OCTO Coding Challenge 2024 - Week 3

Welcome back to Week 3 of Bentley's OCTO Coding Challenge for 2024!

As always, you'll have until Thursday, 19th December, 11PM EST, to complete 2 coding puzzles.

You can solve the puzzles with any tools/languages you like, including and especially AI!
In fact we'll be giving special recognition to colleagues who submit transcripts of their interactions with CoPilot Chat.

Hi, Tunc. When you submit this form, the owner will see your name and email address.

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Part 1: Text Generation (20 Points)

Introduction
Most text generation AI models, including LLMs such as GPT-4, produce text by sampling from a probability distribution over the next words to continue a sentence. A simple example is a *Markov Chain*, represented by a weighted graph where nodes are words and edges lead to next words with probability equal to the edge weight.

Problem Statement
Given a Markov Chain as a weighted directed *acyclic* graph, what is the longest sequence (sentence) through the Markov Chain possible?

The Markov Chain is given as a JSON file: https://tinyurl.com/vvndt88h
The JSON file represents the Markov Chain in adjacency list format. Each of the top-level keys represent nodes/words and map to another object/dict whose keys are all the possible words that could come next, and whose values are the edge weights.
A sequence/sentence starts with the node "START" and ends once the "END" node is reached.
Length of a sequence/sentence is measured in the number of words (excluding "START" and "END").
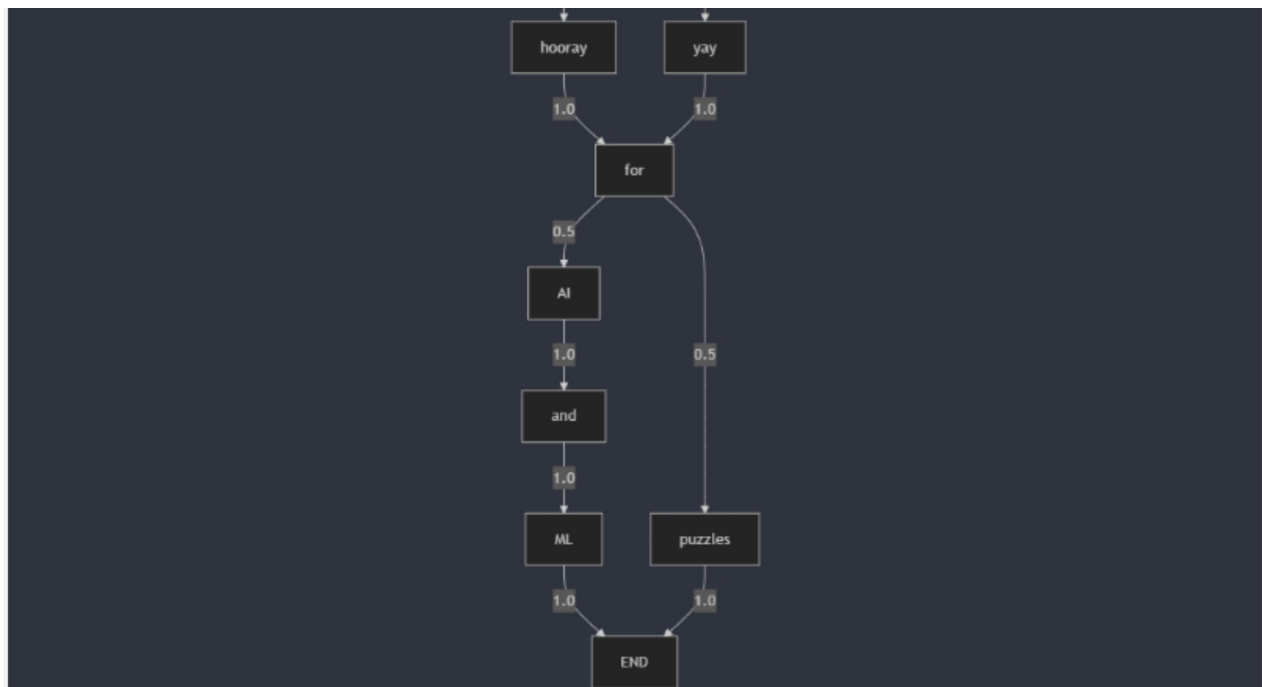
Example
The following example JSON file, https://tinyurl.com/5k52fpxk, represents the following possible sentences:

- Hooray for AI and ML. (probability 30%)
- Hooray for holidays. (probability 30%)
- Yay for AI and ML. (probability 20%)
- Yay for puzzles. (probability 20%)

The longest sentence is "Yay for AI and ML", with **5** words.

The value must be a number

2

Part 1 (Bonus) (2 Points)

Feel free to share your solution source code for Part 1.

Remember, recognition will be given to correct submissions for the following categories:

1. Code golf: Who's got the shortest source?
2. Most elegant solution
3. Best use of AI in writing a solution.

Enter your answer

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Part 2: Average Sentence Length (30 Points)

Introduction
Let's try something a step up in difficulty. Let's actually work with the probability distribution of our Markov Chain.

Problem Statement

Given a Markov Chain as a weighted directed (*not necessarily acyclic*) graph, what is the average sentence length?
As in Part 1, length is measured in number of words (excluding "START" and "END").

The Markov Chain (which was generated from Bentley's press releases!) is given as an adjacency list JSON file: https://tinyurl.com/43pu74r5
Round your answer to 2 decimal places.

Example

The following example JSON file, https://tinyurl.com/mu5efpvz, represents the following possible sentences:

- Hooray for AI and ML. (probability 30%)
- Hooray for puzzles. (probability 30%)
- Yay for AI and ML. (probability 20%)
- Yay for puzzles. (probability 20%)

The average sentence length is 5 * 0.3 + 3 * 0.3 + 5 * 0.2 + 3 * 0.2 = **4.00** words.

The value must be a number

4

Part 2 (Bonus) (2 Points)

Feel free to share your solution source code for Part 2.

Remember, recognition will be given to correct submissions for the following categories:

1. Code golf: Who's got the shortest source?
2. Most elegant solution
3. Best use of AI in writing a solution.

Enter your answer

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AI Bonus (10 Points)

Feel free to share transcripts of any use of CoPilot Chat in solving these puzzles.

Remember, there's a recognition category for best use of AI!

Enter your answer

☐ Send me an email receipt of my responses

Microsoft 365

Microsoft Forms | AI-Powered surveys, quizzes and polls Create my own form

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