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News Headline Generator using GRU-based Encoder-Decoder

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Introduction

- Automatic headline generation = Summarizing news articles into concise, informative titles.
- Uses Natural Language Processing (NLP) and Deep Learning.
- Replaces manual effort with AI-driven summarization.

Problem Statement

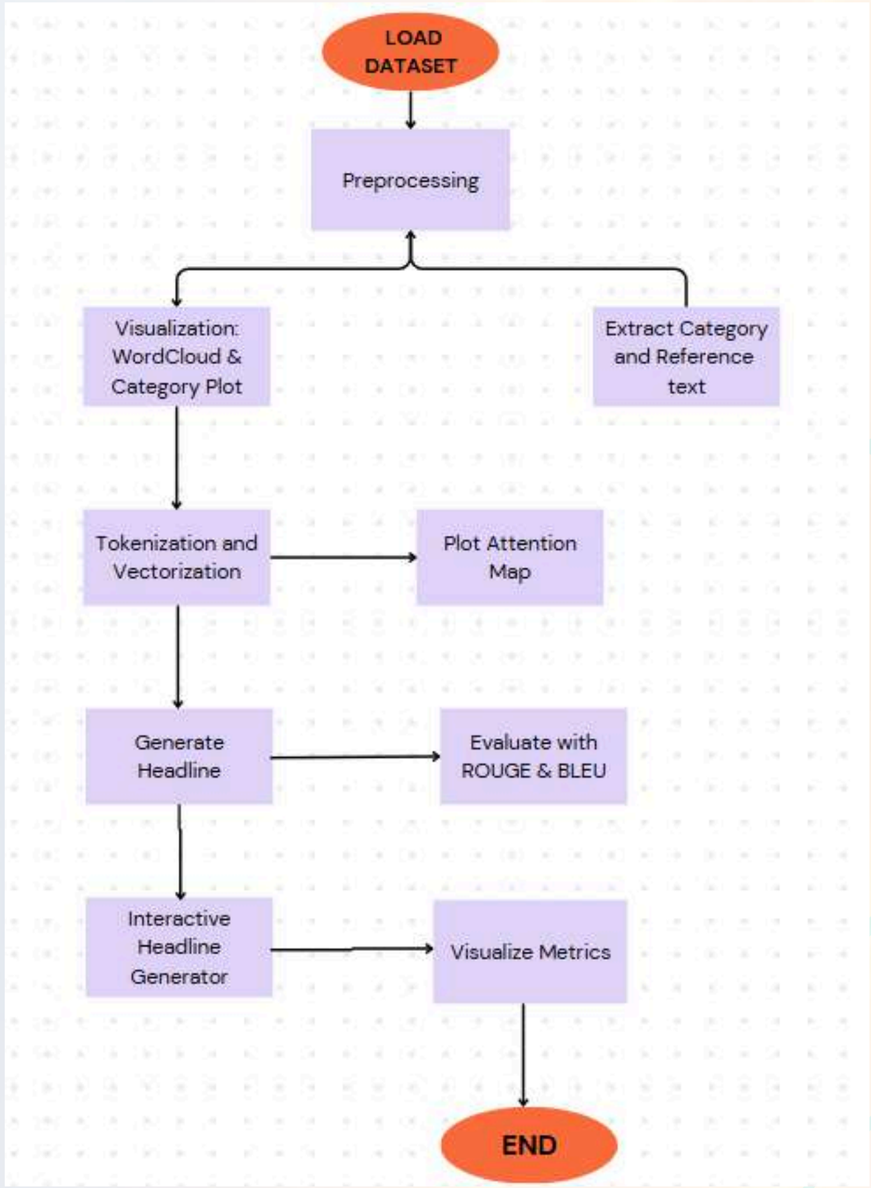
- News articles are lengthy; users want quick insights.
- Manual headline writing is subjective, slow, and inconsistent.
- Goal: Build a model that auto-generates high-quality headlines from raw news text.

Project Objective

Implement and compare encoder-decoder architectures: LSTM/GRU, LSTM with Attention, and Transformer with Self-Attention.

- Structure: News text + Corresponding Headline.
- Preprocessing:
    - Lowercasing
    - Punctuation removal
    - Stopword removal (if applied)
    - Tokenization

Model Architecture diag:-



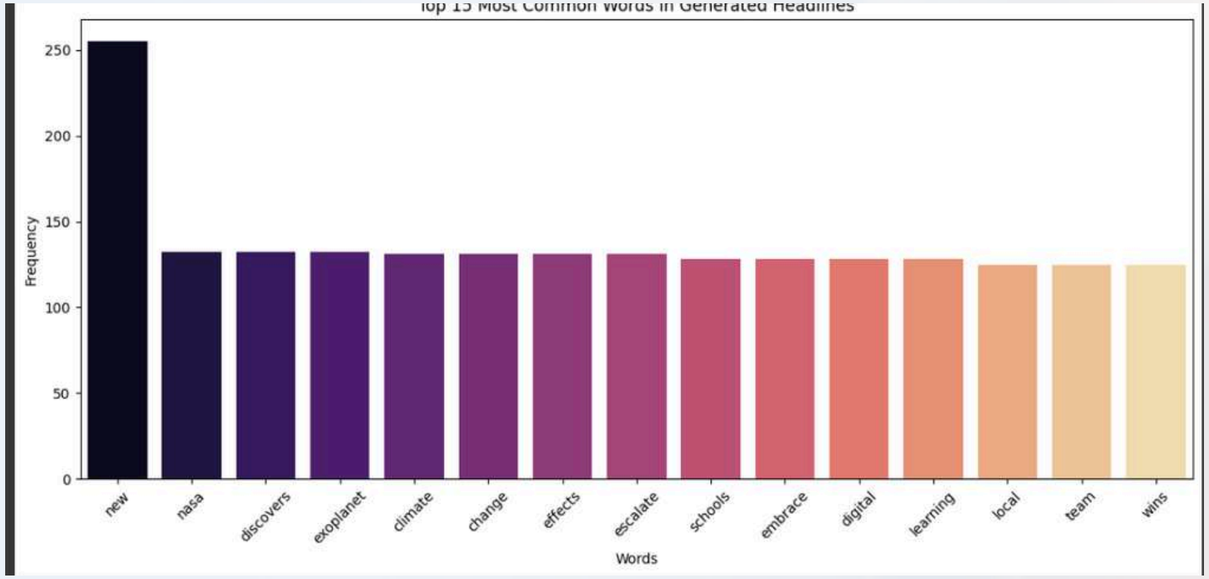
Preprocessing Pipeline

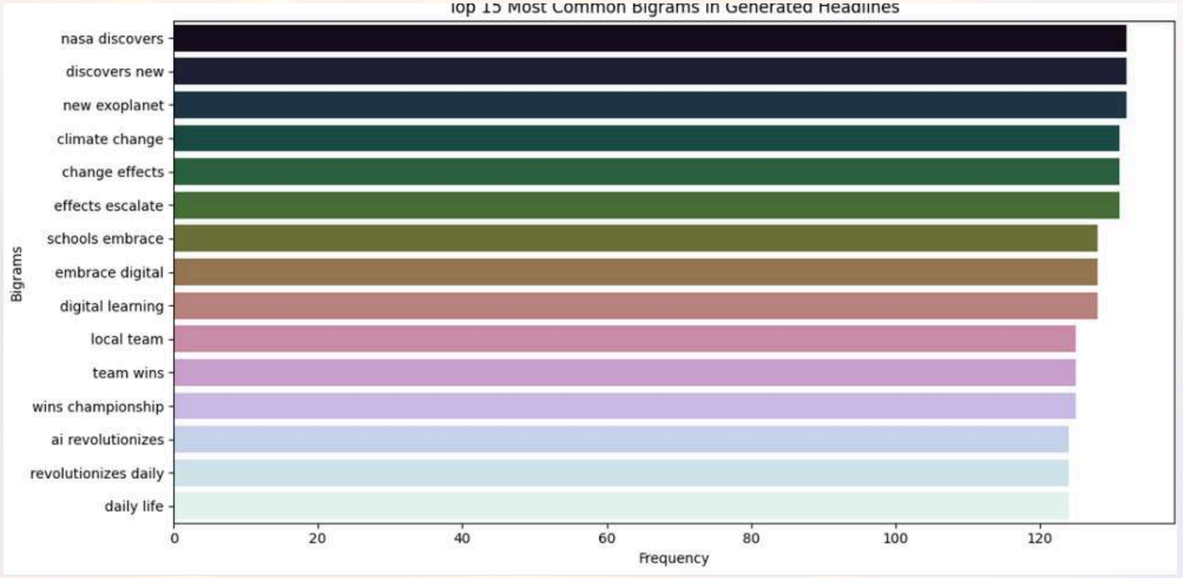
- Importing and cleaning the dataset.
- Splitting data into training and test sets.
- Tokenizing input text and headlines.
- Padding sequences for equal input length.

Evaluation Metrics

- ROUGE(Recall-Oriented Understudy for Gisting Evaluation) Score – Compares overlap between generated and true headlines.
- BLEU(Bilingual Evaluation Understudy) Score – Measures n-gram overlap.
- Qualitative Evaluation: Human-readable relevance

15 Most Common words or diagrams





Conclusion

- Developed a GRU-based Encoder-Decoder model.
- Generated concise headlines from full news articles.
- Open scope for improvements using advanced techniques.

References

GRU :-
https://www.geeksforgeeks.org/gated-recurrent-unit-networks/

LSTM :-
https://www.geeksforgeeks.org/understanding-of-lstm-networks/

Bahdanau :-
https://machinelearningmastery.com/the-bahdanau-attention-mechanism/

Thank You!

Any Questions?