

IAT 460 Generative AI and Computational Creativity

A2: Implement a Rule-Based System

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1. Source Code

<https://github.com/harjotsk03/iat460markovmodelstory>

2. Sample Outputs

- a. It was a **mysteriousday** when **Alicedecided** to embark on a **questin** the ancient ruins. As **Aliceventure** forth, a wise old sage appeared with a warning. Air sparkled with possibility, each moment pregnant with **potential**. **echoes** of laughter mingled with the rustling leaves, creating a. Intrigued by this development, they pressed forward with renewed curiosity. Leaving traces of gold in the air. wisdom of ages past seemed to seep from. Along the way, Aliceencountered a magical barrier blocking the path. Magic and **mystery**. a **gentle** breeze carried the scent of adventure, beckoning brave souls to explore. the air sparkled with possibility,. Time seemed to move differently in this strange place. With determination, the brave **adventurerdecoded** the mysterious messages. Ancient knowledge revealed itself to their understanding. Finally, **Alicediscovered** the true meaning of their quest. Sometimes the greatest treasures are found in the journey itself. On moss-covered stones, telling tales of magic and mystery. a gentle breeze carried the scent of adventure,.

Word count: 159

- b. It was a peacefulday when the brave **adventurerdecided** to **discoverin** the mystical garden. As the brave adventurersolve, a wise old sage appeared with a warning. Through ancient stone, leaving traces of gold in the air. wisdom of ages past seemed to stand still in. With wonder in their eyes, they embraced the challenge ahead. Dreams and reality intertwined. crystal formations caught the light, sending rainbow reflections across weathered walls. the path. Along the way, the curious **explorerencountered** a series of challenging puzzles. Whispers of forgotten legends echoed through the air. With determination, Bobdecoded the mysterious messages. Light, sending rainbow reflections across weathered walls. the path ahead wound through mist-shrouded archways, each step promising new discoveries. magical energies pulsed through ancient. The pieces of the puzzle began falling into place. The rustling leaves, creating a symphony of wonder. time seemed to stand still in this enchanted realm, where. Finally, the curious **explorerformed** an unexpected alliance with magical beings. In the **air**. **wisdom** of ages past seemed to seep from every crack and crevice.. Knowledge and wisdom come to those who persist in their quest. Still in this enchanted realm, where

dreams and reality intertwined. crystal formations caught the light, sending rainbow.

Word count: 200

- c. It was a magical day when Alice decided to investigate in the mystical garden. As Charlie investigate, a wise old sage appeared with a warning. The path ahead wound through mist-shrouded archways, each step promising new discoveries. magical energies pulsed through ancient stone,. With wonder in their eyes, they embraced the challenge ahead. Possibility, each moment pregnant with potential. echoes of laughter mingled with the rustling leaves, creating a symphony of wonder. time seemed to. Along the way, Charlie encountered a group of skeptical local villagers. Time seemed to move differently in this strange place. From every crack and crevice.. With determination, Ethan unlocked an ancient secret. Time seemed to stand still in this enchanted realm, where dreams and reality intertwined. crystal. Their persistence was rewarded with a breakthrough. With possibility, each moment pregnant with potential. echoes of laughter mingled with the rustling leaves, creating a. Finally, Charlie discovered the true meaning of their quest. The rustling leaves, creating a symphony of wonder. time seemed to stand still in this enchanted realm, where dreams and reality intertwined. crystal formations caught. Sometimes the greatest treasures are found in the journey itself. The rustling leaves, creating a symphony of wonder. time seemed to seep from every crack and crevice..

Word count: 200

A generated story that combines two key techniques, grammar rules like a Mad Libs template, filling in slots like "TIME" and "CHARACTER" with preset options to create the basic story structure ("It was a sunny day when Alice..."). Then, it uses Markov chains, which learn patterns from sample descriptive text to generate natural-sounding descriptions (like how "ancient" often leads to "trees" in the training data). The code alternates between these methods - creating structured plot points from grammar rules, then sprinkling in flowing descriptions from the Markov chain - until it reaches at least 100 words.

- d. it was a sunny day when charlie decided to create in the bustling city. Each step promising new discoveries. magical energies pulsed through ancient stone, leaving traces of gold in the air. wisdom of ages past seemed to stand. as alice explore, an ancient scroll materialized before them. Possibility, each moment pregnant with potential. echoes of laughter mingled with the rustling leaves, creating a symphony of wonder. time seemed to seep. intrigued by this development, they pressed forward with renewed curiosity. The light, sending rainbow reflections across weathered walls. the path ahead wound through mist-shrouded archways, each step promising new discoveries. magical energies. along the way, ethan encountered a series of challenging puzzles. time seemed to

move differently in this strange place. Echoes of laughter mingled with the rustling leaves, creating a symphony of wonder. time seemed to stand. with determination, diana unlocked an ancient secret. From every crack and crevice.. their persistence was rewarded with a breakthrough. Mystery. a gentle breeze carried the scent of adventure, beckoning brave souls to explore. the air sparkled. finally, alice made a life-changing discovery. Air sparkled with possibility, each moment pregnant with potential. echoes of laughter mingled with the rustling leaves, creating a. knowledge and wisdom come to those who persist in their quest. Beckoning brave souls to explore. the air sparkled with possibility, each moment pregnant with potential. echoes of laughter.

Word count: 229

- e. it was a peaceful day when the brave adventurer decided to explore in the forgotten temple. Adventure, beckoning brave souls to explore. the air sparkled with possibility, each moment pregnant with potential. echoes of laughter mingled with the rustling. as ethan create, strange symbols began to glow on the walls. Tales of magic and mystery. a gentle breeze carried the scent of adventure, beckoning brave. with wonder in their eyes, they embraced the challenge ahead. And mystery. a gentle breeze carried the scent of adventure, beckoning brave souls to explore. the air sparkled with. along the way, alice encountered a group of skeptical local villagers. whispers of forgotten legends echoed through the air. Gold in the air. wisdom of ages past seemed to stand still in this enchanted realm, where dreams and reality intertwined. crystal. with determination, the curious explorer decoded the mysterious messages. Caught the light, sending rainbow reflections across weathered walls. the path ahead wound through mist-shrouded archways, each step promising new discoveries. magical energies. ancient knowledge revealed itself to their understanding. The path ahead wound through mist-shrouded archways, each step promising new discoveries. magical energies pulsed through ancient stone, leaving traces of gold in the. finally, charlie discovered the true meaning of their quest. Past seemed to stand still in this enchanted realm, where dreams and reality intertwined. crystal formations caught. knowledge and wisdom come to those who persist in their quest. This enchanted realm, where dreams and reality intertwined. crystal formations caught the light, sending rainbow reflections across weathered walls. the path ahead wound through.

Word count: 259

3. Technical Documentation

a. System Architecture

The story generator combines two key components: a generative grammar for story structure and a Markov chain for natural language generation. The grammar

ensures coherent narrative flow while the Markov model adds varied, natural-sounding descriptions.

b. Implementation Details

- i. Grammar System: Dictionary-based rules define story elements (OPENING, MIDDLE, DEVELOPMENT, MIDDLE2, ENDING)
- ii. Markov Chain: A language model that learns from detailed descriptions and predicts words based on pairs of consecutive words.
- iii. Generation Process: Alternates between grammar-based structure and Markov-generated descriptions until reaching desired length

c. Technical Challenges

- i. Primary challenge was balancing structured narrative with natural language flow.
- ii. However I solves it by, using grammar rules for story backbone
- iii. Length validation to ensure substantial content
- iv. The second challenge I faced was with weird outputs with extra spacing between each of the words being picked from my grammar dictionary. I solved this by reaching out to Griffin who noticed I had a return ' '.join instead of return ''.join. This was a simple but crucial fix.
- v. The final “issue” or challenge I encountered was that the when it was going through the Markov's chain function it hallucinated a little bit at times and did some funky things like repeat it self, put full stops where they don't and shouldn't be, and miss out spaces between some words or simply putting 2 words instead of one in place. I have put these in red in the first two stories to show what I mean.

4. Creative Statement

a. Vision and Goals

- i. Created to generate stories that feel both structured and natural by combining rule-based storytelling with statistical language patterns. Inspired by traditional storytelling structure while incorporating modern procedural generation techniques.

b. Inspiration

- i. The inspiration came from my last course, IAT 222 where Griffin was my TA for that course as well where my final project was very similar. We used stories that people would fill in the blanks, we then had an AI generated image to display to the user of the story they had completed with the words they had filled in. I thought it would be cool to use the templates we used in that course but have this code fill it out automated through grammars and Markov's.

5. Results

- a. The system successfully produces varied yet coherent narratives (sometimes) by:

- i. Maintaining consistent story structure
 - ii. Adding natural descriptive language
 - iii. Balancing predictability with variety
 - iv. Generating scalable content
- b. One thing to fix and work on is the output and hallucination of the system. As I mentioned in the challenge's answer, at times when it goes through the Markov's function it mashes words together or causes it to make little sense however for the most part the system works well.