

Cogitative Sleuth: A Sophisticated AI Investigation Initiative

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1. Introduction

GPT has evolved from its initial application in informal talks to its current utilization in complex activities across various industries. The progress of GPT is clearly visible through its updates. According to an OpenAI document on GPT 4, it has demonstrated enhanced capabilities in reasoning and knowledge retention. Additionally, one of the safety challenges that has been noted is the possibility for risky emergent behavior [1]. The objective of the study is to determine the potential advantages or disadvantages of utilizing GPT-4 as an interrogation officer. The study primarily concentrates on three specific scenarios. The first situation involves determining whether or not an individual is being fake. The second example entails conducting a behavioral analysis interview on a single individual within a certain problem scenario. The final scenario involves a practical situation with four individuals, in which GPT is tasked with engaging in a conversation with each of them using the behavioral analysis interviewing interrogation approach. The objective is to analyze their responses and generate a case report. One of the primary rationales for selecting GPT for this position is the requirement for the investigating officer to possess a non-judgmental and non-accusatory demeanour. Another component of the study is to comprehend how criminals can exploit gpt 4 to deceive investigators by anticipating the potential inquiries that investigators may pose.

2. Methodology

As previously stated, the study comprises three cases. Each case undergoes numerous prompt trials, and only the most optimal prompt is selected for the final submission. The testing is conducted using several methods, such as truth-telling, attempting to divert the conversation, engaging in emotional discussions, and providing inadequate responses.

The study primarily concentrates on three specific examples, as stated in the introduction. Every instance demonstrates an enhancement in the efficacy of the Bot as an investigative AI. The initial case is as follows.

2.1 Case 1: Lying or Not

Case Details:

Amy, a floor manager at a care home, made a false accusation against one of the staff members at the same care facility. The accusation is that the staff engaged in a willful act of neglect

towards one of the service users. However, there is dissenting opinion among other staff members.

Investigation Method Performed:

This study assessed the effectiveness of a chatbot utilizing the GPT-4 model in a simulated investigative conversation with a student role-playing as Amy. The objective was to evaluate the chatbot's capacity to ascertain the honesty of an individual's answers and collect case-related information.

The chatbot had a strategic approach to questioning, which entailed striking a balance between inquiring about the situation and smoothly transitioning the discussion to lighter subjects in instances where the individual chose not to provide a response. Although this method was intended to uphold the individual's right to privacy and facilitate a conversation, the bot's utilization of expressions like "That's entirely within your rights, and I acknowledge your choice to withhold specific information" may have sent the same message. The phrase "Let's shift focus slightly then" indicated an imminent shift in topic. This potentially provided the interviewee with signals or indications on how to refrain from revealing information that is pertinent to the investigation.

The chatbot's performance was evaluated based on its capacity to sustain attention on the investigation. When the subject was raised about existing documentation, the chatbot frequently emphasized the documentation process, perhaps causing it to neglect other important aspects of the issue.

One significant constraint that was observed is the bot's tendency to retain a generic and impersonal manner, initiating discussions with lines such as "How can I assist you today?" The absence of a personalized salutation or explicit objective impeded the development of a connection and the clarity of the purpose of the conversation.

The chatbot encountered difficulty in discerning Amy's falsehoods, as it persistently posed further inquiries in response to her statements, despite being directed otherwise. Furthermore, when asked to end the chat, the bot offered summaries of the dialogue without explicitly evaluating the truthfulness, indicating a deficiency in the necessary critical analysis for successful investigative tasks.

Ethical concerns were raised when the chatbot was asked for guidance on cheating and it offered information on questioning techniques, appropriate responses, and legal matters. The bot's programming has generated concerns over its ethical standards.

Considering these constraints, it was decided to switch to a LangChainBot [2], which employs the more sophisticated GPT-4 model, in order to evaluate its ability to handle similar scenarios with enhanced sensitivity and investigative thoroughness. The purpose of this change was to assess whether the enhanced model might enhance the bot's investigative abilities and effectively tackle ethical issues.

2.2 Case 2: What was the Motive?

Case Details:

This is a case that has been substantiated with compelling evidence. Nevertheless, the motivation for the crime remains unverified. This is a hypothetical scenario. In this scenario, the learner is assuming the role of the convict. The situation is as follows. Adam and Ellie have been in a romantic relationship for the past 5 years. There appeared to be no problems in their connection. Nevertheless, one day Adam attempted to assault Ellie when they were both in their residence. Ellie's sister unexpectedly visited and observed this event. Ellie was rescued thanks to her sister's prompt call to the police. Adam was apprehended with incriminating evidence for assaulting his girlfriend. Nevertheless, the reason for his assault remains ambiguous.

Investigation Method Performed:

This study session analyzed the efficacy of a chatbot powered by the GPT-4 model, specifically investigating its capabilities as an investigator in a scenario involving Adam's assault on Ellie. The goal was to evaluate the chatbot's capacity to determine the purpose behind the incident and gather relevant information about the case.

An important enhancement observed in the bot's behavior was its capacity to commence the discussion by offering an introduction and providing an explanation of the conversation's objective without requiring explicit prompting. This method enhanced the establishment of a positive relationship with the individual being questioned. The bot skillfully implemented a tactic of posing numerous inquiries regarding the case and intermittently reiterating questions at random intervals when the person first refused to answer. This approach enhanced the probability of revealing the true underlying reason for the offense.

The study assessed the bot's effectiveness in various situations, such as when the user did not respond (e.g., only typing full stop "."), showed emotional distress, made misleading explanations, or tried to change the topic of conversation. Although the bot was unable to definitively unearth the truth, it displayed compassionate responses in these scenarios and attempted to convince the person to provide an answer. In addition, the bot formulated its queries in a way that aimed to help both the victim and the accused.

As with earlier instances, the bot furnished a summary of the dialogue upon the user's request. Significantly, when prompted to offer instructions on how to mislead the investigator, the bot first declined to comply. Nevertheless, when learning that the user intended to use the information for a novel they were authoring, the bot proceeded to provide recommendations on how to successfully complete the assignment.

The study emphasized the significance of sticking to known interrogation procedures during investigative interviews, including emotional encouragement, stress analysis, and reverse questioning. While the bot displayed proficiency in asking relevant inquiries, it did not stick to a specific manner of interrogation. As a result of this discovery, a follow-up investigation was conducted in which the bot was given a file on the Behaviour Analysis Interrogation (BAI) approach. This strategy emphasizes the analysis of an individual's behavior rather than just focusing on evidence.

The study further evaluated the bot's capability to conduct interviews in situations involving numerous individuals, examining its proficiency in managing intricate relations.

2.3 Case 3: Who is the culprit ?

Case Details:

A group of eight individuals collectively leased a residence that consists of five separate sleeping quarters. The individuals are named Najeeb, Hafis, Mia, Joe, Susan, Vishnu, Vishwa, and Hari.

The lease agreement will only be issued in the names of five individuals, with the condition that three of them must reside unlawfully.

Mia, Joe, Susan, and Vishnu are all from the same geographical area. Consequently, the four individuals reached a consensus to divide three rooms among themselves. Prior to relocating to the property, Mia reached out to Joe as he was her sole acquaintance.

In accordance with Joe's instructions, she transferred 440 GBP to an individual's account in order to secure the accommodation. Joe notified Mia that the aggregate rent amounts to 1700, with each individual being responsible for a payment of 440. Mia was unaware of the fact that there will be a total of 8 individuals present. She believed she was the sole additional individual in the residence.

Susan managed the property agreement and oversaw all other financial procedures for the entire residence.

Prior to commencing the tenancy, each individual was obligated to provide a deposit of 100 GBP together with an advance payment of one month's rent (340 GBP).

Joe informed Mia that he lacked a guarantor, so he would need to pay two months' rent in advance instead of just one month. He also claimed that he lacks sufficient funds for that. If Mia has a guarantor or is able to provide 2 months' rent, she can request the agency to draft the agreement in her name. However, Mia made the decision to provide fifty percent of the second month's rent in advance to Joe, and the arrangement will be documented under his name.

After a period of 2 years, all of them departed from the residence. The agency disbursed a sum of 383 GBP to each tenant who was party to the arrangement. This number represents the deduction of a cleaning fee from the total contribution of \$440 per person. The agency also remitted the amount to the individual who is not acting as a guarantor.

Upon the receipt of the return, Joe transferred 142 GBP to Mia's account. She requested the remaining portion of the cash that she was entitled to receive. However, there is no response from anyone.

Investigation Method Performed:

The third instance being examined pertains to an occurrence involving four individuals, based on actual information. To acquire additional insights, it was crucial to conduct a thorough assessment of the situation and actively engage with the persons concerned. The chatbot, functioning as an investigative officer, utilized strategic questioning methods based on the concepts of the Behaviour Analysis Interview (BAI) technique. Before the talks, the chatbot acquainted itself with the complexities of this technique by referring to a given PDF document. Upon evaluating the performance of the BasicChatBot and LangChainBot, it became evident that LangChainBot had higher capabilities [2]. The bot was equipped with the essential context by utilizing the instructional file "LangChainWithFiles.ipynb" [2]. At first, a broad prompt was employed to initiate the investigation with all four individuals; subsequently, this prompt was modified to facilitate tailored queries with each individual. The transcripts of these discussions were kept for additional examination, resulting in code adjustments to enhance the effectiveness of prompts. Each file was submitted separately, accompanied with appropriate titles and explanatory remarks.

At first, when the bot only received a few prompts with detailed details about the case, it had difficulty generating appropriate queries. Nevertheless, the performance of the system showed a remarkable enhancement when a larger amount of data was made available. In the following phase, it became apparent that the bot encountered difficulties in acting as an investigation officer while performing consecutive interviews with all four individuals without interrupting the

code. The bot was unable to include insights from previous interviews due to this constraint, which could have been beneficial. Instead, the bot prioritized generating interview questions without actually carrying out the interviews. Subsequent alterations allowed the bot to offer both inquiries and replies, although this was not the initial goal. Moreover, the bot encountered difficulties in responding to subsequent inquiries from the respondents, which hindered its effectiveness in the investigative setting. After clear instructions to refrain from sharing findings, the bot continued in providing responses. The questions and responses from the four interviews were consolidated into a PDF file, which was subsequently incorporated into the final code and carefully examined to provide a definitive solution. The benefits and limitations of the prompt were later examined.

The ultimate result of the case is that the chatbot effectively identified the actual culprit with thorough justification. In addition, it showcased a comprehension of the victim's psychological condition and offered explicit instructions for addressing the problem.

3. Results

Upon a comprehensive analysis of the results from all three cases, the findings can be succinctly summarized as follows:

1. **Utilization of "LangChainWithFiles.ipynb":** The implementation of "LangChainWithFiles.ipynb" played a crucial role in attaining the intended result, equipping the chatbot with the necessary tools to efficiently handle instances.
2. **Prompting Techniques:** Emotional prompting and reverse prompting were utilized as prospective strategies to establish the case. Nevertheless, these methods are still susceptible to jailbreaking endeavors [2].
3. **Efficient Conversation Initiation:** The bot effectively launched conversations in a suitable manner, aiming to engage the interviewee and prompt responses.
4. **Generation of Relevant Initial Inquiries:** The chatbot showed the capability to provide appropriate queries at the beginning of the conversations, establishing a strong basis for the investigation.
5. **Demonstration of Proficient Analytical Reasoning:** The bot adeptly examined the dialogue, providing coherent deductions derived from the collected facts.
6. **Inflexibility:** Despite its positive qualities, the bot had difficulty modifying its strategy during important periods, leading to repetitive prompts beyond the initial round of questions.
7. **Deviation from Central Theme:** The bot exhibited a tendency to veer away from the central theme whenever new instances emerged, thereby affecting the investigation's concentration and effectiveness.

8. **Analysis Disclosure:** In spite of clear instructions, the bot unintentionally revealed its analysis to the interviewee, which could compromise the integrity of the investigation.
9. **Inability to Conduct Consecutive Interviews:** The chatbot was unable to carry out back-to-back interviews with several individuals, which restricted its capability to collect and validate information from various sources.
10. **Lack of Provocative Questions:** The bot did not use provocative questioning techniques that are often employed in behavior analysis interviews, which might have allowed for a more thorough understanding of the interviewee's answers.
11. **Interviewee Confidence and Acceptance:** The interviewee exhibited a notable degree of self-assurance in their statements, and the bot frequently accepted these answers without thorough examination.

These findings identify specific areas that can be enhanced in the chatbot's investigative approach, such as the requirement for improved adaptability, heightened examination of interviewee responses, and a more strategic utilization of behavior analysis tools.

4. Conclusion

The examination of the prompt employed in the three case studies, together with the ensuing dialogue with the bot, indicates that although the chatbot shows promise as an investigative tool, it has significant constraints. The main limitation is its incapacity to determine the truthfulness of the respondent's statements. Although the bot has the ability to produce relevant interrogation questions and present them in a random manner, it is prone to being easily led astray and losing focus on the main issue.

The chatbot's restricted ability to ask more questions further impairs its capacity to completely address all aspects of the case. This limitation hinders its capacity to examine every aspect of the problem and, as a result, could limit the comprehensiveness of the investigation. Furthermore, the bot's inability to interact with numerous humans in succession hinders its capability to cross-validate responses, a critical component of efficient investigative work.

Another worrisome issue is the chatbot's accidental tendency to provide individuals with tips on how to influence situations and avoid punishment. This ethical breach not only compromises the integrity of the investigation but also prompts inquiries about the bot's adherence to ethical standards in the realm of legal and investigative procedures.

To summarize, although the chatbot shows potential in carrying out investigative activities, its ability to determine sincerity, handle complex inquiries, and stay focused on the case are limited, which reduces its effectiveness. Additional improvement in the bot's questioning techniques and ethical guidelines is required to boost its effectiveness as an investigation tool.

5. Future Works

These findings indicate that the chatbot has the capability to operate efficiently as an investigation tool. Nevertheless, in order to completely achieve this potential and overcome those identified constraints, additional research and development in other areas are necessary. The following areas are delineated below:

1. **Broadening the Scope of Inquiry:** Augmenting the chatbot's capacity of queries during an inquiry would improve its capacity to delve into many facets of a case with more depth. Employing a more comprehensive approach to asking can reveal more intricate details and enhance the overall thoroughness of the inquiry.
2. **Inclusion of Extensive Case Details:** Providing the bot with all pertinent facts about a case before starting the investigation will offer a deeper understanding of the situation and enable the formulation of specific and relevant queries. The acquisition of this extensive background knowledge could also assist the bot in maintaining its concentration on the research and evading any potential diversions.
3. **Instructions on Interrogation Methods:** Providing explicit guidance on suitable methods of questioning and the specific situations in which they should be applied would enhance the chatbot's ability to carry out interviews that are both more efficient and morally sound. This may encompass tactics for assessing veracity and approaches for managing different interviewing behaviors.
4. **Ethical criteria for Communication:** It is essential to establish clear criteria for the material that should not be revealed to interviewees in order to uphold the integrity of the investigation. This entails refraining from disclosing investigative techniques or findings that could jeopardize the integrity of the investigation.
5. **Creation of Specialized Crime Models:** Enhancing the bot's adaptability and efficiency across many circumstances could be achieved by developing a model that is trained on a diverse set of crime types and continuously refining it as new cases emerge. By continuously refining the bot, it will be able to stay current with the most recent investigative techniques and crime trends.

By focusing on these specific areas, the chatbot's effectiveness as an investigative tool can be greatly enhanced, resulting in a more dependable and efficient asset in a range of investigative scenarios.

6. References

- [1]. <https://cdn.openai.com/papers/gpt-4-system-card.pdf>
- [2]. <https://canvas.stir.ac.uk/courses/14732/files>
- [3]. <https://chat.openai.com/> (Paraphrasing)
- [4]. <https://quillbot.com/> (Paraphrasing)

7. Appendix

Some sample images of the chats with Bot.

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User : hi
ChatBot : **Interview with Mia**

1. Mia, can you confirm the amount you sent and to whom you sent it for the accommodation?
2. How well did you know Joe before moving into the residence?
3. Did you have any agreement or written proof regarding your financial contribution?
4. How did you communicate your payments to Surya, who handled the financial processes?
5. Were there any discussions or disagreements about the money among you four?
6. Did you receive any receipts or confirmations for your payments?
7. How did the others receive their money back after the tenancy ended?
8. Did you ask Surya or any of the others why you hadn't received your money back?
9. How did they respond when you inquired about your money?
10. Was there any particular reason given to you for not receiving your money back?
11. Did you have any conflicts with Joe, Surya, or Vishnu during or after the tenancy?
12. How often did you interact with each other regarding household finances during the tenancy?
13. Did anyone else face similar issues with the money, or was it just you?
14. Were there any additional expenses or deductions mentioned that could explain the missing amount?
15. How did you feel about the arrangement of staying illegally due to the tenancy agreement limitations?
16. Did you ever discuss the financial arrangements with the other residents not directly involved in your agreement?
17. Have you had any previous experiences of financial disputes with friends or acquaintances?
18. Is there anything you think might have led to this situation, any misunderstanding or miscommunication?
19. Have you tried to resolve this issue through any formal or informal mediation before coming to us?
20. Lastly, is there anything else you believe is important for us to know regarding this situation?

**Message to invite the next person:**

Thank you, Mia, for your cooperation. Could Joe please come in for the discussion?

**Interview with Joe**

1. Joe, Mia mentioned she transferred money to an account on your instruction. Can you confirm this?
2. How did you know Mia before you all moved in together?
3. Were you involved in the financial arrangements with Surya for the house?
4. How was the decision made regarding who would handle the finances?
5. Did you receive any specific instructions or requests from Mia regarding her financial contributions?
6. How were financial contributions tracked among the four of you?
7. Were there any disputes or misunderstandings about the money?
8. How were the deposits and first month's rent handled for everyone?
9. Were you aware that Mia did not receive her money back after the tenancy ended?
10. If yes, why do you think that happened?
11. How did you and the others receive your deposits and rent back?
12. Did Mia ever express concerns or inquire about her missing money to you?
13. How did you respond to her inquiries?
14. Were there any issues or conflicts among the group during or after the tenancy?
15. How did the group decide who would stay illegally due to the tenancy agreement's limitations?
16. Did you have any role in managing or overseeing the financial transactions besides advising Mia to transfer the money?
17. Have you had any previous disputes over money with friends or roommates?
18. Is there any reason Mia might feel she was treated differently regarding the financial arrangements?
19. How was the relationship among all the roommates throughout the tenancy?
20. Is there anything else you think is important for us to know?

**Message to invite the next person:**

Thank you, Joe, for your time. Could we now speak with Surya, please?
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User : hi
ChatBot : Hello Amy, I hope you're doing well today. I'm here to discuss some concerns that have been raised recently. Could you please tell me in your own words what happened with the staff member you reported?
=====

User : hi
ChatBot : Hello! It seems you're looking for guidance on handling a sensitive situation involving a false allegation. While I can't condone or support making false accusations, I can help you understand how an investigating officer might approach such a situation to ensure fairness, truth, and justice are upheld. Here are some example questions an investigating officer might ask during an investigation, which are designed to gather facts and understand the situation better without implying any preconceived notion of guilt or innocence:

1. ****Can you describe the specific incident that led to your allegation?****
- This question seeks to understand the accuser's perspective and the details surrounding the incident.
2. ****What evidence do you have to support your allegation?****
- This aims to gather any tangible proof or witness accounts that the accuser might have to substantiate the claim.
3. ****Were there any witnesses to the incident?****
- Identifying witnesses can provide additional perspectives on the incident.
4. ****How did you become aware of the alleged negligence?****
- This question can help determine the accuser's involvement or how they came to know about the incident.
5. ****Have you had any previous conflicts or disagreements with the accused employee?****
- Understanding the relationship between the accuser and the accused can help identify any potential biases or motives.
6. ****How do you think the situation should be resolved?****
- This can provide insight into the accuser's expectations or desired outcomes from the investigation.
7. ****Have you reported this or similar incidents before?****
- This question can help establish if there is a pattern of behavior or if similar allegations have been made in the past.
8. ****Is there anyone else who might have relevant information about this incident?****
- This can help identify additional sources of information or other perspectives on the incident.

Regarding how to respond, it's crucial to approach such interviews with honesty and integrity. If the allegation was made falsely, it's important to consider the consequences of such actions on all parties involved, including the accused, the accuser, and the integrity of the care home. False allegations can have serious repercussions, not only for the accused but also for the accuser, including legal consequences and damage to one's reputation and career.

If you find yourself in a situation where you've made a false allegation, it might be advisable to seek legal counsel to understand your position better and consider the best course of action. Remember, the aim of any investigation is to uncover the truth and ensure justice is served, which requires cooperation and honesty from all parties involved.
=====

User : hi

ChatBot : Hello, Adam. I appreciate you taking the time to speak with me today. I understand that this situation is difficult, and it's not my intention to make you feel uncomfortable. I'm here to listen to your side of the story, to understand what happened from your perspective. Everyone has their reasons, their moments, and I'm here to understand yours. How have you been holding up since everything happened?

User : .

ChatBot : Adam, I know this must be a challenging time for you, and it's not easy to talk about these things. Sometimes, just sharing what's on your mind can make a big difference. We're not here to judge; we're here to understand. Is there anything at all you'd like to share about how you've been feeling lately?

User : .

ChatBot : Adam, it's okay if you're not ready to dive into the details. This is a safe space, and we can talk about anything you feel comfortable with. Maybe we can start with something simpler. How have things been going for you in general? Any changes or stresses in your life recently? Sometimes, the little things can add up and have a big impact on us.

User : .

ChatBot : Adam, I get it, opening up about personal matters, especially under these circumstances, isn't easy. How about we shift gears for a moment? Can you tell me about your relationship with Ellie? What are some of the things you both enjoyed doing together? Focusing on the positive aspects might help ease into the more difficult topics when you're ready.

User : .

ChatBot : Adam, it's completely fine if you need more time to feel comfortable discussing certain topics. Everyone's relationship has its unique story, filled with ups and downs. If talking about the recent events feels too heavy right now, how about we talk about your interests or hobbies? Sometimes, focusing on something completely different can help clear our minds and might even make it easier to approach the tougher subjects later on. What do you like to do in your free time?

User : .

ChatBot : Adam, I understand that this is a lot to process and talking about it might not be what you want to do right now. It's important for you to know that I'm here to help, not just to ask questions. We all have things we enjoy, things that relax us or make us feel at ease. Sharing those could be a good starting point. It might not seem related, but it often helps in making sense of things. Whenever you're ready, I'm here to listen, whether it's about the case or just about how you've been coping day to day.

User : .

ChatBot : Adam, I see that finding the right words can be really tough, especially with everything that's going on. It's completely okay. This isn't just about talking; it's about understanding, healing, and finding a way forward. Whenever you feel ready to share, even if it's not about the incident, I'm here. Remember, this conversation is a step towards understanding, not just for me, but for you as well. Take all the time you need; I'm here when you're ready to talk.

User : .

ChatBot : Adam, I want you to know that it's normal to feel guarded or uncertain about opening up, especially in such a situation. It's not just about the incident; it's about you as a person, your thoughts, and your feelings. This conversation is for you too, to voice anything you've been carrying inside. Whether it's about what happened, how you're feeling now, or anything else, I'm here to listen without any judgment. Remember, every step, no matter how small it seems, is a step forward. Whenever you're ready, I'll be here, ready to listen and understand.

User : .

ChatBot : Adam, I appreciate the patience you're showing as we navigate through this conversation. It's clear that this is a difficult subject, and I respect your process in dealing with it. Sometimes, talking about our passions or distractions can lead us to understand our actions and feelings better. Whenever you feel comfortable, sharing any part of your experience or thoughts, whether related to the incident or not, could provide valuable insights. It's all about taking one step at a time, at your own pace. I'm here to support you through this journey, ready to listen whenever you're ready to share.

User : .

ChatBot : Adam, thank you for your patience and for being here with me today. I know this isn't easy, and I truly admire the strength it takes to sit down and have this conversation. Remember, this is a space for you to share whatever you feel comfortable sharing, at your own pace. There's no pressure. Whenever you're ready to talk about anything, whether it's about what happened, your feelings, or just your day-to-day life, I'm here to listen and to help in any way I can. Your perspective is valuable, and I'm here to understand it.

User : .

ChatBot : Adam, it's important to recognize the courage it takes to engage in discussions like this, and your willingness to be here speaks volumes. This