DTSA 5511 Final Project Presentation

Assignment

DTSA 5511

Introduction to Deep Learning

Final project

Introduction

- **Lyrics generator**
  - Train the model with "Song Lyrics from 79 Musical Genres" from Kaggle
  - Generate lyrics for specified genres

- **Motivation**
  - Generative AI is one of the most attractive field in the machine learning
  - Music is fun!

Problem Definition

- Deep learning for generating lyrics
  - Objective
    - Train a deep learning model to generate genre-specific lyrics.
  - Distinct Linguistic Nuances
    - Each music genre has its unique linguistic characteristics and style.
  - Harnessing Data
    - Utilizing a dataset to ensure the generated lyrics resonate with the designated genre's essence.
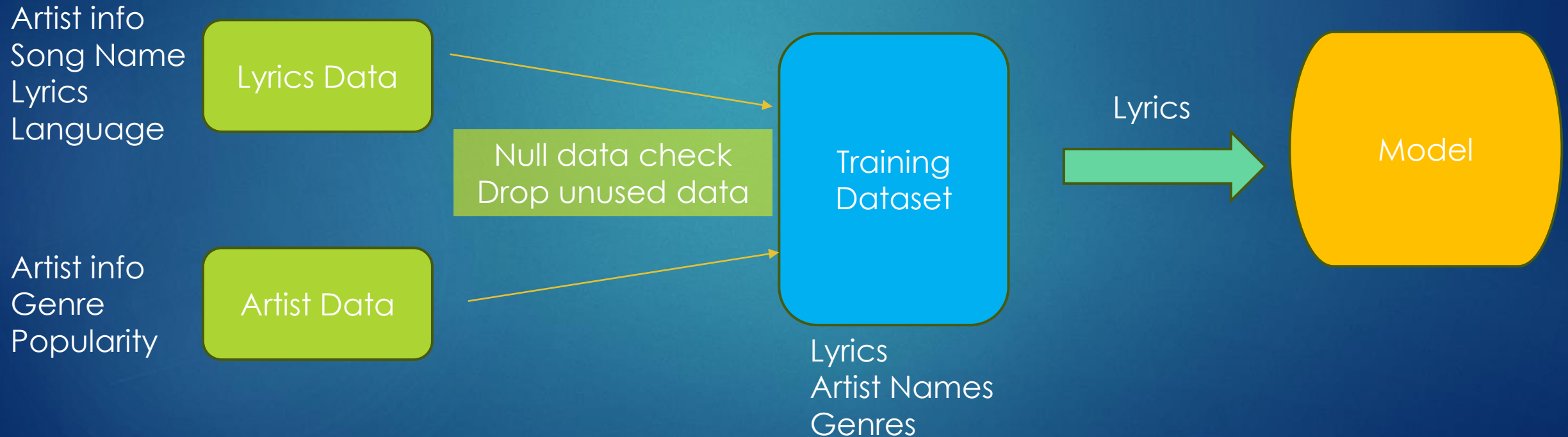
Approach & Methodology

- **Multiple Models**
  - Build multiple RNN models
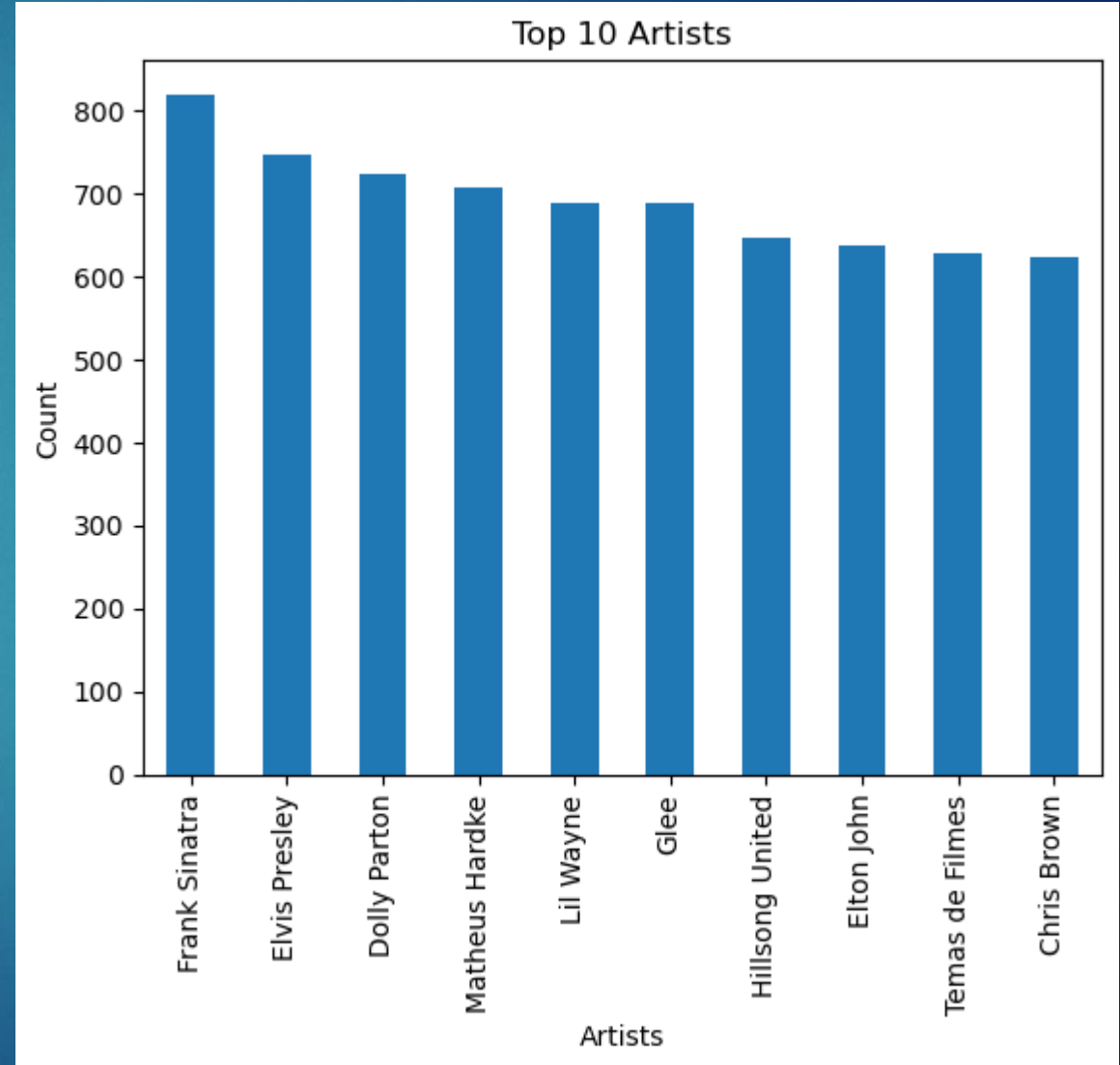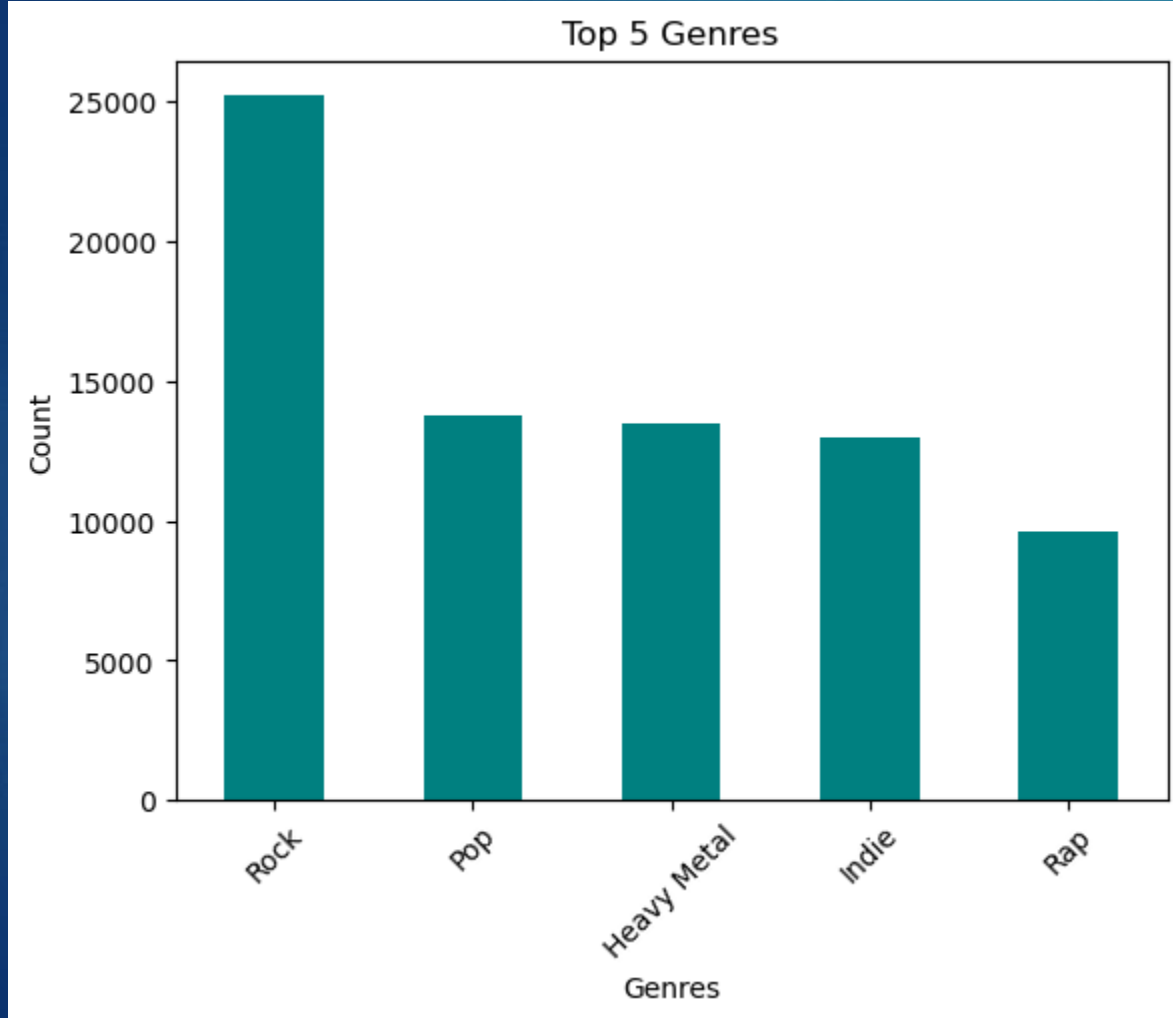 - Primary goal is to evaluate performance in generating lyrics

- **Analysis**
  - Model performance
  - Computational efficiency during model construction

EDA

▶ Data cleaning and create appropriate dataset for training

Artist info
Song Name
Lyrics
Language

Lyrics Data

Null data check
Drop unused data

Training
Dataset

Lyrics

Model

Artist info
Genre
Popularity

Artist Data

Lyrics
Artist Names
Genres

Visualization the data

Model Selection

- LSTM
- GRU
- Transformer Models
- Seq2Seq

We chose LSTM and GRU

Model deployment

- Preprocessing the dataset(Tokenization)
  - Words in Lyrics convert into Token
- Training
  - Build the model and train
- Output
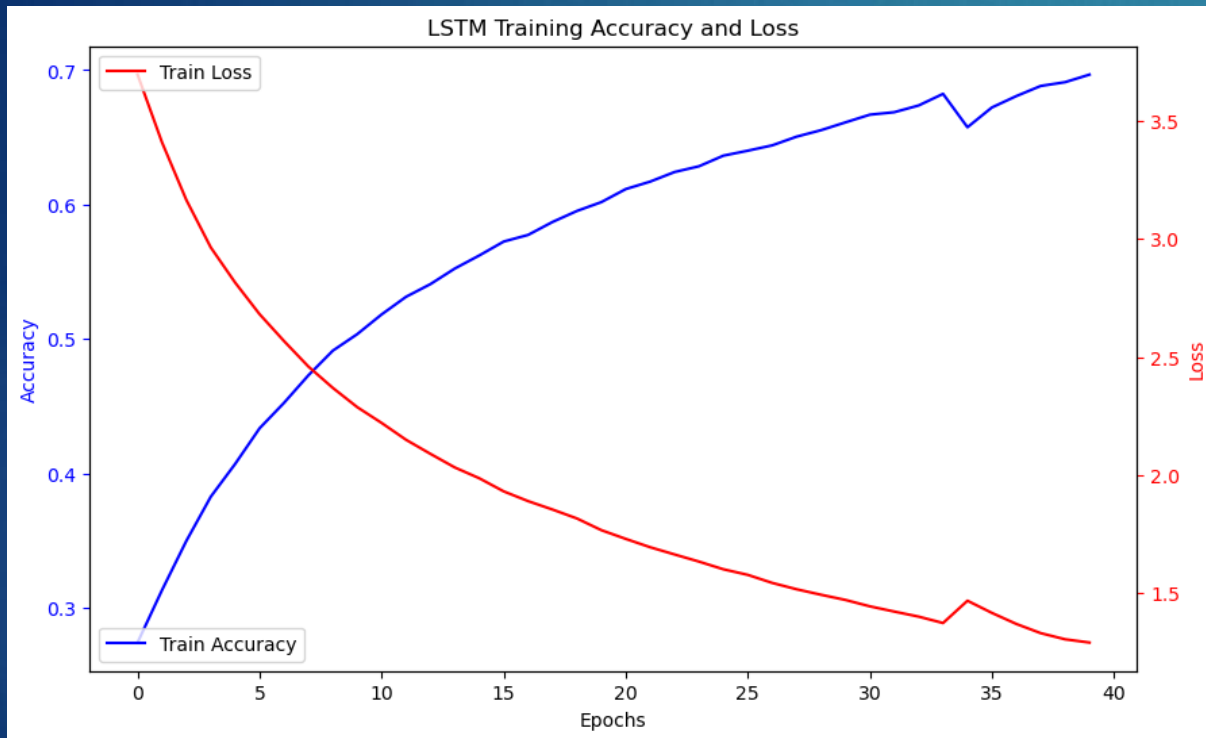 - Generate lyrics from Seed Words

Tokenization → Training → Output

Model – LSTM -

- LSTM stands for Long Term Short-Term Memory
  - Recurrent Neural Network(RNN) architecture
  - Learn and remember contexts
  - Less susceptible to the vanishing gradient problem

- Architecture
  - Embedding layer
  - Bidirectional LSTM layer with 250 unites(250 is average words in lyrics)
  - Dropout layer for preventing overfitting
  - Dense layer

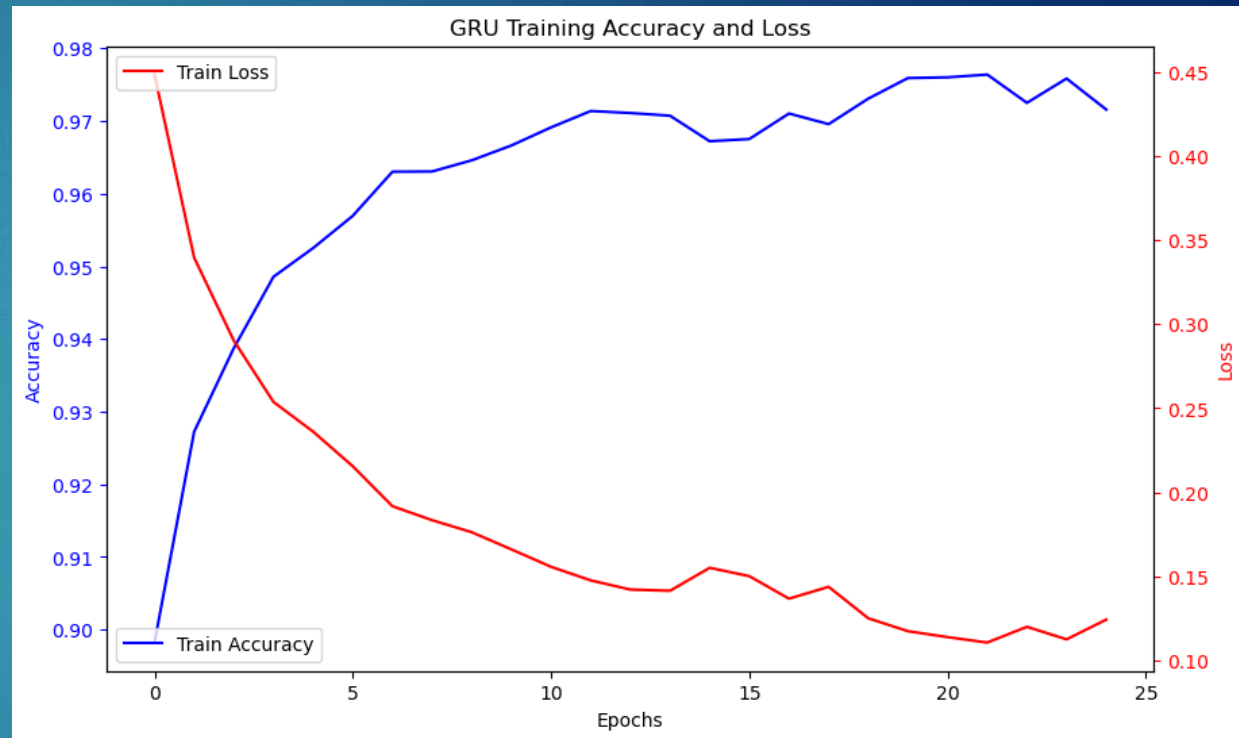# Model – GRU -

- GRU stands for Gated Recurrent Unit
  - Similar to LSTM architecture
  - Simplified gating mechanism
  - Faster training

- Architecture
  - Embedding layer
  - Bidirectional GRU layer with 250 unites
  - Dropout layer for preventing overfitting
  - Dense layer

Model comparison - Training -

LSTM(913.1 sec)   GRU(563.8 sec)

LSTM and GRU comparison

Genre	Seed Text	LSTM	GRU
Pop	Why you	Why you and i don't have to be a little bit of me on me on a time i can make i	Why you had to call me now that i can't wanted your plane gets all the words that he first met you
	I know	I know and you see me i see you know that you see your love is your heart and you're not you're	I know you're leavin' babe goodbye so long i hope someday somebody listens to your song those bright lights never ever spell
	Because	Because i don't know i don't have to be a way you see it on the clock i don't have to	Because that he don't have a little girl that we didn't care and the world decided to check cause i can
	Sushi	Sushi i know i know that you know that you're leaving not don't know that you know that you're leaving you	Sushi my heart have strong like this too my times i love it so baby when i fall when you see

Model Comparison – Metrics -

▶ Measurable Metrics

  ▶ The GRU model outperforms LSTM in both training time and accuracy

	Time to training	Accuracy
LSTM	913.1	0.6967
GRU	563.8	0.9716

▶ Unmeasurable Metrics

  ▶ The GRU model generates more natural lyrics by human observations

We select GRU for generating Lyrics

Generated songs – Heavy Metal -

Genre	Seed Text	GRU
Heavy Metal	Night abyss	Night abyss of dreams now a cold of pain now they won't find you think of me the truth for the way
	Legend of	Legend of me now your smile is on the smoke i am my mothers' only son torture welcome to the torture
	Dark hell	Dark hell a time without you a slave to a business a mistress a wife slave to the bottle the needle
	Sushi	Sushi hang man coming better run to save your kids your wives your lives your babies hang the wire round
	Debt generator	Debt generator the fucked up things trap and punish me i cannot explain my problem kill my hopeless life i cannot be
	God	God tales in history now myths and legends lie among the halls of knowledge for young and old alike there's nothing

Generated songs – Artist Glee -

Artist	Seed Text	GRU
Glee	Running	Running up the light up out of my heart now and put until our time it's just so hard to do
	Rain	Rain no way i could ever go but i'm going back to the start ooooohhhhhhh in circles chasing in tails coming
	Deep Learning	Deep Learning in the room i don't know how i never loved you like a love is all i need somebody
	Sushi	Sushi hum but that's too strong cause it is my favorite holiday but all this years been a busy blur don't
	All you need is	All you need is home to you know you know i'd think you know you're lonely to me for my head cause i got
	Mother	Mother cannot guide you now you're on you're own only me beside you still you're not alone no one is alone

Conclusion

▶ Achieved our goal

▶ Our work looks straight forward, but, spent significant effort

▶ Identified our future endeavors

▶ Learnt a lot from the machine learning course

To be continued…

Thank You