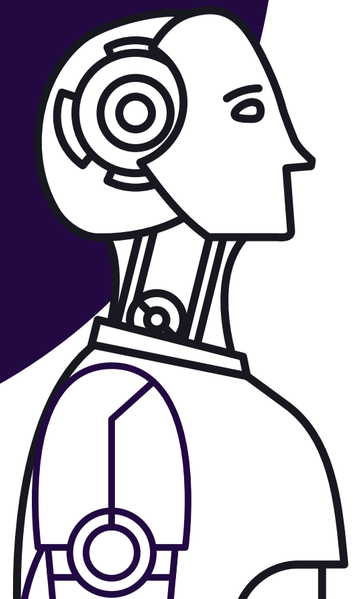
MIT | Academy of Engineering

(An Autonomous Institute Affiliated to Savitribai Phule Pune University)

DEEP ENCODER-DECODER NETWORKS FOR SEMANTIC SEGMENTATION OF ANAEMIC RBCS AND IMAGE CAPTIONING



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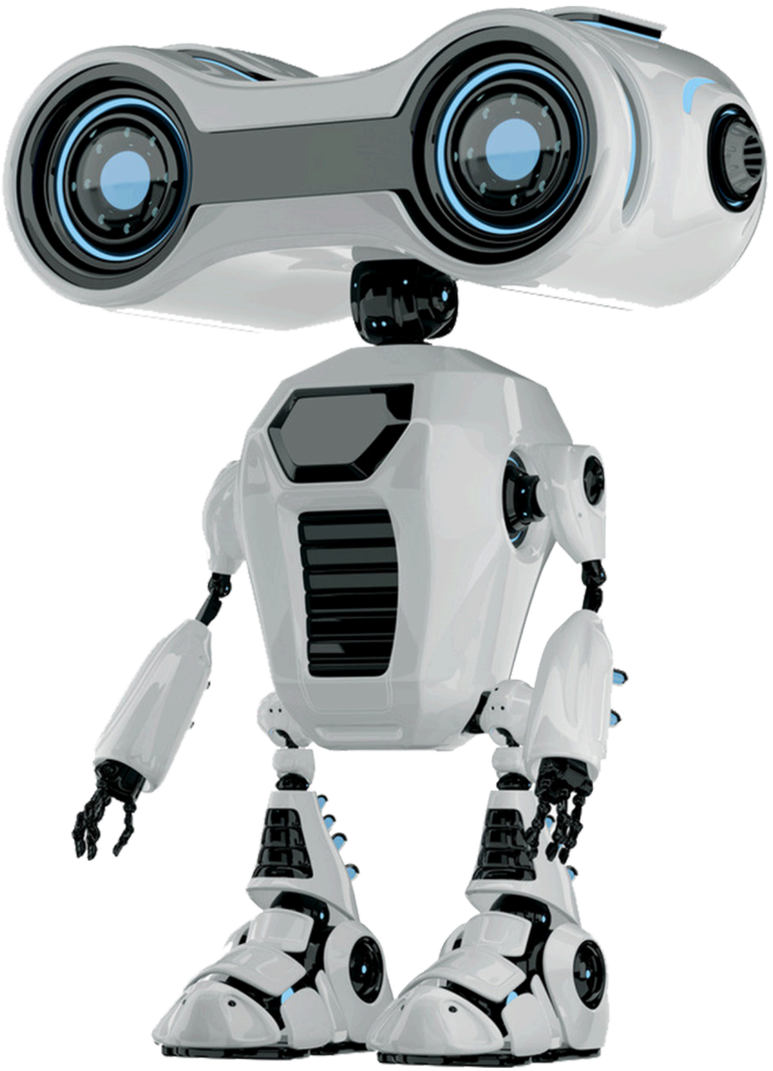
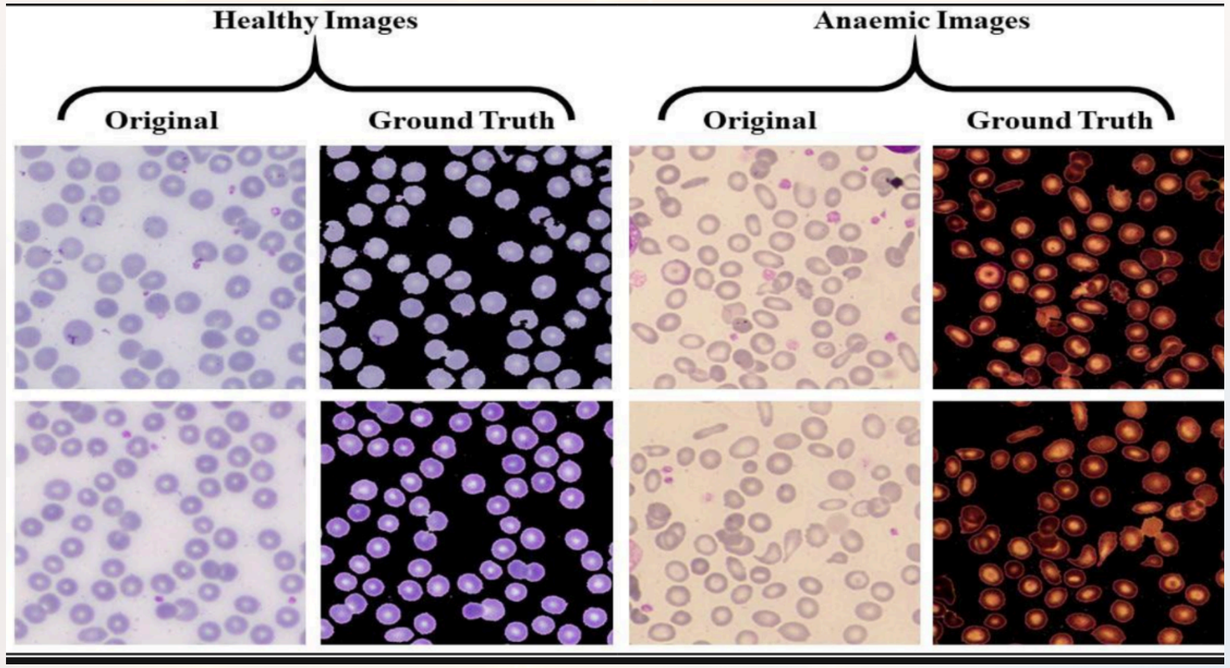
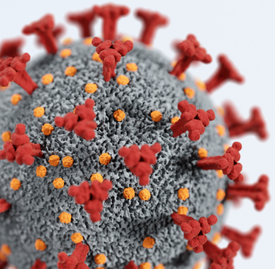


01. INTRODUCTION

Deep learning encoder-decoder models (LSTM, GRU, Attention RNN, Transformer) are used for:

- Semantic segmentation of anaemic RBCs
- Medical image captioning
- Objective: Improve diagnostic precision and automate image interpretation in anaemia detection.

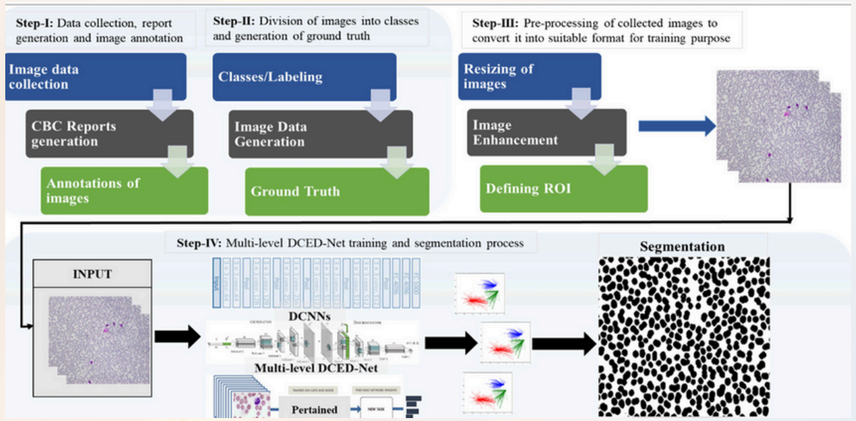




02. BASE PAPER SUMMARY

The base paper focuses on headline generation from news articles using:

- Sequence-to-sequence models with attention
- Emphasis on improving relevance and coherence
- Evaluated using BLEU, ROUGE metrics



03. BASE PAPER METHODOLOGY

- Preprocessing: Tokenized, padded article-headline pairs
- Model Architecture: Encoder-decoder with Bahdanau Attention
- Training Framework: TensorFlow/Keras
- Evaluation: BLEU and ROUGE scores for text output quality

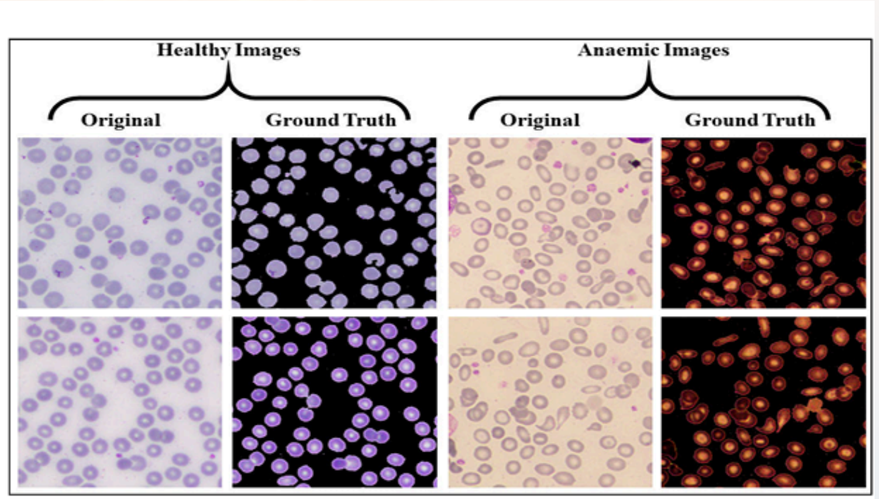


FIGURE 2. This diagram shows the samples from healthy and anaemic images from the proposed dataset. The images of this dataset are captured under various illumination as shown in the diagram.

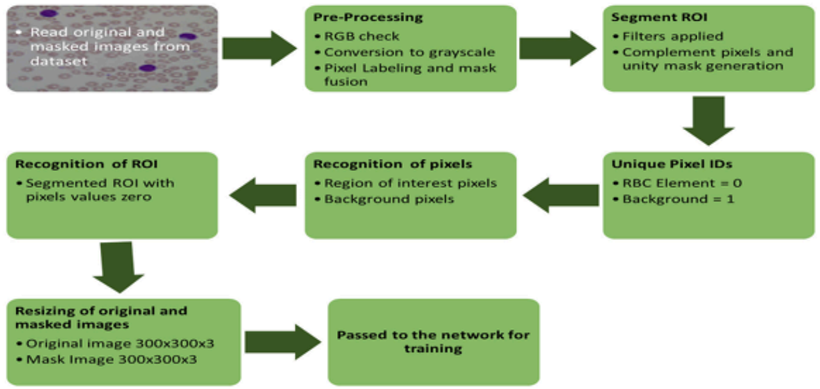
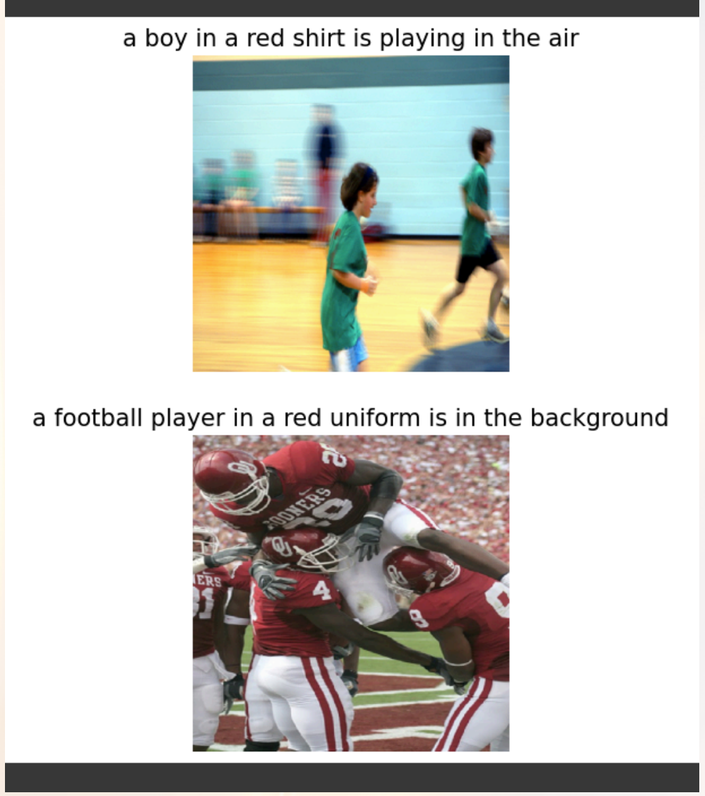
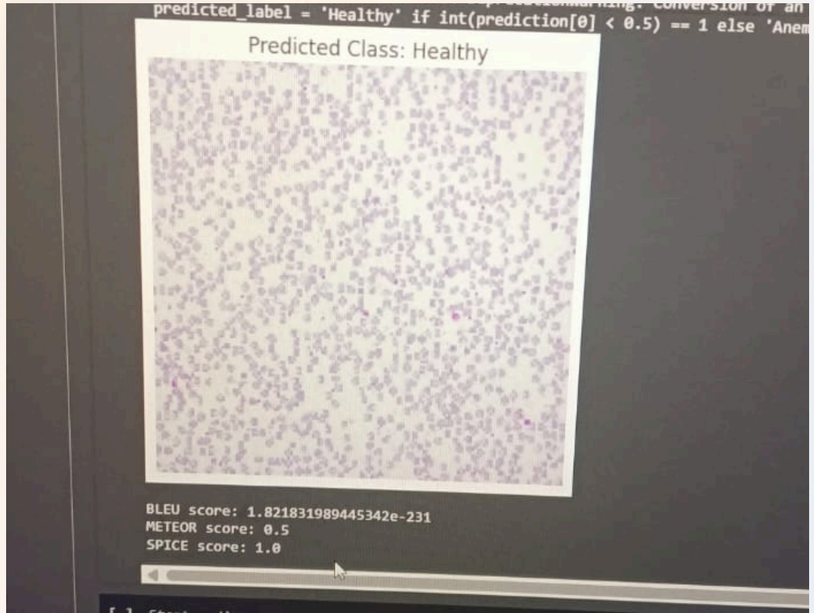


FIGURE 3. All pre-processing steps of DCED-Net.

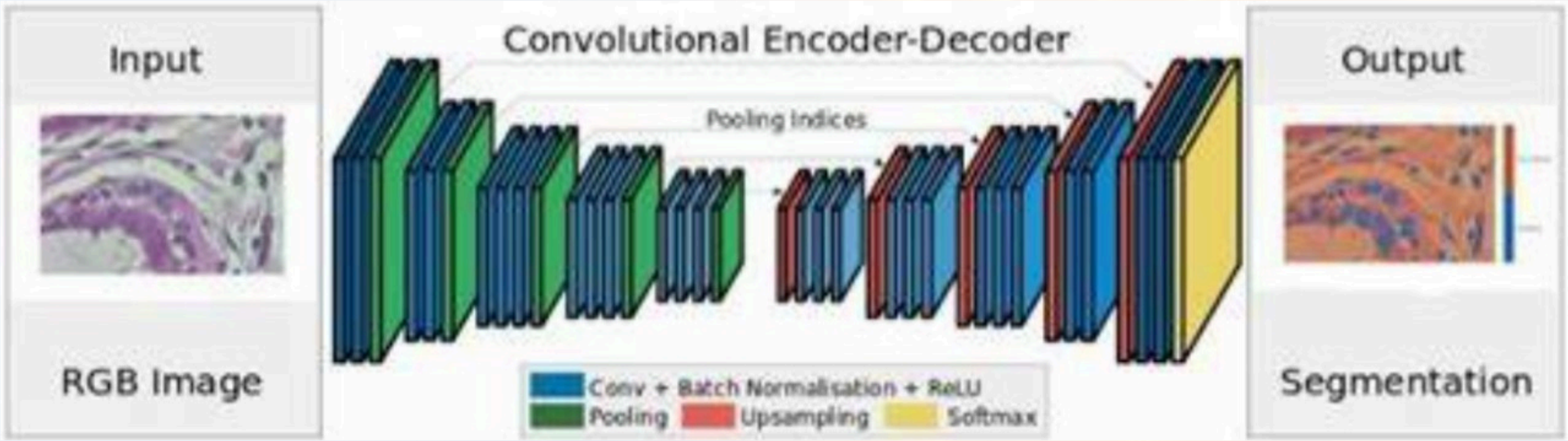
04. Our Project

- Shifted application to medical imaging using:
- Semantic segmentation: Detect anaemic RBCs using encoder-decoder models
- Image captioning: Generate medical image descriptions
- Models used: LSTM, GRU, Bahdanau Attention, Transformer
- Tools: TensorFlow/Keras, image preprocessing, tokenization for captions



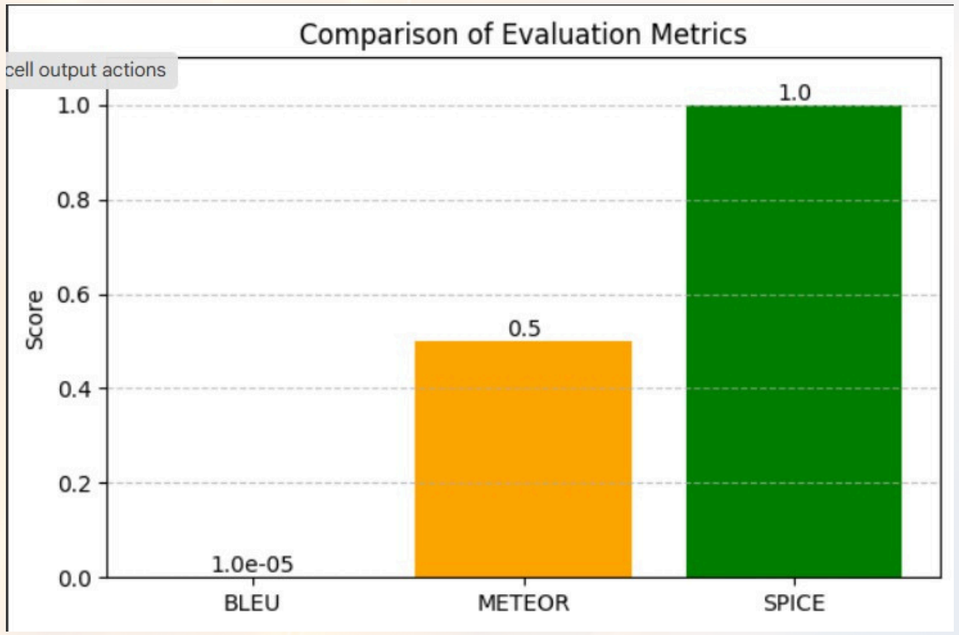


05.ENCODER-DECODER ARCHITECTURE DIAGRAM



06. RESULTS AND EVALUATION

- Segmentation: Evaluated with IoU, F1-Score, Pixel Accuracy
- Captioning: Evaluated with BLEU, ROUGE
- Transformer-based models performed best in capturing context and generating relevant outputs
- Efficient, accurate models suitable for clinical applications



07. CONCLUSION AND FUTURE WORK

CONCLUSION:

Encoder-decoder models efficiently segment anaemic RBCs and generate relevant image captions

Transformer and Attention models offer higher accuracy and relevance

FUTURE WORK:

Incorporate larger datasets

Deploy hybrid models (CNN + Transformer)

Enable real-time medical diagnostics on edge devices

THANK YOU

History of AI

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