

*Deep Learning Course Project*

# Shakespeare Text Generation using VAE + Transformer

# Team

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## Introduction

- **Background:** Using deep learning to create human-like text.
- **Why It Matters:** Powers chatbots, creative writing, and content tools.
- **Real-World Examples:** ChatGPT, auto-completion, AI assistants.

# Project Goal

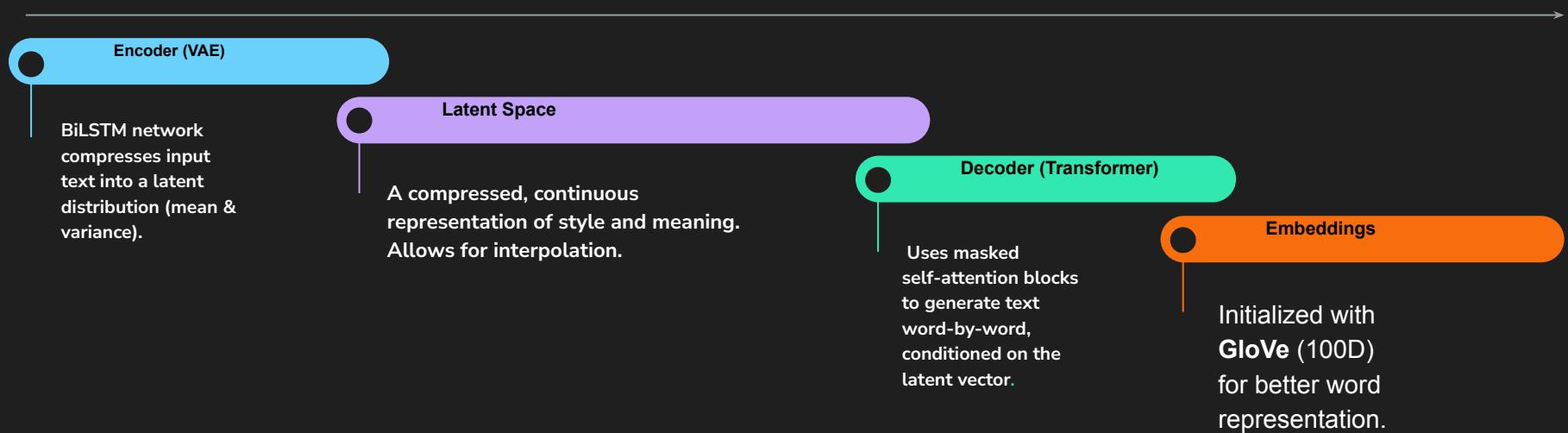
- **Objective:** Generate original text in Shakespeare's poetic style.
- **Core Idea:** Combine a **VAE** (for structured latent space) with a **Transformer Decoder** (for powerful text generation).
- **Dataset:** Shakespeare's complete works (plays & sonnets).

# Dataset & Preprocessing

- **Source:** Shakespeare text dataset.
- **Cleaning Steps:**
  - Converted to lowercase.
  - Removed speaker names and special characters.
  - Added start\_token and end\_token for sequence control.
- **Vectorization:** Used Keras TextVectorization to convert words to integer sequences (Vocabulary: 20K tokens).

# Model Architecture (VAE + Transformer)

## Our Hybrid Approach



# Training Pipeline



# Complete



## 6. Quality Control →

### Temperature Scaling:

- **Low (0.2):** Coherent but repetitive
- **Medium (0.7):** Balanced (our choice)
- **High (1.5):** Creative but less coherent
- **+ Top-P Sampling:** Filter unlikely words

## Results & Generated Text

- **Sample Output (Shakespeare-style):**

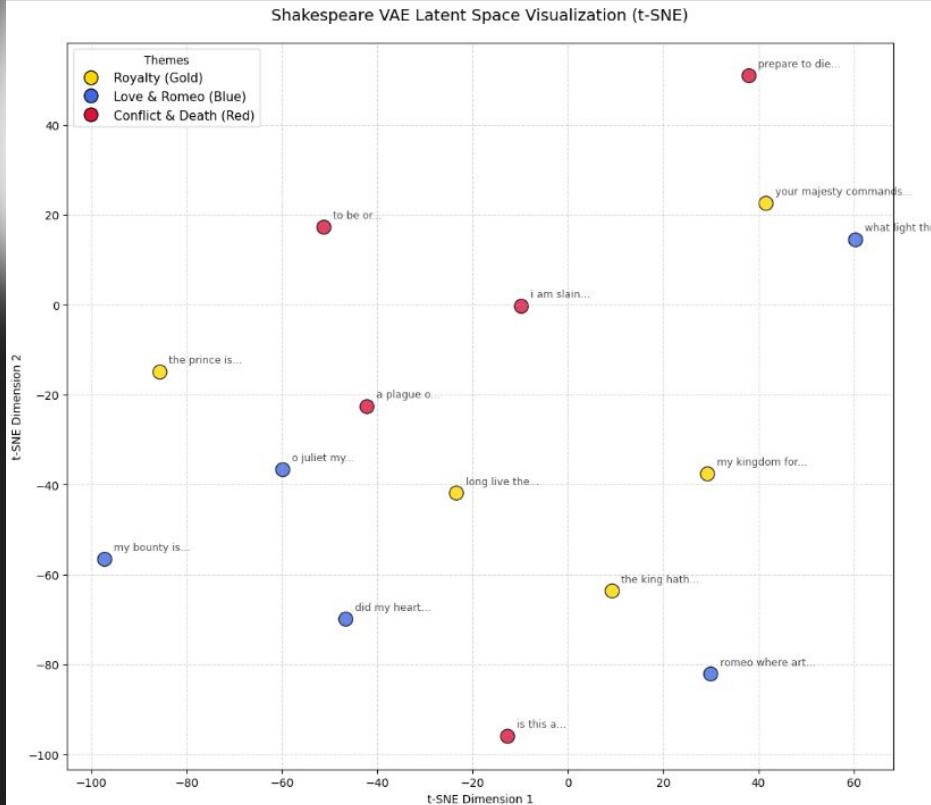
"the king hath sent his grace to thee and thou art dead a noble mind is here  
o'erthrown..."

- **Observations:**

- **Coherence:** Text maintains grammatical structure and thematic consistency.
- **Diversity:** Model generates varied sentences, not just repetitions.
- **Style:** Successfully captures archaic vocabulary and poetic rhythm.

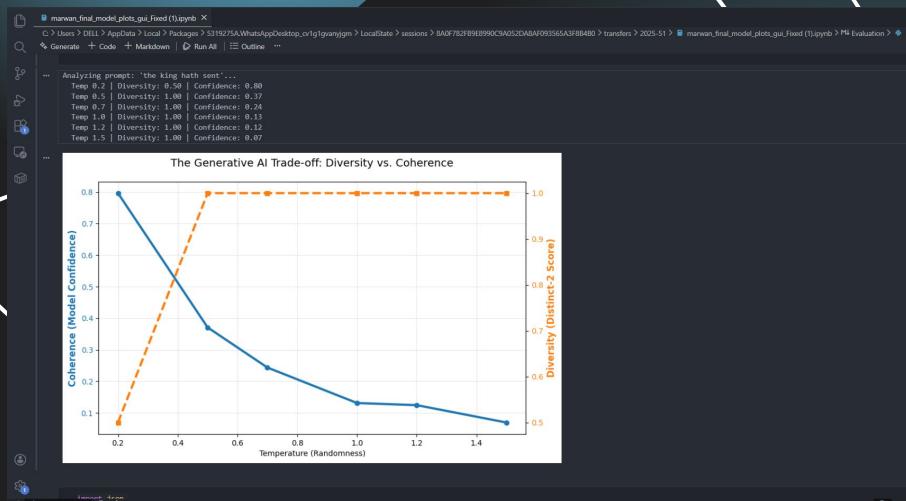
# Latent Space Exploration

- **Interpolation:** Smoothly morphs between two prompts (e.g., "the king hath sent" → "romeo where art thou").
- **Visualization (t-SNE):** Shows the model clusters similar themes (love, royalty, conflict) in different regions of the latent space.
- **Controlled Generation:** By navigating the latent space, we can control the style and content of the output.



# The Coherence-Diversity Trade-off

- **Finding:** The **Temperature** parameter controls a key trade-off:
  - **Low Temp (e.g., 0.2):** High coherence, but repetitive and safe.
  - **High Temp (e.g., 1.5):** High diversity and creativity, but lower coherence.
- **Our Choice:** Used a balanced temperature (~0.7) with **Top-P (Nucleus) Sampling** for the best mix.



# Interactive Demo (Gradio)

We built a web interface to interact with our model:

- **Feature 1: Text Generator** – Input a prompt, get a Shakespearean continuation.
- **Feature 2: Sentence Morpher** – Visually interpolate between two ideas in the latent space.
- **Live Demo:** Users can experiment with temperature and length settings.

The screenshot shows a web browser window titled "Shakespeare VAE Studio". The URL is https://huggingface.co/spaces/ahmed3746887278237832/textGeneration\_Using\_VAE. The interface has a dark theme with blue highlights. On the left, there's a "Prompt" input field containing the text "'the king hath sent'". Below it is a "Generator" section with "Advanced Settings" for "Temperature" (0.6), "Max Length" (60), "Min Length" (15), and "Top-P" (0.9). A "Generate Text" button is at the bottom. On the right, there's an "Output" section displaying a list of generated words: "hearth, expend mockery, weight, repaid, merriment tickling, grace! melting sweetness, ring? capulet, green unswept, gallants expectation frosts forked hermione, montjoy, laughing quarrels, bleu fret rustic longs creeping curse, nobody welkin effeminate apprehends pavilion, iden, services, personal cumberland, saidist diligence apprehension, threefoot persons comedy, evils; their? fountain, proudly, slept honours moor? taxation larry, bare, authentic rooted start, envy, sisters, elsinore, clifford.

## Conclusion & Learnings

- **Summary:** Successfully built a hybrid model that generates coherent, Shakespeare-style text.
- **VAE + Transformer Synergy:** VAE provides a structured, interpolatable latent space; the Transformer enables high-quality sequence generation. The combination is powerful for controlled creativity.
- **Future Work:**
  - Scale up model size and dataset.
  - Incorporate more control (e.g., control emotion, rhyme scheme).
  - Extend to a full encoder-decoder Transformer for more complex tasks.

# Links



DataSet

<https://www.kaggle.com/datasets/kingburrito666/shakespeare-plays>

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GUI

[https://huggingface.co/spaces/ahmed3746887278237832/TextGeneration\\_Using\\_VAE](https://huggingface.co/spaces/ahmed3746887278237832/TextGeneration_Using_VAE)



**Thank you!**

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