ChatBot using Ollama

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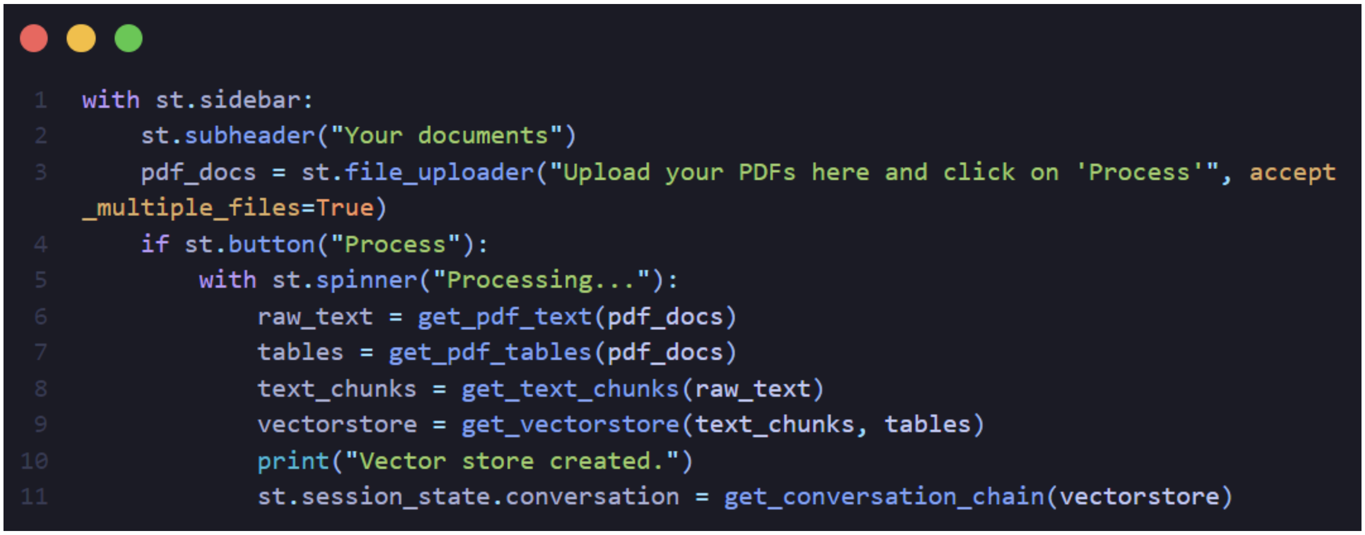
Overview

1. This project uses `Ollama` to download the `llama` model and use it to create a chatbot. The chatbot is trained on the `llama` model and can be used to chat with the user.
2. `HuggingFace` free available models were used to create the embeddings of the input `pdf documents`.
3. The embeddings were then stored in the `Chroma` database which is a `Vector` database. Using this it becomes easier to search for the nearest embeddings and get the response.
4. Then the `llama` model is trained on the data and the chatbot is created.

Taking PDF Input



```python
with st.sidebar:
    st.subheader("Your documents")
    pdf_docs = st.file_uploader("Upload your PDFs here and click on 'Process'", accept_multiple_files=True)
    if st.button("Process"):
        with st.spinner("Processing..."):
            raw_text = get_pdf_text(pdf_docs)
            tables = get_pdf_tables(pdf_docs)
            text_chunks = get_text_chunks(raw_text)
            vectorstore = get_vectorstore(text_chunks, tables)
            print("Vector store created.")
            st.session_state.conversation = get_conversation_chain(vectorstore)
```

1. The user uploads the pdf document.
2. The pdf document is then converted to text using the `pdfplumber` library.
3. The text is then passed to the `HuggingFace` model to get the embeddings.
4. The embeddings are then stored in the `Chroma` database.
5. The different function are used to perform the above tasks and then finally create the conversation chain based on it and train the `llama` model on it.
    1. The vectorstore is passed to the `llama` model and the chain is created.
    2. The chain is created to store the memory of the past chats and result to be displayed to the user.

```
def get_conversation_chain(vectorstore):
llm = Ollama(model="llama3")
memory = ConversationBufferMemory(memory_key='chat_history',
return_messages=True)

conversation_chain = ConversationalRetrievalChain.from_llm(
    llm=llm,
    retriever=vectorstore.as_retriever(),
    memory=memory
)
return conversation_chain
```

6. 1. `RecursiveCharacterTextSplitter` is used to create `chunk` out of the texts of the pdf.

```
def get_text_chunks(text):
text_splitter = RecursiveCharacterTextSplitter(
    chunk_size=512,
    chunk_overlap=128,
    length_function=len,
    separators=[" ", ",", "\n", "."]
)
chunks = text_splitter.split_text(text)
return chunks
```

    2. An attempt is made to extract `table data` specifically using inbuilt function from the library `pdfplumber`. This resulted is some question getting answered correctly from the table.

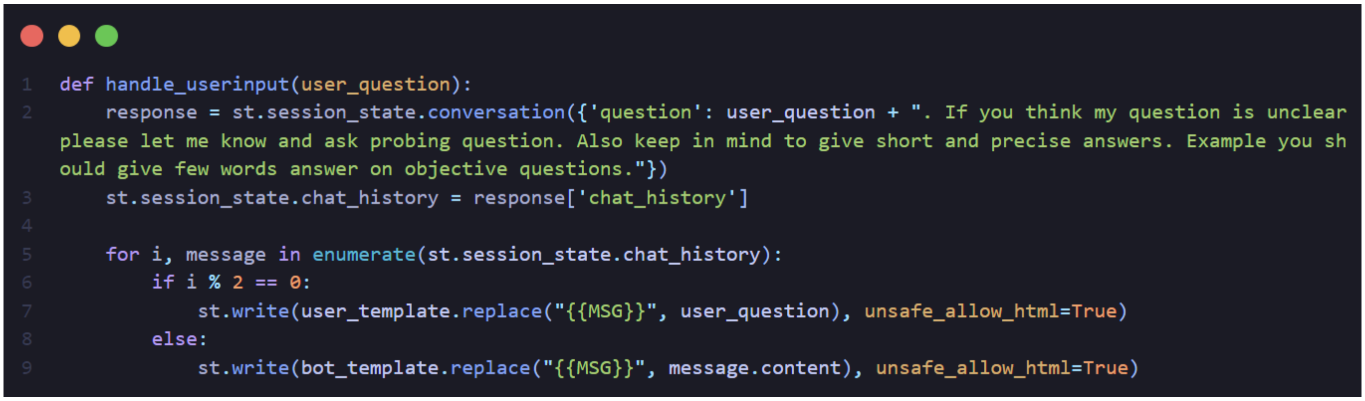
```
def get_pdf_tables(pdf_docs):
tables = []
```

```
for pdf in pdf_docs:
    with pdfplumber.open(pdf) as pdf_file:
        for page in pdf_file.pages:
            tables.append(page.extract_tables())
return tables
```

3. In below function, text data and table data is merged together for further processing.

```
def get_vectorstore(text_chunks, tables):
# Convert tables into a list of strings
table_texts = []
for table in tables:
    for row in table:
        # Flatten the row if it's a list of lists
        if all(isinstance(cell, list) for cell in row):
            row = [item for sublist in row for item in sublist]
        # Filter out None values
        row = [item for item in row if item is not None]
        table_texts.append(' '.join(row))

# Combine text_chunks and table_texts
all_texts = text_chunks + table_texts

if(torch.backends.mps.is_available()):
    device = 'mps'
elif(torch.cuda.is_available()):
    device = 'cuda'
else:
    device = 'cpu'

embeddings = HuggingFaceInstructEmbeddings(model_name="sentence-
transformers/all-MiniLM-L6-v2", model_kwargs={'device': device},
encode_kwargs={'device': device})

vectorstore = Chroma.from_texts(texts=all_texts, embedding=embeddings)

return vectorstore
```

Handling User Input



```python
def handle_userinput(user_question):
    response = st.session_state.conversation({'question': user_question + ". If you think my question is unclear please let me know and ask probing question. Also keep in mind to give short and precise answers. Example you should give few words answer on objective questions."})
    st.session_state.chat_history = response['chat_history']

    for i, message in enumerate(st.session_state.chat_history):
        if i % 2 == 0:
            st.write(user_template.replace("{{MSG}}", user_question), unsafe_allow_html=True)
        else:
            st.write(bot_template.replace("{{MSG}}", message.content), unsafe_allow_html=True)
```

1. This function is called when user askes a question.
2. The question is passed to the model and the model returns the response stored in the `response` variable.
3. The response is then stored in the `chat_history` to be displayed to the user.
4. The for loop is to display the response and question to the user in respective `html templates`.
5. The part of the question after the user question is added to the model so that the model could potentially learn from the user input and ask a probing question if the details is not enough to answer the user question.