance for Disclosure 403-9-c

This disclosure covers work-related hazards that pose a risk of high-consequence injury if not controlled, even when there are control measures in place. The hazards might have been identified proactively through risk assessment, or reactively as a result of either a high-potential incident or a high-consequence injury.

Examples of work-related hazards causing or contributing to high-consequence injuries include excessive workload demands, tripping hazards, or exposure to flammable materials.

If the identified work-related hazards vary significantly across different locations, the organization may group or disaggregate these by relevant categories, such as by geographical area or business line. Similarly, if there are a high number of hazards, the organization may group or categorize them to facilitate reporting.

When reporting how it has determined which work-related hazards pose a risk of high-consequence injury using Disclosure 403-9-c-i, the organization can describe the criteria or threshold used to determine which hazards pose such a risk and which do not. The processes to identify hazards and assess risks, and to apply the hierarchy of controls, are reported using Disclosure 403-2-a.

Disclosure 403-9-c-ii does not require reporting which work-related hazards have caused or contributed to which high-consequence injuries during the reporting period; it requires the aggregate analysis of all work-related hazards that resulted in high-consequence injuries.

If a work-related incident resulting in a high-consequence injury is still under investigation at the end of the reporting period, the organization can state this in its reported information. The organization can report on actions taken during the reporting period to eliminate hazards and minimize risks that were identified, or to address work-related incidents that took place, in prior reporting periods.

Guidance for Disclosure 403-9-d

This disclosure covers any actions taken or underway to eliminate other work-related hazards and minimize risks (i.e., not covered in Disclosure 403-9-c) using the hierarchy of controls. This disclosure can include actions taken in response to non-high-consequence work-related injuries, and work-related incidents with low probability of causing high-consequence injuries.

Guidance for Disclosure 403-9-f

Types of worker can be based on criteria such as full-time, part-time, non-guaranteed hours, permanent or temporary basis, type or degree of control (e.g., control of work or workplace, sole or shared control), and location, among others.

Guidance for Disclosure 403-9-g

If the organization follows the ILO code of practice on Recording and notification of occupational accidents and diseases, it can state this in response to Disclosure 403-9-g. If the organization does not follow the ILO code of practice, it can indicate which system of rules it applies in recording and reporting work-related injuries and

that arise from exposure to hazards at work. Other types of incident can occur that are not connected with the work itself. For example, the following incidents are not considered to be work related:

Note 3: Traveling for work: Injuries and ill health that occur while a worker is traveling are work related if, at the time of the injury or ill health, the worker was engaged in work activities 'in the interest of the employer'. Examples of such activities include traveling to and from customer contacts; conducting job tasks; and entertaining or being entertained to transact, discuss, or promote business (at the direction of the employer).

Working at home: Injuries and ill health that occur when working at home are work related if the injury or ill health occurs while the worker is performing work at home, and the injury or ill health is directly related to the performance of work rather than the general home environment or setting.

Mental illness: A mental illness is considered to be work related if it has been notified voluntarily by the worker and is supported by an opinion from a licensed healthcare professional with appropriate training and experience stating that the illness is work related.

For more guidance on determining 'work-relatedness', see the United States Occupational Safety and Health Administration, Determination of work-relatedness 1904.5 , https://www.osha.gov/pls/oshaweb/owadisp.show_document?np_table=STANDARDS&p_id=9636 , accessed on 1 June 2018.

Note 4: The terms 'occupational' and 'work-related' are often used interchangeably. a worker suffers a heart attack while at work that is unconnected with work; • a worker driving to or from work is injured in a car accident (where driving is not part of the work, and where the transport has not been organized by the employer); • a worker with epilepsy has a seizure at work that is unconnected with work. •

Bibliography

GRI 12: Coal Sector 2022

287', metadata={'source': '../input/input_gri.pdf', 'page': 286}}}]}

```
[107]: chat_history.append((result['question'],result['answer']))
chat_history
```

```
[107]: [('please define high-potential work-related incident',
        ' A high-potential work-related incident is an occurrence arising out of or in
        the course of work that has the potential to result in injury or ill health.
        Examples of high-potential incidents include electrical problems, explosions,
        fires, overflows, overturning, leakage, flow, breakage, bursting, splitting,
        loss of control, slipping, stumbling and falling, body movement without stress,
        body movement under/with stress, shock, fright, and workplace violence or
        harassment.')]}
```

```
[109]: query_new="can you identify other work-related risks"
output_new=qa({'question':query_new,'chat_history':chat_history})
output_new
```

```
[109]: {'question': 'can you identify other work-related risks',
        'chat_history': [('please define high-potential work-related incident',
        ' A high-potential work-related incident is an occurrence arising out of or
```

in the course of work that has the potential to result in injury or ill health. Examples of high-potential incidents include electrical problems, explosions, fires, overflows, overturning, leakage, flow, breakage, bursting, splitting, loss of control, slipping, stumbling and falling, body movement without stress, body movement under/with stress, shock, fright, and workplace violence or harassment.')] ,

'answer': ' Other work-related risks include handling dangerous machinery, tools, vessels, and vehicles; exposure to excessive noise and vibration, causing hearing and other sensory problems; slips, trips, falls from heights, falls overboard, and drowning; working with animals considerably heavier than the worker, lifting heavy weights, and other work giving rise to musculoskeletal disorders; working near people or animals, increasing the risk of exposure to infectious diseases; attacks by wild animals; exposure to dust and potentially harmful organic substances and chemicals; and exposure to extreme temperatures and severe weather.',

'source_documents': [Document(page_content='Note 3: Traveling for work: Injuries and ill health that occur while a worker is traveling are work related if, at the time of the injury or ill health, the worker was engaged in work activities 'in the interest of the employer'. Examples of such activities include traveling to and from customer contacts; conducting job tasks; and entertaining or being entertained to transact, discuss, or promote business (at the direction of the employer). Working at home: Injuries and ill health that occur when working at home are work related if the injury or ill health occurs while the worker is performing work at home, and the injury or ill health is directly related to the performance of work rather than the general home environment or setting. Mental illness: A mental illness is considered to be work related if it has been notified voluntarily by the worker and is supported by an opinion from a licensed healthcare professional with appropriate training and experience stating that the illness is work related. For more guidance on determining 'work-relatedness', see the United States Occupational Safety and Health Administration, Determination of work-relatedness 1904.5 , <https://www.osha.gov/pls/>

[oshaweb/owadisp.show_document?np_table=STANDARDS&p_id=9636](https://www.osha.gov/pls/oshaweb/owadisp.show_document?np_table=STANDARDS&p_id=9636) , accessed on 1 June 2018. Note 4: The terms 'occupational' and 'work-related' are often used interchangeably. Bibliography GRI 403: Occupational Health and Safety 2018 686', metadata={'source': '../input/input_gri.pdf', 'page': 685}),

Document(page_content='Note 2: Work-related injuries and ill health are those that arise from exposure to hazards at work. Other types of incident can occur that are not connected with the work itself. For example, the following incidents are not considered to be work related: Note 3: Traveling for work: Injuries and ill health that occur while a worker is traveling are work related if, at the time of the injury or ill health, the worker was engaged in work activities 'in the interest of the employer'. Examples of such activities include traveling to and from customer contacts; conducting job tasks; and entertaining or being entertained to transact, discuss, or promote business (at the direction of the employer). Working at home: Injuries and ill health that occur when working at home are work related if the injury or ill health occurs

while the worker is performing work at home, and the injury or ill health is directly related to the performance of work rather than the general home environment or setting. Mental illness: A mental illness is considered to be work related if it has been notified voluntarily by the worker and is supported by an opinion from a licensed healthcare professional with appropriate training and experience stating that the illness is work related. For more guidance on determining 'work-relatedness', see the United States Occupational Safety and Health Administration, Determination of work-relatedness 1904.5 , https://www.osha.gov/pls/oshweb/owadisp.show_document?np_table=STANDARDS&p_id=9636 , accessed on 1 June 2018.

Note 4: The terms 'occupational' and 'work-related' are often used interchangeably. a worker suffers a heart attack while at work that is unconnected with work; • a worker driving to or from work is injured in a car accident (where driving is not part of the work, and where the transport has not been organized by the employer); • a worker with epilepsy has a seizure at work that is unconnected with work. Bibliography GRI 12: Coal Sector 2022 287', metadata={'source': '../input/input_gri.pdf', 'page': 286}),

Document(page_content='work-related injury or ill health negative impacts on health arising from exposure to hazards at work Source: International Labour Organization (ILO), Guidelines on Occupational Safety and Health Management Systems, ILO-OSH 2001 , 2001; modified Note 1: 'Ill health' indicates damage to health and includes diseases, illnesses, and disorders. The terms 'disease', 'illness', and 'disorder' are often used interchangeably and refer to conditions with specific symptoms and diagnoses. Note 2: Work-related injuries and ill health are those that arise from exposure to hazards at work. Other types of incident can occur that are not connected with the work itself. For example, the following incidents are not considered to be work related: Note 3: Traveling for work: Injuries and ill health that occur while a worker is traveling are work related if, at the time of the injury or ill health, the worker was engaged in work activities 'in the interest of the employer'. Examples of such activities include traveling to and from customer contacts; conducting job tasks; and entertaining or being entertained to transact, discuss, or promote business (at the direction of the employer). Working at home: Injuries and ill health that occur when working at home are work related if the injury or ill health occurs while the worker is performing work at home, and the injury or ill health is directly related to the performance of work rather than the general home environment or setting. Mental illness: A mental illness is considered to be work related if it has been notified voluntarily by the worker and is supported by an opinion from a licensed healthcare professional with appropriate training and experience stating that the illness is work related. For more guidance on determining 'work-relatedness', see the United States Occupational Safety and Health Administration, Determination of work-relatedness 1904.5 , https://www.osha.gov/pls/oshweb/owadisp.show_document?np_table=STANDARDS&p_id=9636 , accessed on 1 June 2018.

Note 4: The terms 'occupational' and 'work-related' are often used interchangeably. a worker suffers a heart attack while at work that is

unconnected with work;•\na worker driving to or from work is injured in a car accident (where driving is not\ncpart of the work, and where the transport has not been organized by the\nemployer);•\na worker with epilepsy has a seizure at work that is unconnected with work. •\nGRI Standards Glossary 2022\n869', metadata={'source': '../input/input_gri.pdf', 'page': 868}),

Document(page_content="Topic 13.19 Occupational health and safety\nHealthy and safe work conditions are recognized as a human right. Occupational health and safety involves the\nprevention of physical and mental harm to workers and promotion of workers' health. This topic covers impacts\nrelated to workers' health and safety.\nAgriculture, aquaculture, and fishing are listed among the most hazardous sectors, with high numbers of work-related\ninjuries and ill health each year (see references [304] and [309]). Work-related hazards associated with agriculture,\naquaculture, and fishing include:\nBecause workers in agriculture, aquaculture, and fishing sectors often live where they work, occupational health and\nsafety impacts can also be associated with workers' living conditions. Adequate working and living conditions provide\naccess to potable drinking water, quantity and quality of food, hygiene, sanitation, and appropriate accommodation.\nWorkers are entitled to safe, hygienic, and socially acceptable access to sanitation, a lack thereof can increase the\nrisk of contracting infectious diseases.\nWorkers may work long hours and many consecutive days in the agriculture sector, especially when harvesting crops.\nThey can be exposed to pesticides and other chemical substances used. Children living with workers on farms and\nplantations can also be exposed to hazardous substances (see also topic 13.6 Pesticides use and topic 13.17 Child\nlabor).\nFishing is associated with many risks, such as ill health, work-related injuries, and death. Fishing far offshore is\nconsidered one of the most dangerous occupations. Vessel disasters and falls overboard pose the greatest safety\nrisks and are the sector's leading causes of fatalities. Vessel safety risks are linked to weather, lack of weather\nwarning systems, power loss, engine failure, or inadequate maintenance levels. At-sea crew transfers between\nfishing vessels and support vessels can pose additional safety risks, especially in rough seas.\nMost fishing vessels fall outside of size parameters regulated by international maritime safety standards. Small-scale\nfishers operate millions of fishing vessels that vary in degree of sophistication. Frequently, these vessels prove\nunsuitable for the conditions in which they may be used, such as carrying considerable amounts of fish or sailing far\noffshore.\nVessel safety standards address risks related to general safety, such as fire safety, lighting, ventilation, personal\nsafety, vessel stability, and survival at sea. Vessel safety training serves to prevent vessel disasters and ensure\ncompliance with the safety standards. Insurance schemes can further provide income security for fishers and, in case\nof death or injury, to their families.\nPrimary fish processing, such as catching, sorting, and storing fish, often requires handling dangerous tools, such as\nknives and hooks. When fish are manually beheaded, gutted, skinned, or filleted, it is common for workers to\nexperience cuts or severe lacerations. Fish and other aquatic animals' bites, stings, and tail kicks can also lead to\ninjuries. In the case of ill health or injury offshore, professional medical care or even an urgent medical

evacuation\nmight be unavailable.\nFishing can involve long hours at sea, far offshore. The daily and weekly rest requirements determined by crewing\nlevels can also affect fishing crews' health and safety. Because workers can reside aboard fishing vessels for long\nperiods, poor living conditions can also disrupt their rest periods. Fishers may also experience difficulty taking shorehandling dangerous machinery, tools, vessels, and vehicles;•\nexposure to excessive noise and vibration, causing hearing and other sensory problems;•\nslips, trips, falls from heights, falls overboard, and drowning;•\nworking with animals considerably heavier than the worker, lifting heavy weights, and other work giving rise to\nmusculoskeletal disorders;•\nworking near people or animals, increasing the risk of exposure to infectious diseases; •\nattacks by wild animals;•\nexposure to dust and potentially harmful organic substances and chemicals;•\nexposure to extreme temperatures and severe weather. •\nleave or getting off their vessels at foreign ports.\n \n \n \n \nGRI 13: Agriculture Aquaculture and Fishing Sectors 2022\n351", metadata={'source': '../input/input_gri.pdf', 'page': 350}}]]}