MID TERM PROGRESS

- Presented by: Sai Chandra Sri Ramula
- Course/Project: IMAGE CAPTIONING SYSTEM
- Overview: A walkthrough of our Image Captioning project, including progress, challenges.

PROJECT OVERVIEW

•Problem Statement: Automatically generating textual descriptions for images using AI.

•Dataset: Flickr8k (8,000 images with multiple captions).

•Objective: Build a Data Science model that can generate captions based on image content.

•Approach:

•Extracted image features using CNN (InceptionV3, ResNet50).

•Used RNN (LSTM) with Attention to generate captions.

METHODOLOGY & PROGRESS

1.Data Preparation & Text Preprocessing

- •Loaded dataset and split into Train, Validation, and Test sets.
- •Cleaned captions by removing punctuation and converting to lowercase.
- •Tokenized captions and created word-to-index mappings.
- •Applied padding for uniform sequence length.

2.Feature Extraction & Analysis

- •Used InceptionV3 & ResNet50 for feature extraction.
- •Saved extracted features (Features.pkl) for efficient training.
- •Conducted PCA & t-SNE analysis to compare extracted features.

3.Model Definition & Training

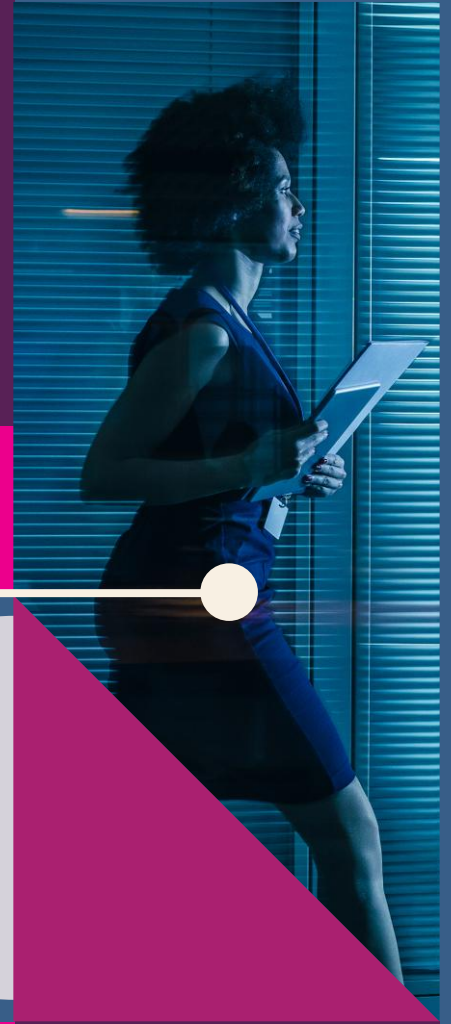
- •Implemented CNN Encoder + RNN Decoder (LSTM + Attention).
- •Trained the model successfully.
- •Faced Overfitting Issues (accuracy reached 1.0000 too fast).

SCATTER PLOT VISUALIZATION USING INCEPTIONV3 AND RESNET50

ADDRESSING OVERFITTING

OVERFITTING IN MODEL TRAINING & FIXES

- **Problem:**
  - Loss dropped too quickly.
  - Validation accuracy was unrealistically high.
- **Fixes Applied:**
  - Added Dropout (reduces model overfitting).
  - Applied L2 Regularization.
  - Checked dataset split to ensure correct validation.
- **Next Steps:**
  - Evaluate model on unseen images.
  - Fine-tune model with different hyperparameters.



CONCLUSION

- **Summary:**
  - Explained dataset, text preprocessing, methodology, training, and overfitting issue.
  - Discussed how we addressed overfitting.
  - Next steps: Improve captioning performance and optimize model inference.
- **Future Work:**
  - Implement different decoding strategies (Beam Search, Greedy decoding).
  - Experiment with different pre-trained CNN architectures for better feature extraction.(Like Resnet50)
  - Further improve text preprocessing and feature Extraction to handle complex captions.
- **Open for Questions!**

THANK YOU