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TEXAS
The University of Texas at Austin

LUCCA: LLMs under Conversational Cognitive Architectures

FRI II Final Presentation

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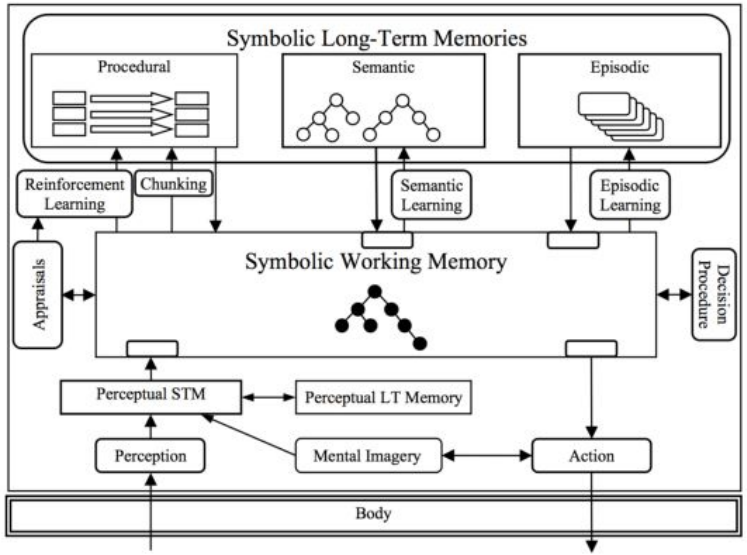
Introduction

Goal: Develop a conversation cognitive architecture using LLMs

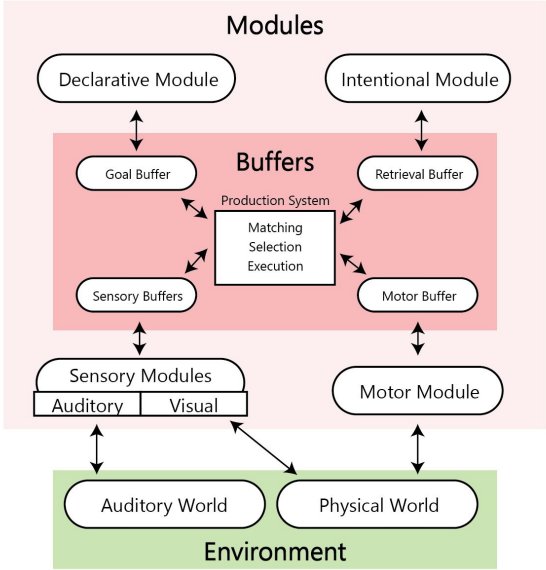
Main steps:

(1) Create personal/factual information memory bases
(2) Set up querying structure between data and LLM
(3) Configure and set up conversational LLM agent

Background

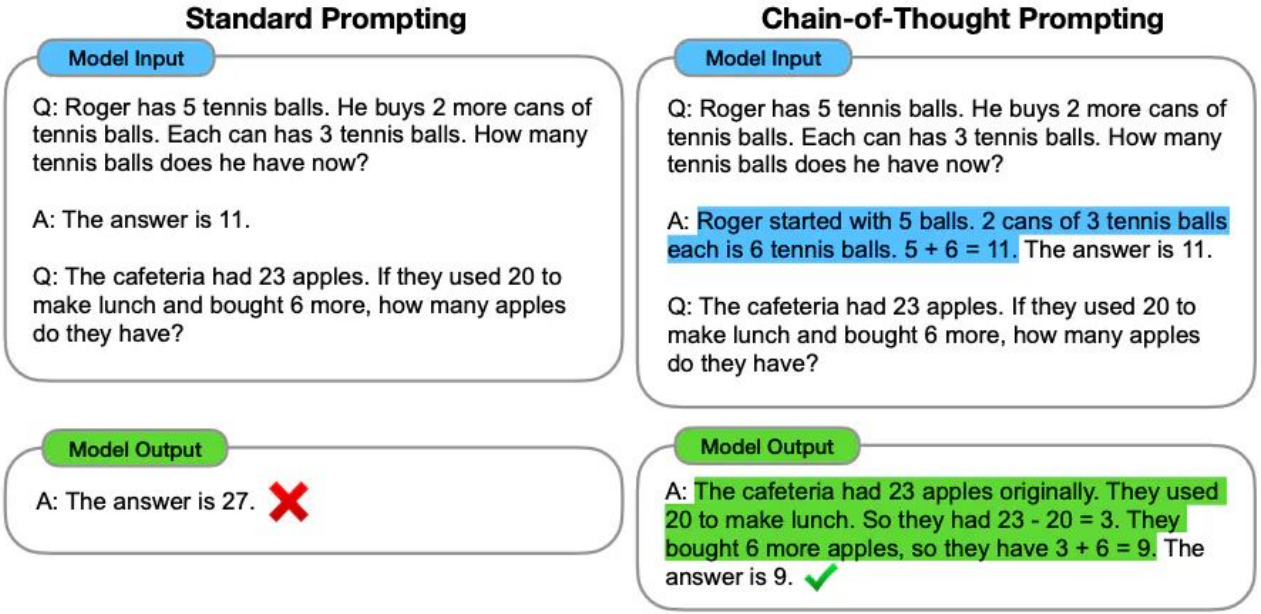


SOAR Architecture



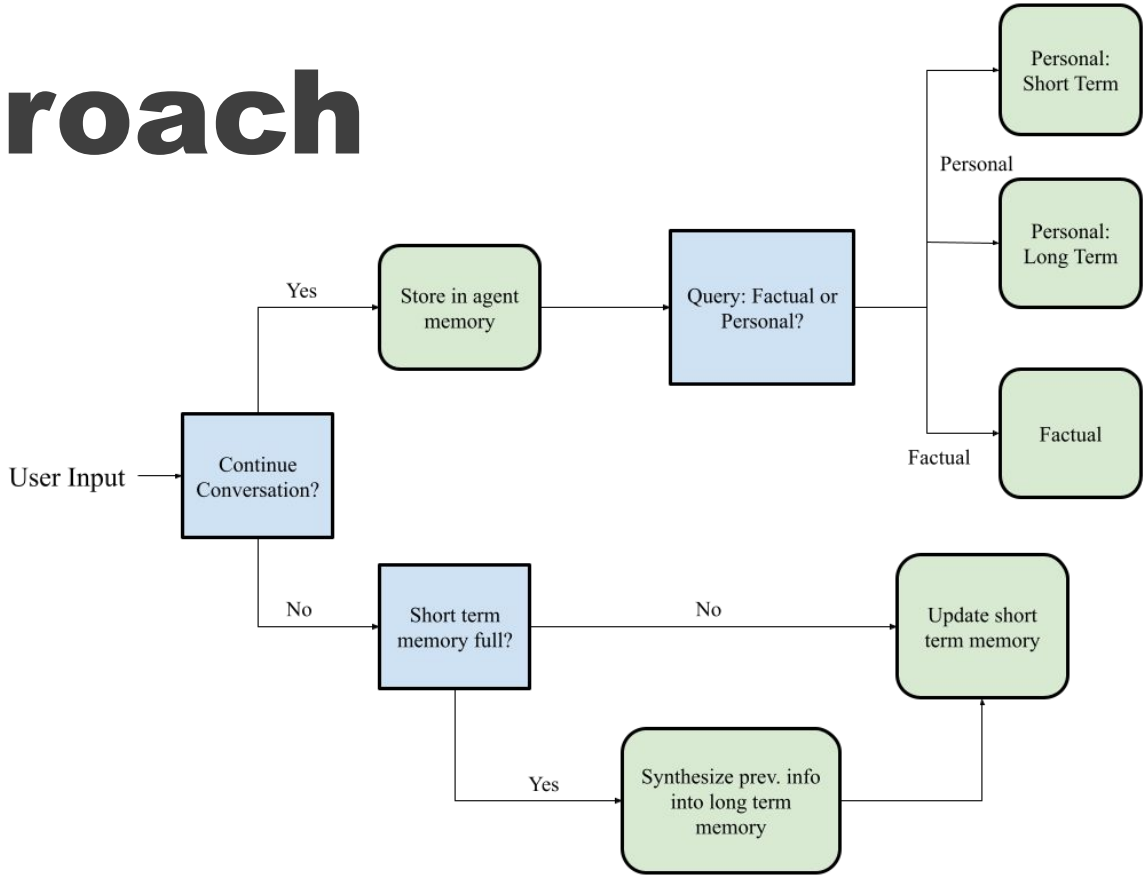
ACT-R Architecture

Background



Chain-of-Thought

Approach


User Input
Continue Conversation?
Yes
Store in agent memory
Query: Factual or Personal?
Personal
Personal: Short Term
Personal: Long Term
Factual
Factual
No
Short term memory full?
No
Update short term memory
Yes
Synthesize prev. info into long term memory

Approach: CoT

"You are a helpful chatbot, LUCCA, designed to hold casual conversations with people and provide help. A member of the lab, (name), has had conversations with you over the past few weeks in which they've told you information about their life. I will provide information about the previous conversation. What is your very concise response?... Previous conversation: (information)"

Experimentation

Applying LUCCA in different conversational scenarios

1) Personal memory tests
2) Factual memory tests
3) HRI Study

Factual Recall

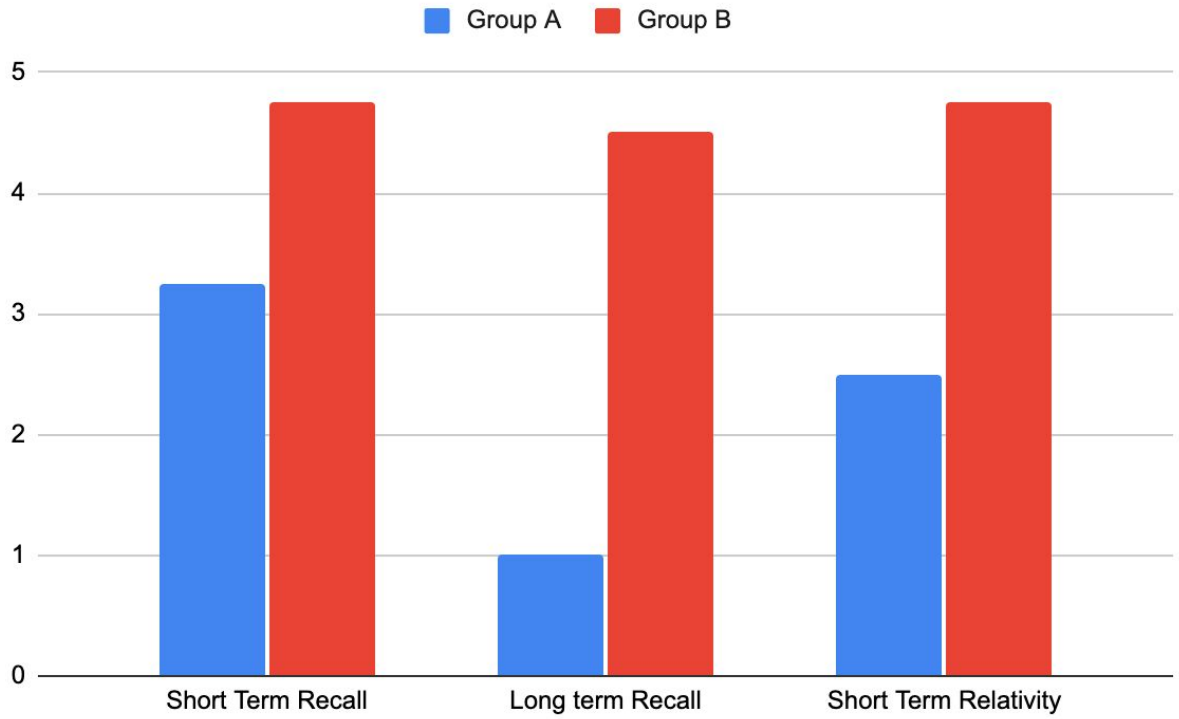
AI: Hey <Name>! How's it going?
Person: Hi! Can you tell me about the AHG?
AI: Sure! The Anna Hiss Gym is …
Person: Where can I find Justin Hart?
AI: Justin Hart's room is at …
Person: Thanks!
AI: Alright, talk to you later! Take care!

Personal Recall

AI: Hey <Name>! How's it going? Did you find your way around AHG alright?
Person: Yes I did! Where can I find..

Results/Evaluation

- HRI study focusing on personal and factual retrieval
- Assigned to A (without LUCCA) or B (without LUCCA)
- Likert scale rating for various metrics



A = Without memory base
B = With memory base

Conclusion

- Created an accurate lighter-weight cognitive framework centered around LLMs
- Utilizes personal memory modules, factual data stores, and prompting techniques
- Future work: abstract reasoning, audio/visual input