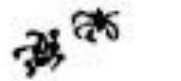# Winnie the Pooh
Story Generator

November 2024

The Problem

- Bedtime stories are an integral part of many children's routine
- Some children – like my niece – become bored with the same stories repeated night after night

Solution:

- Build a program that generates new, customized stories that are appropriate for young children and based on classic Winnie-the-Pooh characters.

Approach & Components

Vector Database – Chroma DB

• Sample texts embedded and stored

RAG Framework – DSPy

• Retrieves context from database and generates story with LLM

Metric Evaluation – DeepEval

• Define and evaluate readability score

User Interface – Gradio

RAG Process Overview

Documents
(Winnie the Pooh texts)

Vector Database
chroma

context

User Input
name & prompt

RAG Framework
DSPy

Signature:
name, prompt, context → story

generated story

Metric Evaluation
DeepEval.
Readability Score

PASS

User Interface
gradio

Final Story

FAIL – modify prompt

The Data

- The original Winnie the Pooh text is in the public domain
  - Available on various digital libraries
- Cleaning – remove whitespace and nonessential symbols, such as * and _
- Split each story into chunks (200 char. length)
  - Langchain's *RecursiveCharacterTextSplitter*
- Save metadata pertaining to each chunk
  - Title, author, chapter , chunk #

Vector Database (Chroma DB)

- Default embeddings to vectorize text chunks
  - Sentence Transformers *all-MiniLM-L6-v2*
- Querying DB → returns closest vectors by cosine similarity
- Top 3 results from querying "honey":

Chapter: 1, Chunk: 17, Cosine Distance: 1.084
… then he got up, and said: "And the only reason for making **honey** is so as I can eat it." So he began to climb the tree. He climbed and he climbed and he climbed …

Chapter: 5, Chunk: 29, Cosine Distance: 1.093
… so as not to hurt myself, and I would get to the Jar of **Honey**, and I should lick round the edges first of all, pretending that there wasn't any more …

Chapter: 5, Chunk: 51, Cosine Distance: 1.101
… A full jar, full of **honey** right up to the top, and it had HUNNY written on it, so that I should know it was **honey**. That's very funny."…

RAG framework with DSPy

- OpenAI's GPT-4o mini

Signature: *GenerateStory*

- Inputs: name, prompt, context → Output: story
  - ○ Name and prompt from user input
  - ○ Context retrieved from the database based on prompt similarity
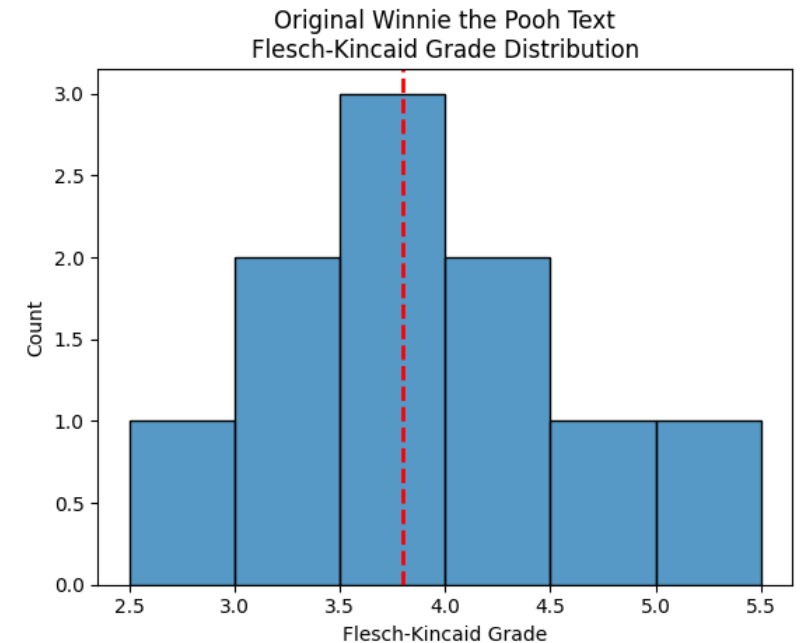
Module: *StoryGenerator*

- ChainOfThought using GenerateStory signature
- Returns generated story

Readability Metrics

- To generate text that is appropriate for children, a readability metric is necessary

- **Flesch–Kincaid readability test** measures complexity based on word and sentence length:

$$0.39 \left(\frac{total\ words}{total\ sentences} \right) + 11.80 \left(\frac{total\ syllables}{total\ words} \right) - 15.59$$

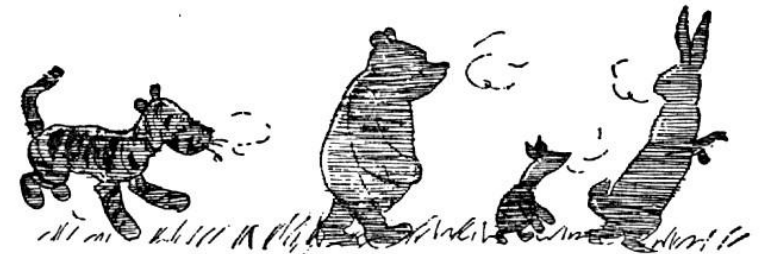- Original Winnie the Pooh stories grade levels
  - Mean = 3.8
  - Standard Deviation = 0.8

Original Winnie the Pooh Text
Flesch-Kincaid Grade Distribution

Evaluating LLM Results with DeepEval

- Define new DeepEval class ReadabilityMetric
  - High and low thresholds to maintain a child-appropriate reading level
  - Target below 4.6 Flesch-Kincaid grade level (< original mean + 1 standard dev.)

- If generated story fails to fall within the thresholds, modify prompt
  - "… use simple words and sentences"
  - Failing twice returns message to user to try a different story prompt

- If passes metric, returns the generated story

User Interface with Gradio

Winnie the Pooh Story Generator

Simply enter a character name and setting, then I will write a story from the Hundred Acre Woods for you!

Who is the story about?

What do you want the story to be about?

Submit **Clear**

A story for you...

Winnie the Pooh Story Generator

Simply enter a character name and setting, then I will write a story from the Hundred Acre Woods for you!

Who is the story about?

Rose

What do you want the story to be about?

They go on an adventure into the forest and make new friends

Submit | Clear

A story for you...

Once upon a time, in a lovely forest, there lived a little girl named Rose. Rose was very happy because she had a best friend named Pooh. One sunny day, Rose said to Pooh, "Let's go on an adventure!"

"Oh, yes! An adventure sounds grand!" said Pooh with a smile.

So off they went, hand in hand, through the tall trees and soft green grass. As they walked, they heard the sweet sound of birds singing. "Tweet, tweet!" they sang. Rose giggled and waved at the birds.

Then, Pooh noticed something shiny in the bushes. "What could that be?" he wondered. They peeked through the leaves and saw a little bunny!

"Hello, Bunny!" said Rose. "Would you like to join our adventure?"

"Oh, yes! I love adventures!" said the bunny, hopping in excitement.

Soon, they met a wise old owl in a tree. "Who, who are you?" asked Owl.

"We're Rose and Pooh, and we're going on an adventure! Do you want to come?" asked Rose.

"I would love to!" said Owl, flapping his wings.

Now, with Bunny and Owl, they explored deeper into the forest. They laughed and played games, and they even found a funny little stream where they splashed water all around.

As the sun began to set, Rose said, "This was the best adventure! We made new friends, just like in the best stories!"

Pooh nodded. "Yes, and friends make every adventure special!"

With their hearts full of joy, they walked home together, knowing they would always have each other.

The End.

Thank you