在ChatAgent执行step函数时，可以在数据库中查询最近5条记录（也就是最近的5条seminar_conclusion），选择相似度大于等于阈值的条目，存储到relevant_memory当中。

输入向量维度: 1536
输入向量示例: [-0.007929762825369835, 0.010366055183112621, -0.002788914367556572, -0.025105290114879608, 0.0070321811363101006]...
成功连接到MySQL数据库
在CodeReviewComment阶段，第30条记录数据库查询相似度：0.9609765410423279，大于等于阈值0.75
在CodeReviewComment阶段，第29条记录数据库查询相似度：0.6972991824150085，小于阈值0.75
在CodeReviewComment阶段，第28条记录数据库查询相似度：0.9501327872276306，大于等于阈值0.75
在CodeReviewComment阶段，第27条记录数据库查询相似度：0.7519677877426147，大于等于阈值0.75
在CodeReviewComment阶段，第26条记录数据库查询相似度：0.7587493658065796，大于等于阈值0.75
数据库连接已关闭
最终返回 4 条相关记忆
ChatAgent的step函数中，relevant_memory = ['Here is the modified code for the "Say Hi" application, formatted according to the specified markdown code block format:\n\nmain.py\n```python\n\'\'\'\nThis is the main file for the "Say Hi" application using tkinter.\nIt creates a simple GUI that displays the message "Hi" when a button is clicked.\n\'\'\'\nimport tkinter as tk\nfrom tkinter import messagebox\n\nclass MainApp:\n   \'\'\'\n   MainApp class to create the main application window and handle events.\n   \'\'\'\n   def __init__(self, master):\n   \'\'\'\n   Initializes the main application window and its components.\n   \'\'\'\n   self.master = master\n   master.title("Say Hi Application")\n   \n   self.label = tk.Label(master, text="Welcome to the Say Hi Application!")\n   self.label.pack(pady=10)\n   \n   self.say_hi_button = tk.Button(master, text="Say Hi", command=self.say_hi)\n   self.say_hi_button.pack(pady=5)\n\n   def say_hi(self):\n   \'\'\'\n   Displays a message box with the text "Hi".\n   \'\'\'\n   messagebox.showinfo("Greeting", "Hi")\n\nif __name__ == "__main__":\n

relevant_memory会作为messages的一部分（content='历史记忆： Python'），messages会转换为openai的消息格式openai_messages，并将其传入API获取回复。

输入向量维度: 1536
输入向量示例: [-0.005494278855621815, 0.004942756611853838, 0.0035953668411821127, -0.02934936247766018, 0.0020298114977777004]...
成功连接到MySQL数据库
在Coding阶段，第27条记录数据库查询相似度：0.7748041749000549，大于等于阈值0.75
在Coding阶段，第26条记录数据库查询相似度：0.740711510181427，小于阈值0.75
数据库连接已关闭
最终返回 1 条相关记忆
ChatAgent的step函数中，relevant_memory = [' Python']

ChatAgent的step函数中，messages = (relevant_memory + input_message):[SystemMessage(role_name='Programmer', role_type=<RoleType.DEFAULT: 'default'>, meta_dict={'chatdev_prompt': "ChatDev is a software company powered by multiple intelligent agents, such as chief executive officer, chief human resources officer, chief product officer, chief technology officer, etc, with a multi-agent organizational structure and the mission of 'changing the digital world through programming'.", 'task': 'say hi in python.\n1. Open a Python environment (e.g., IDE, terminal, or Jupyter Notebook).\n2. Write a print statement to display "Hi".\n3. Execute the code to see the output.\n4. (Optional) Save the code in a Python file (e.g., `say_hi.py`).', 'assistant_role': 'Programmer', 'user_role': 'Chief Technology Officer', 'content': 'ChatDev is a software company powered by multiple intelligent agents, such as chief executive officer, chief human resources officer, chief product officer, chief technology officer, etc, with a multi-agent organizational structure and the mission of 'changing the digital world through programming'.\nYou are Programmer. we are both working at ChatDev. We share a common interest in collaborating to successfully complete a task assigned by a new customer.\nYou can write/create computer software or applications by providing a specific programming language to the computer. You have extensive computing and coding experience in many varieties of programming languages and platforms, such as Python, Java, C, C++, HTML, CSS, JavaScript, XML, SQL, PHP, etc,.\nHere is a new customer's task: say hi in python.\n1. Open a Python environment (e.g., IDE, terminal, or Jupyter Notebook).\n2. Write a print statement to display "Hi".\n3. Execute the code to see the output.\n4. (Optional) Save the code in a Python file (e.g., `say_hi.py`)..\nTo complete the task, you must write a response that appropriately solves the requested instruction based on your expertise and customer's needs.'}, role='system', content='ChatDev is a software company powered by multiple intelligent agents, such as chief executive officer, chief human resources officer, chief product officer, chief technology officer, etc, with a multi-agent organizational structure and the mission of 'changing the digital world through programming'.\nYou are Programmer. we are both working at ChatDev. We share a common interest in collaborating to successfully complete a task assigned by a new customer.\nYou can write/create computer software or applications by providing a specific programming language to the computer. You have extensive computing and coding experience in many varieties of programming languages and platforms, such as Python, Java, C, C++, HTML, CSS, JavaScript, XML, SQL, PHP, etc,.\nHere is a new customer's task: say hi in python.\n1. Open a Python environment (e.g., IDE, terminal, or Jupyter Notebook).\n2. Write a print statement to display "Hi".\n3. Execute the code to see the output.\n4. (Optional) Save the code in a Python file (e.g., `say_hi.py`)..\nTo complete the task, you must write a response that appropriately solves the requested instruction based on your expertise and customer's needs.', function_call=None, tool_calls=None), ChatMessage(role_name='System', role_type=None, meta_dict={}, role='system', content='历史记忆： Python', function_call=None, tool_calls=None, refusal=None, audio=None), UserChatMessage(role_name='Chief Technology Officer', role_type=<RoleType.USER: 'user'>, meta_dict=None, role='user', content='According to the new user's task and our software designs listed below: \n\nTask: "say hi in python.".\n\nTask description: "".\n\nModality: "application".\n\nProgramming Language: "Python"\n\nIdeas:""\n\nWe have decided to complete the task through a executable software with multiple files implemented via Python. As the Programmer, to satisfy the new user's demands, you should write one or multiple files and make sure that every detail of the architecture is, in the end, implemented as code. The software should be equipped with graphical user interface (GUI) so that user can visually and graphically use it; so you must choose a GUI framework (e.g., in Python, you can implement GUI via tkinter, Pygame, Flexx, PyGUI, etc,).\n\nThink step by step and reason yourself to the right decisions to make sure we get

ChatAgent的step函数中，openai_messages = (relevant_memory + input_message)to_openai_message()[{'role': 'system', 'content': 'ChatDev is a software company powered by multiple intelligent agents, such as chief executive officer, chief human resources officer, chief product officer, chief technology officer, etc, with a multi-agent organizational structure and the mission of 'changing the digital world through programming'.\nYou are Programmer. we are both working at ChatDev. We share a common interest in collaborating to successfully complete a task assigned by a new customer.\nYou can write/create computer software or applications by providing a specific programming language to the computer. You have extensive computing and coding experience in many varieties of programming languages and platforms, such as Python, Java, C, C++, HTML, CSS, JavaScript, XML, SQL, PHP, etc,.\nHere is a new customer's task: say hi in python.\n1. Open a Python environment (e.g., IDE, terminal, or Jupyter Notebook).\n2. Write a print statement to display "Hi".\n3. Execute the code to see the output.\n4. (Optional) Save the code in a Python file (e.g., `say_hi.py`)..\nTo complete the task, you must write a response that appropriately solves the requested instruction based on your expertise and customer's needs.'},{'role': 'system', 'content': '历史记忆： Python'},{'role': 'user', 'content': 'According to the new user's task and our software designs listed below: \n\nTask: "say hi in python.".\n\nTask description: "".\n\nModality: "application".\n\nProgramming Language: " Python"\n\nIdeas:""\n\nWe have decided to complete the task through a executable software with multiple files implemented via Python. As the Programmer, to satisfy the new user's demands, you should write one or multiple files and make sure that every detail of the architecture is, in the end, implemented as code. The software should be equipped with graphical user interface (GUI) so that user can visually and graphically use it; so you must choose a GUI framework (e.g., in Python, you can implement GUI via tkinter, Pygame, Flexx, PyGUI, etc,).\n\nThink step by step and reason yourself to the right decisions to make sure we get it right.\n\nYou will first lay out the names of the core classes, functions, methods that will be necessary, as well as a quick comment on their purpose.\n\nThen you will output the content of each file including complete code. Each file must strictly follow a markdown code block format, where the following tokens must be replaced such that "FILENAME" is the lowercase file name including the file extension, "LANGUAGE" in the programming language, "DOCSTRING" is a string literal specified in source code that is used to document a specific segment of code, and "CODE" is the original code:\n\nFILENAME\n\n`LANGUAGE\n\n\'\'\'\nDOCSTRING\n\n\'\'\'\nCODE\n\n`\n\nYou will start with the "main" file, then go to the ones that are imported by that file, and so on.\n\nPlease note that the code should be fully functional. Ensure to implement all functions. No placeholders (such as 'pass' in Python).'}]
num_max_token:16384

持久化到MySQL，存了2张表，一张conclusion表，一张phase表：

conclusion_id	phase_id	role	content	content_type	embedding	created_at
26	18	Chief Executive Officer<->Chief Product Officer	Application	text	[-0.017947275191545486, 0.005497738253325224, 0.00	2025-06-02 04:31:12
27	19	Chief Executive Officer<->Chief Technology Offic	Python	text	[0.008870973251760006, -0.017251063138246536, 0.01	2025-06-02 04:36:07
28	20	Chief Technology Officer<->Programmer	To create a s	text	[-0.020851027220487595, 0.018728306517004967, -0.01	2025-06-02 04:39:07
29	21	Programmer<->Code Reviewer	Finished	text	[-0.008959381841123104, -0.00929493922740221, 0.007	2025-06-02 04:41:59
30	22	Code Reviewer<->Programmer	Here is the n	text	[-0.012734908610582352, 0.01966606080532074, -0.004	2025-06-02 04:44:56
31	21	Programmer<->Code Reviewer	Finished	text	[-0.008959381841123104, -0.00929493922740221, 0.007	2025-06-02 04:47:44
32	22	Code Reviewer<->Programmer	Here is the n	text	[-0.012734908610582352, 0.01966606080532074, -0.004	2025-06-02 04:50:50
33	21	Programmer<->Code Reviewer	Finished	text	[-0.008959381841123104, -0.00929493922740221, 0.007	2025-06-02 05:00:43
34	22	Code Reviewer<->Programmer	Here is the n	text	[-0.012734908610582352, 0.01966606080532074, -0.004	2025-06-02 05:01:22
35	23	Chief Technology Officer<->Programmer	Based on th	text	[-0.019624751061201096, 0.018259793519973755, 0.01	2025-06-02 05:02:27
36	24	Chief Executive Officer<->Chief Product Officer	Here's a det	text	[-0.012825380079448225, 0.02170552499592304, 0.006	2025-06-02 05:03:03

phase_id	phase_name	phase_prompt
18	DemandAnalysis	ChatDev has made products in the following form before:Image: can present information in line chart, bar chart, flow chart, cloud c
19	LanguageChoose	According to the new user's task and some creative brainstorm ideas listed below: Task: "{task}".Modality: "{modality}".Ideas: "{idea
20	Coding	According to the new user's task and our software designs listed below: Task: "{task}".Task description: "{description}".Modality: "{m
21	CodeReviewCommen	According to the new user's task and our software designs: Task: "{task}".Modality: "{modality}".Programming Language: "{languag
22	CodeReviewModificat	According to the new user's task, our designed product modality, languages and ideas, our developed first-edition source codes ar
23	EnvironmentDoc	The new user's task and our developed codes are listed: Task: "{task}".Modality: "{modality}".Programming Language: "{language}"I
24	Manual	The new user's task, our developed codes and required dependencies are listed: Task: "{task}".Modality: "{modality}".Programming

conclusion_id	27
phase_id	19
role	Chief Executive Officer<->Chief Technology Officer
content	Python
content_type	text
embedding	[0.008870973251760006, -0.017251063138246536, 0.013050499372184277, -0.010245448909699917, -0.009018238633871078, 0.014712492004036903, 0.002876
created_at	2025-06-02 04:36:07

这个是上面举例的那条记录

[Seminar Conclusion]:

Python

[Seminar Conclusion]:

<INFO> Python

存储该记录时的调试信息

成功连接到MySQL数据库
Get text embedding from text-embedding-ada-002:
[OpenAI_Usage_Info Receive]
prompt_tokens: 1
total_tokens: 1

成功存储结论，ID: 27
调用save_phase_conclusion函数，phase_name：LanguageChoose，role：Chief Executive Officer<->Chief Technology Officer，content： Python
数据库连接已关闭

在下一个阶段Coding之前存储

开始执行chain中的{'phase': 'Coding', 'phaseType': 'SimplePhase', 'max_turn_step': 1, 'need_reflect': 'False'}
开始执行chat_chain.py中的execute_step(phase_item)
现在开始执行SimplePhase：Coding
执行phases中的Coding
开始执行chat_chain中的self.phases[phase].execute
chatting初始化时的phase_name：Coding
System: **[chatting]**

总结：seminar_conclusion出来之后存数据库→ChatAgent的step函数调用检索函数，将输入信息的embedding与数据库中的embedding作比对，选择相似度大于等于阈值的条目，与其他信息一起传入API获取回复

缺点：加入数据库之后，运行时间很长，需要半小时左右，可以考虑去掉某些Agent的检索操作