Short-Story Generation using RNNs and GPT

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What is this main goal of your work?

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- Story generation using fanfiction archives.
- Use HuggingFace API dataset for all stories starting with Z.
- Use RNNs and fine-tune transformers from the HuggingFace packages.
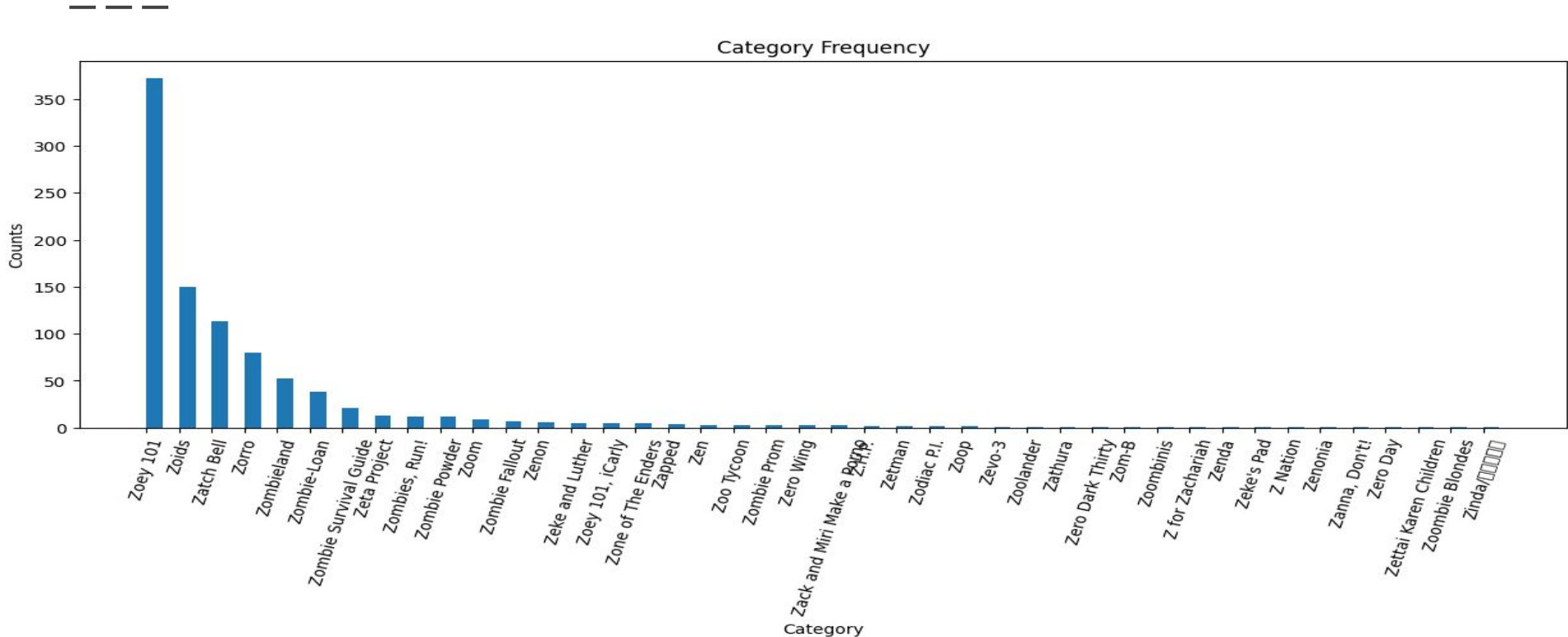- Manual assessment of generated stories.

What is the task?

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- Pre-processing and Exploratory Data analysis (EDA) on the dataset.
- Form word clouds for more context around the categories and stories from the dataset.
- Implementing own RNN(LSTM) for text generation.
- Implementing and fine-tuning Transformers from the HuggingFace packages.

What is the data, if applicable?

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- HuggingFace API – all Z-letter category fanfiction stories.
- Dataset is made of 943 records and 43 categories.
- Pre-processing and EDA-
  - Extract cleaned story by removing extra punctuation, expanding contractions and removing any extra digits or spaces.
  - Loading the cleaned story models and then lemmatization for further simplification.
  - Generating word clouds for more context around the relationships between stories and their themes.
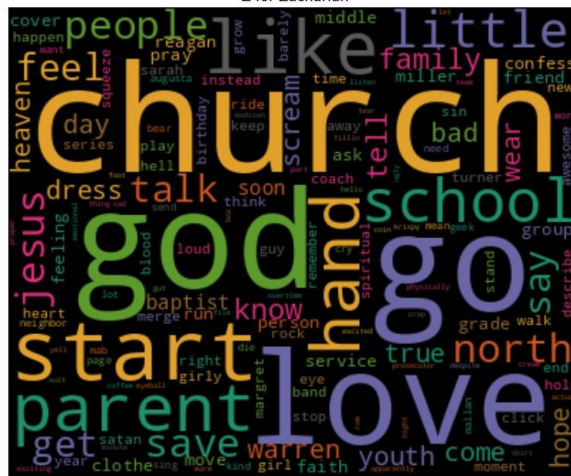
Category-Count Frequency

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Category Frequency

Word Clouds

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- Represent dominant words and their frequencies related to the doc.
- Helpful in visualizing themes, enhance situational description and analyze character traits for text generation.

Z Nation ->

<- Z for Zachariah

LSTM Based Story Generation

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- An LSTM model with 3 layers was used for sentence generation in this project.
- Training data was pre-processed, tokenized and pre-padded sequences were generated.
- 50 epochs.
- The sentences generated by the model were put together to build a coherent story.
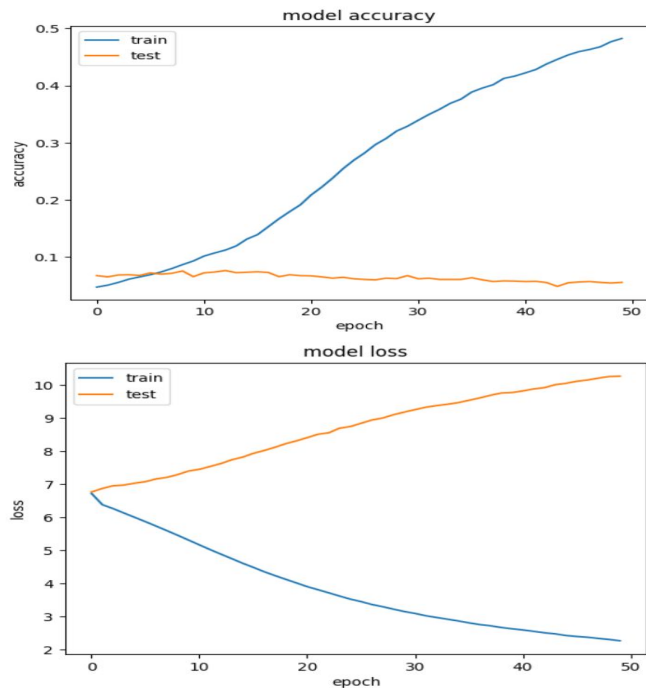
Results - LSTM

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- <u>Just A Question:</u> 2 Aybasbtu Game Script Zero Wing 2 One I Am Not Making My Characters My Doom I Cant Take It Let That Holy Endurance 510 Hound The Early Signs Of This Type Are Lip Splits Rotting Nose Enlarge Eyes Elongated Fingers And Nails Body Becomes Thinner taller Hair Falls Out Smell.
- <u>Alice In Wonderland:</u> Your Remains Rating Zero Wing 2 One I Can Explain Gifts Not A Scientific Man I 1 You Gentlemen Up It Are Like A Lot Oneshot Disclaimer I Need To Be School With My House And Taking Ill The Group Of Justice A Small Metal Guys Had Opened That He

Results - LSTM

- The LSTM model performs very well on the training data.
- But when given new test data, has a low accuracy and high loss.
- The coherency of LSTM generated stories is low. I.e albeit generating meaningful individual words, the story doesn't have a meaning of its own.
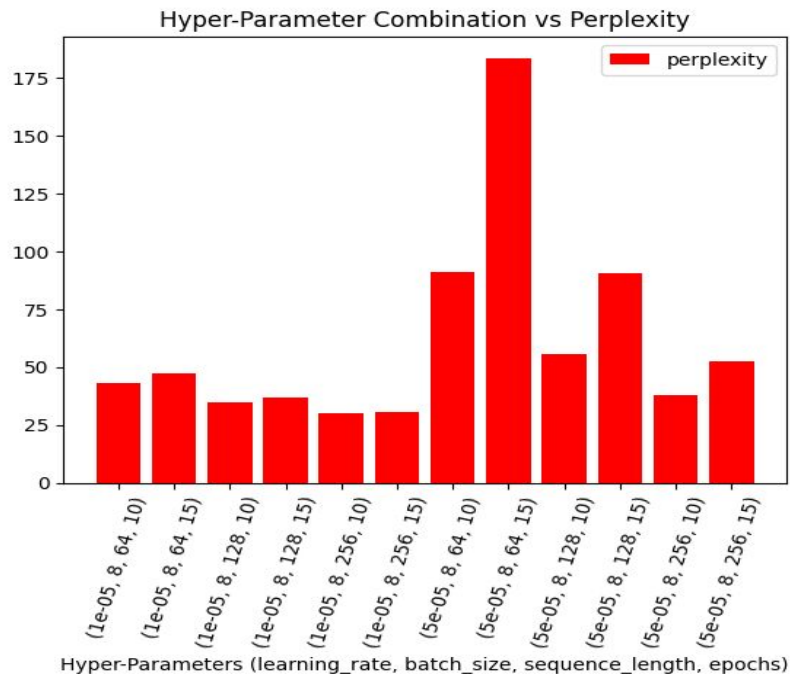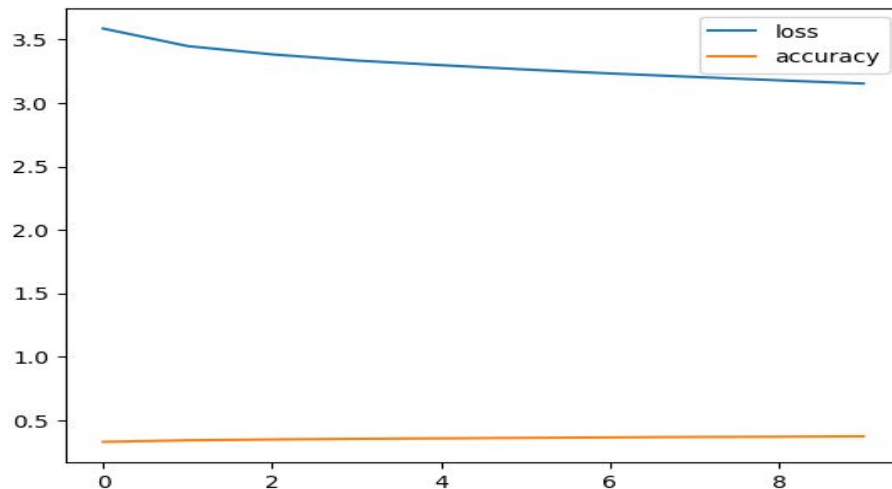
GPT2 Based Story Generation

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- GPT-2 (Generative Pre-trained Transformer 2) is a state-of-the-art language model capable of generating human-like text, trained on a massive amount of internet text data using a transformer architecture.

- Training data and validation data were preprocessed and tokenized (with respective to GPT2 model).

- Multiple GPT2 models were trained on different combinations of Hyper-Parameters(learning rate,batch size, sequence length, epochs).

- Found the perplexity for all models for validation data and selected the model which produced the minimum perplexity.

Experimentation

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Hyper-Parameter Combination vs Perplexity

Hyper-Parameters (learning_rate, batch_size, sequence_length, epochs)

The training loss and accuracy of the GPT2 Model with least perplexity

Results - GPT2

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- Though the loss and accuracy were not ideal, the model succeeded in generating human readable stories with context.
- Generated multiple stories by altering the temperature parameter of the GPT2 model to increase the randomness of the stories.

index	temperature	generated_text
0	1.0	pain It may be the most beautiful day of my life, but I am afraid it is not going to be for you. I do not know what I will do if I see you again. It is been so long since I last saw you, and I have not seen you in a long time. You are the only one I know that I care about. But I cannot let you go, no matter how hard I try. What I want is you to see me again,
1	1.5	pain It may be icky but ive never felt ick in my life. I wish I could change that. It is the only thing I can do right now. I do not think that I will ever have the chance to make a difference, even if I have to go back to my old school and do something about it. This is what happened to me when I was about to give up hope of a brighter future and live in a world full of peace and love
2	2.0	pain It may be the last day of my life, but then again, I had expected it. I was not here to tell them my real name, not when it would make sense to me; they had decided not to. This time though, all that was important had to be their choice. No one would have thought that such a choice would ever come to pass. And if it had happened, my name would never have been in their hands. It might have ended up in
3	3.0	pain It may be The cold blood that seeps out of his veins. But if he did not cry, what should have be in it? For as the wind was blowing to blows, his vision would go dark and his heart would just keep going as his father was struggling with grief. It is this awful, unbearable feeling that comes to him now. No one could stand a more desperate situation in his situation; it is something he can handle without losing his courage and self confidence.

FIN.