# Project Report: Text Generation and Chatbot for Song Lyrics

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## Introduction

The objective of this project is to create a text generation model for generating song lyrics and a chatbot capable of responding to user queries with relevant song lyrics. The project leverages the Spotify Million Song Dataset (link) containing around 57,700 rows of data, with fields such as artist, song title, link, and text (lyrics). This dataset is ideal for experimenting with natural language generation and conversational AI models in the music domain.

## Dataset Description

**Dataset Name:** Spotify Million Song Dataset
**Source:** Hugging Face Datasets Library (Dataset Link)
**Size:**

- 57,700 rows of data in CSV format
- Fields include:
  - **artist:** Name of the artist
  - **song:** Title of the song
  - **link:** URL linking to the song
  - **text:** Lyrics of the song

**Data Splits:**

- Train: 80% (46,160 rows)
- Validation: 10% (5,770 rows)
- Test: 10% (5,770 rows)

# Related Work

Several previous studies have explored text generation in the music domain:

- **OpenAI GPT-2/3:** Used for text generation across various domains, including creative text like poetry and song lyrics.
- **Lyric Generation with Recurrent Neural Networks (RNNs):** Earlier studies used LSTM or GRU-based models to generate lyrics sequentially.
- **Transformers for Creative Text Generation:** Hugging Face Transformers library has been applied to fine-tune pre-trained models like GPT-2 and GPT-3 for song lyric generation.
- **Conversational Chatbots:** Models like DialoGPT and BlenderBot have been used to create interactive systems capable of responding contextually.

# Baselines

To evaluate our model's performance, we will implement the following baselines:

- **Majority Class Baseline:** Generate default text templates for songs or general responses.
- **Basic RNN/LSTM:** Sequential models for generating lyrics based on training data.
- **TF-IDF Retrieval Model:** Retrieve similar lyrics based on user queries using cosine similarity.

# Proposed Methodology

## Models

- **Transformer-Based Text Generation:**
  - Use pre-trained models like GPT-2 or GPT-3 from Hugging Face.
  - Fine-tune the model using the Spotify Million Song Dataset for lyric generation.
- **Chatbot Implementation:**
  - Train a conversational model like DialoGPT to interact with users.
  - Prepare question-answer pairs, e.g., `Question: Generate lyrics for a romantic song. Answer: Generated lyrics.`

## Evaluation Settings

- Use BLEU, ROUGE, and Perplexity scores to evaluate the generated lyrics.
- Evaluate chatbot performance using conversational metrics such as response coherence, relevance, and user satisfaction.

# References


- Spotify Million Song Dataset on Hugging Face
- Vaswani, A., et al. (2017). Attention is All You Need. *Advances in Neural Information Processing Systems.*
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- Wolf, T., et al. (2020). Transformers: State-of-the-Art Natural Language Processing. *ACL.*