Wait, That Was an option?

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Introduction

- AI bring a new perspective to video games
- Choose-Your-Own-Adventure Game
  - “Wait, That Was an Option?”
- AI is able to:
  - Validate the user action
  - Check if it is consistent with the story
  - Update the story information
  - Continue the story for each choice the user makes

AI Challenges in Games

Traditional Games	AI-Driven Games

• Rely on deterministic programming
  ○ Fixed Content Design
  ○ Dialogue, events and outcomes are handcrafted
  ○ Limites replayability and scalability
• Predictable Player Experience
• Heavy Development Overhead
	• Nondeterministic nature of LLMs
	  ○ AI-generated outcomes can vary which makes testing and QA difficult
	• Prompt Engineering can be complex
	• Content validation
	  ○ Outputs must be checked (typically in JSON format)
	• Players can have freedom but how much?
	• Performance and Cost

Technologies

OpenAI

GPT-4o-mini

Processes Natural Language Inputs and Generates narrative response

Pycharm

IDE

used to write python code and import libraries

Gradio

UI Framework

User Interface implementation

Discord

Collaboration

Weekly meetings and other communication

Github

Version Control

https://github.com/crhuyghe/AI-CYOA-Game

AI CYOA GAME

METHODS

Divide and Conquer	Input Validation	Outcome

• AI handles only the creative aspects (storytelling, outcome generation).
• Game backend manages structure, state, and error-checking.
	• Utilization of GPT-4o-mini
	• Validation Check
	• Consistency Check
	• Prompt Engineering
	• Few-Shot Learning
		• If checks pass, AI generates the story outcome.
		• Separate calls made to update:
		  ○ Map info
		  ○ Character states
		  ○ Inventory (add/remove items)
		  ○ Outputs are validated (e.g., JSON format) before applying updates.

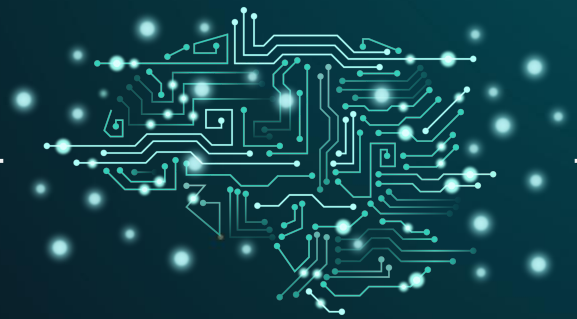
AI CYOA GAME

DATA

GPT-4o-mini
Pretrained model

Does not utilize an extensive dataset

Few Shot Learning
Learning from labeled examples.



Provides the model for LLM applications of how to format the output

Prompt Engineering
Validation and Story Status

Designing inputs to guide the AI behavior

AI CYOA GAME - EXPERIMENTS

- Trial and Error
  - Multiple tests to ensure actual output matched the intended output
  - Slight prompt adjustments
- Manual Assessment

Prompt Change	Fraction of valid outputs	Primary reason for failure
Telling AI to continue the story	1/5 	AI fabricates additional actions beyond the user action
Telling AI not to continue past the user's action	1/5 	AI fabricates additional actions beyond the user action
Telling AI to limit response to three sentences	0/5 	AI fails to explain the outcome in detail
Telling AI not to repeat the user action	2/5 	AI fabricates additional actions beyond the user action
Replace "continue the story" with "detail the consequences of the user action"	4/5 	AI fabricates unnecessary story elements
Tell AI not to fabricate story elements	5/5 	

AI CYOA GAME - EXPERIMENTS

- Satisfactory AI Outputs
- Need to improve the AI story update generation
    - increase the rate that the update calls generated valid JSON strings
- Still imperfect → Malformed JSON is caught by checks within the program

Prompt Change	Fraction of valid JSON outputs
Ask for story updates in prespecified format	0/10 
Included successful few-shot learning example	7/10 
Include examples of empty update JSON lists	9/10 
Including additional examples	19/20 

Game Interface

Wait, That Was an Option?

Story

Moe pushed open the weathered door of his fishing shack, the wooden floor groaning under his boots as he stepped inside. The air was thick with the familiar scent of lake water, old timber, and the faint tang of motor oil. Tomorrow was the big day - his long-awaited fishing trip on Blackwater Lake. He had been planning it for weeks, prepping bait, patching nets, making sure everything was just right.

As the evening breeze rustled the trees, Moe stepped outside and made his way toward the shore, where his boat rested on a pair of worn wooden skids. But the moment he crouched down to inspect it, his stomach sank. There, just beneath the bench seat, a jagged hole gaped in the hull.

He ran a calloused hand over the splintered edges, his brow furrowing. No doubt about it - this boat wasn't going anywhere in its current state. But one way or another, come sunrise, he was going fishing.

The night was young, and the shack was filled with tools, scraps, and whatever ingenuity he could muster.

What was he going to do?

Status

Player Character:
Name: Moe
Location: Moe's shack
Description: A wizened swamp dweller who loves nothing more than a good day out fishing. Relatively old, but with the vitality and ingenuity of a younger man.
Player Inventory:
Item: Fishing rod
Description: Moe's trusty fishing rod. It has caught many a fish in its years.

Story Setting: Blackwater Lake Surroundings

Location 1: Blackwater Lake
Relative area: Next to Moe's shack.
Description: Calm, cool, murky waters. The water seems to be deep near the center, but the shore is muddy and full of reeds. There are certainly fish in there, and who knows what else.

Location 2: Moe's Shack
Relative area: Located nearby to the lakeshore, close to the dock. Surrounded by woods on all other sides.
Description: Moe's private fishing shack. A relatively small, dingy wooden building with old, creaky floors. Used to store supplies and fishing equipment, among other things.

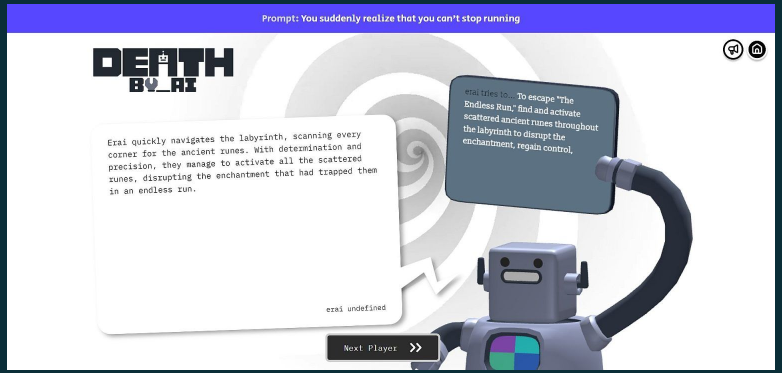
Your Action

Next

Reset Game

Related Work

- Kyle is Famous
- Death by AI
- Documentation:
  - OpenAI API
  - Gradio



References

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[4] https://www.gradio.app/docs

[5] Z. Xie, T. Cohn, and J. H. Lau, “The next chapter: A study of large language models in storytelling,” *Proceedings of the 16th International Natural Language Generation Conference*, Jul. 2023. doi:10.18653/v1/2023.inlg-main.23

[6] https://www.ibm.com/think/topics/few-shot-learning

[7] http://coursera.org/articles/what-is-prompt-engineering