

**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**

Group Members:-

Dhiraj Rathod	202201040139
Sanket Mane	202201040137
Komal Katare	202201040142

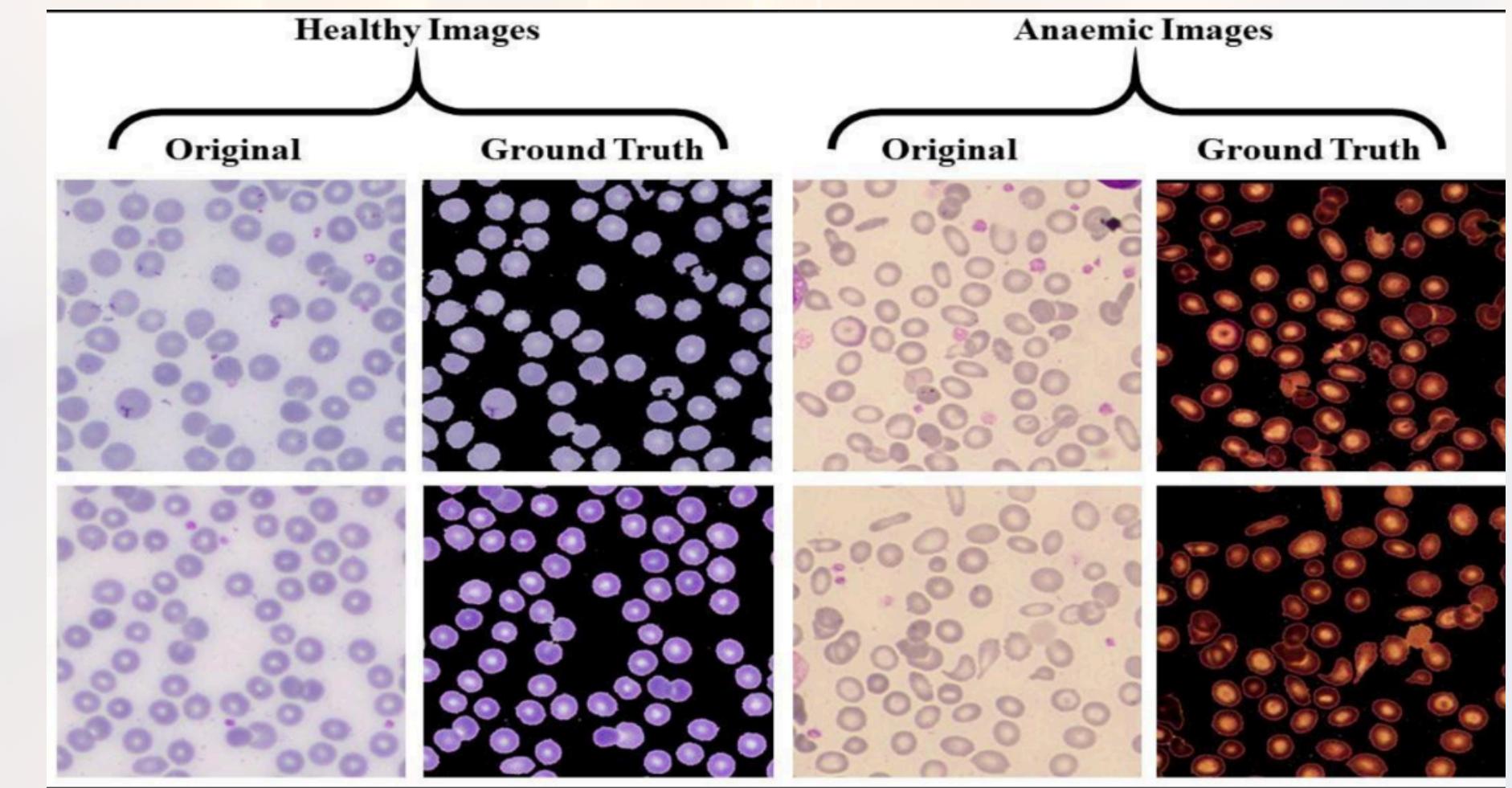
# **INDEX**

- 1.Introduction
- 2.Base paper summary
- 3.Methodology
- 4.Our project
- 5.Encoder ,Decoder Architecture diagram
- 6.Result and Evalution
- 7.Conclusion and Future Work

# 01. INTRODUCTION

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

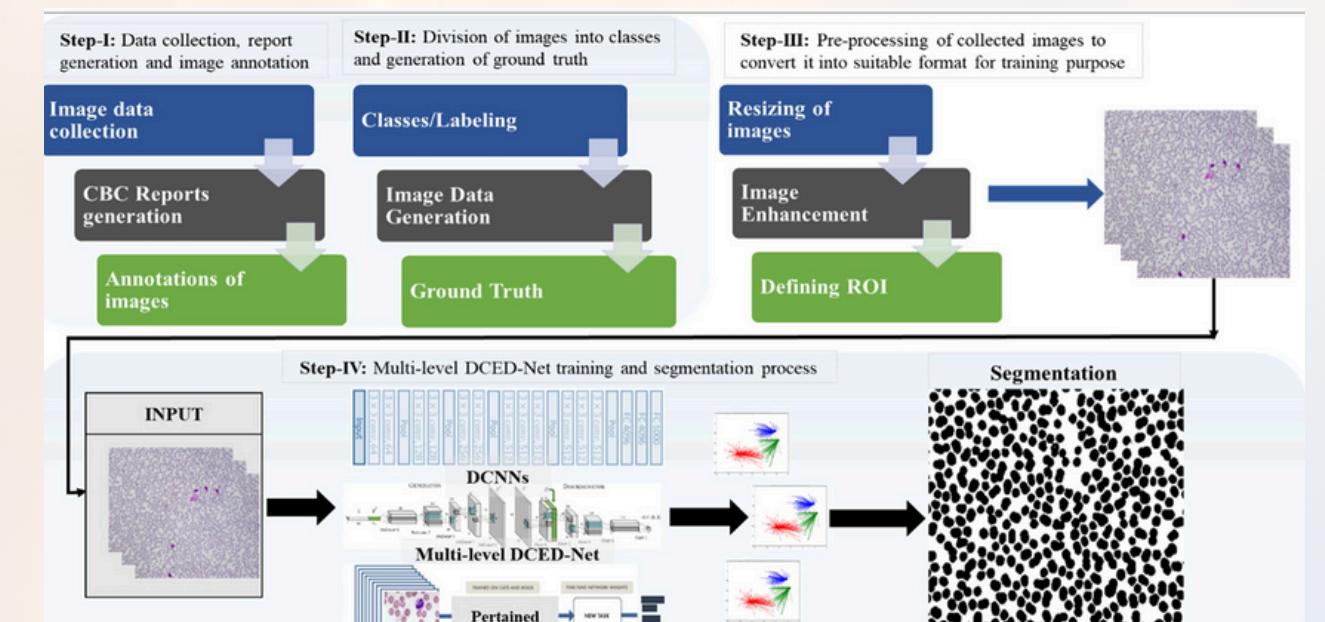
- Semantic segmentation of anaemic RBCs
- Medical image captioning
- Objective: Improve diagnostic precision and automate image interpretation in anaemia detection.



# 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

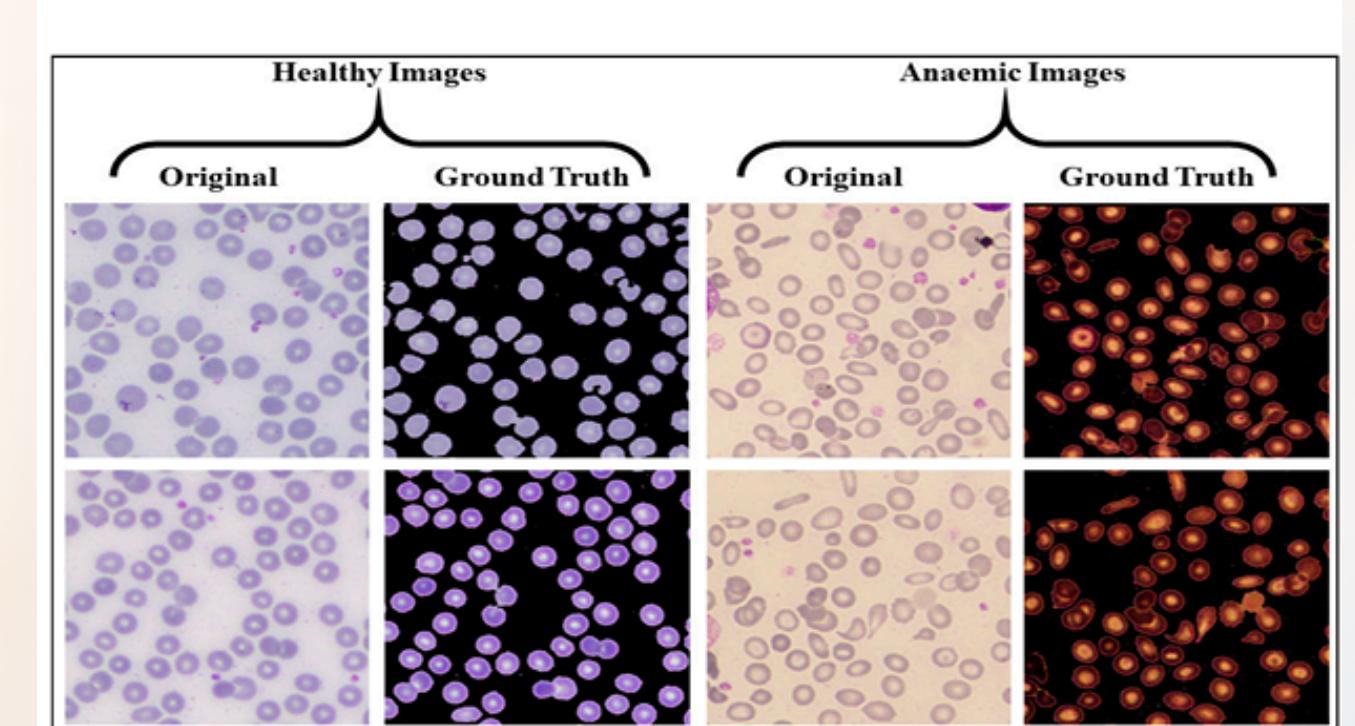


FIGURE 2. This diagram shows the samples from healthy and anaemic images from the proposed dataset. The images of this dataset are captured under various illumination as shown in the diagram.

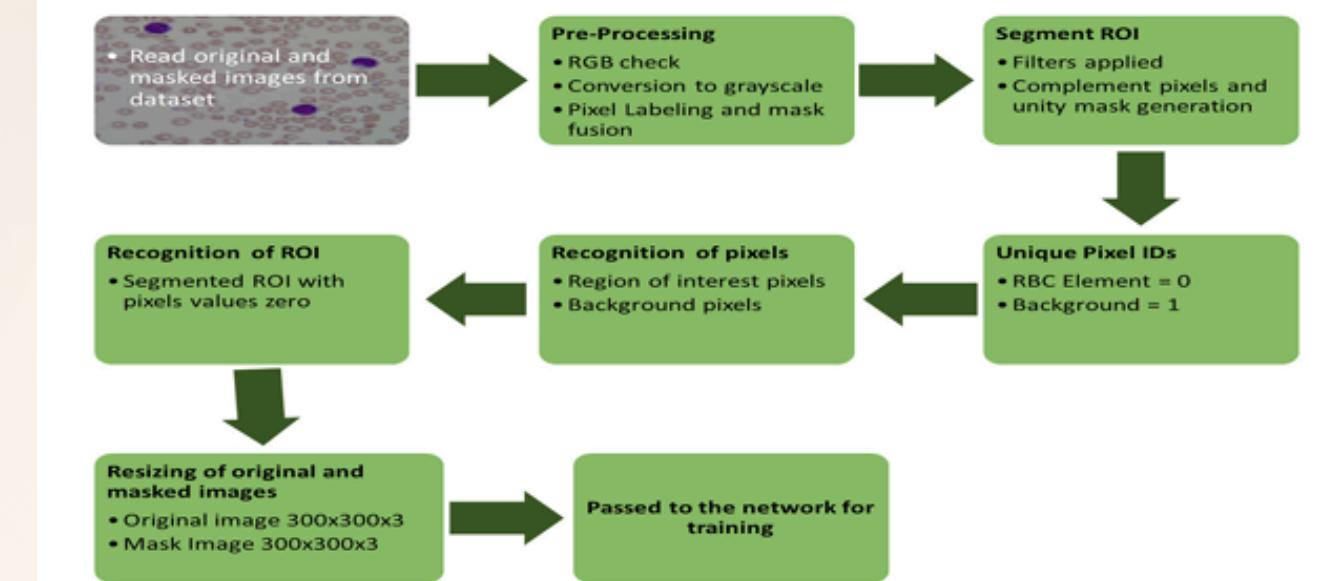


FIGURE 3. All pre-processing steps of DCED-Net.

# 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

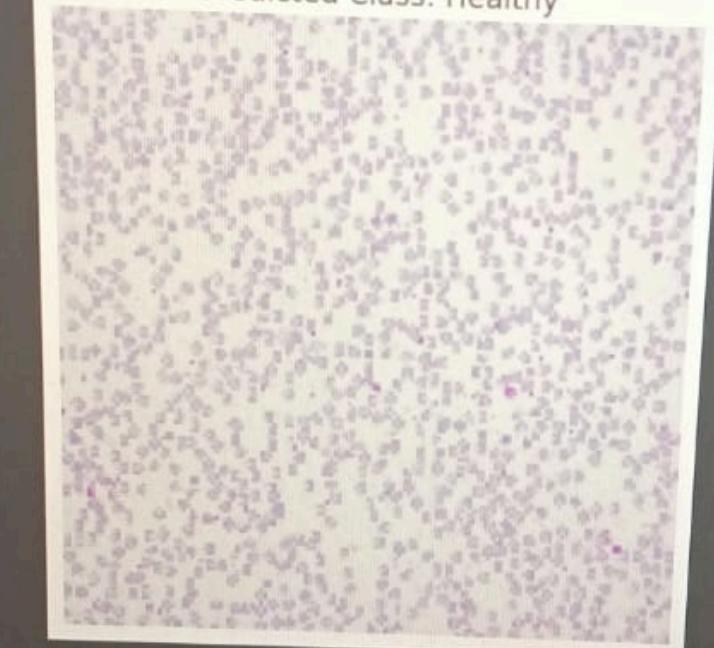
a boy in a red shirt is playing in the air



a football player in a red uniform is in the background



predicted\_label = 'Healthy' if int(prediction[0] < 0.5) == 1 else 'Anemic'  
Predicted Class: Healthy



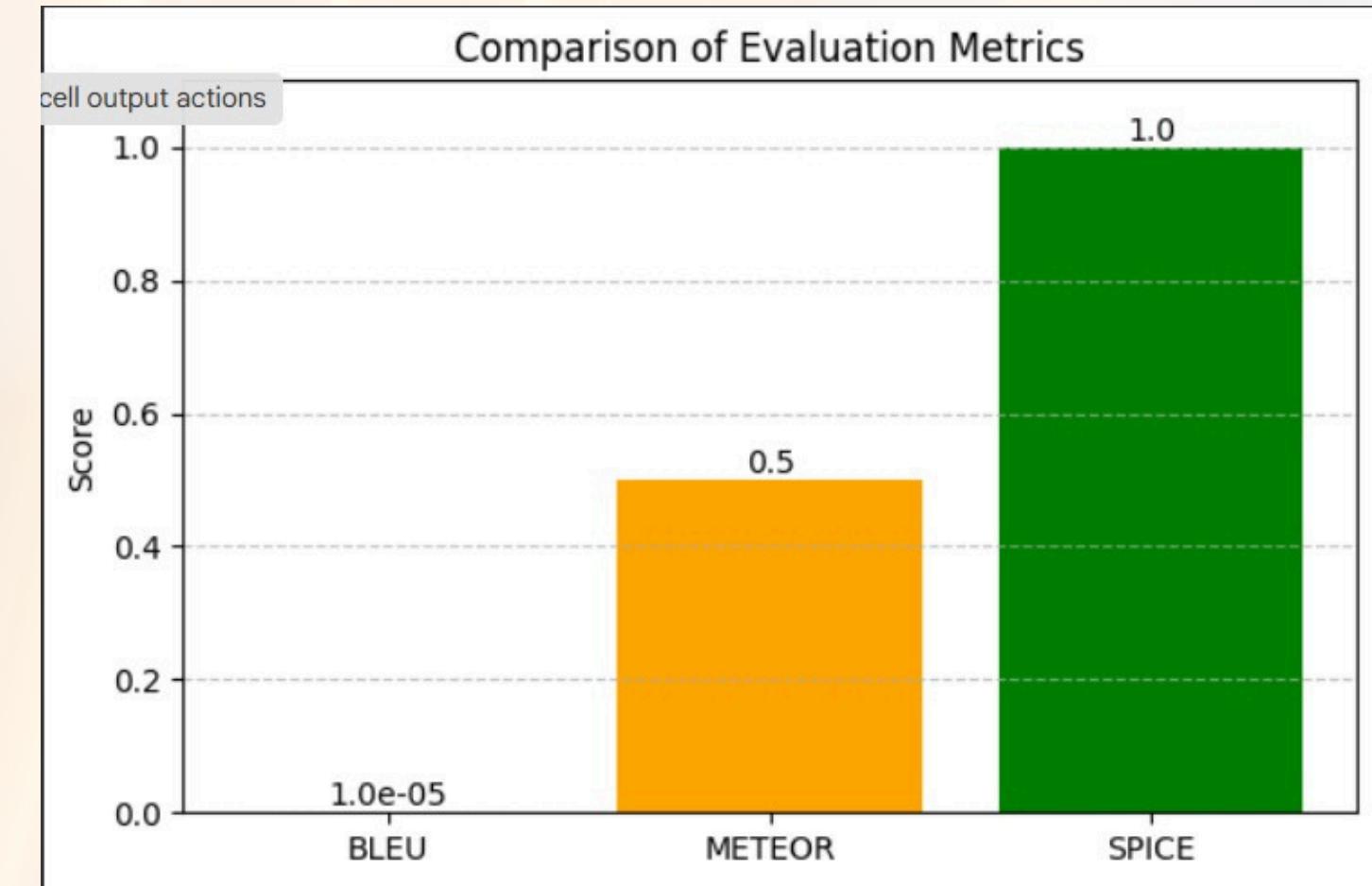
BLEU score: 1.821831989445342e-231  
METEOR score: 0.5  
SPICE score: 1.0

## 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

- Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed at ipsum vitae lacus lobortis lacinia. Donec tristique arcu massa, at pharetra tortor feugiat non. Etiam vehicula hendrerit aliquet. Donec sed nulla dapibus.
- Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed at ipsum vitae lacus lobortis lacinia. Donec tristique arcu massa, at pharetra tortor feugiat non. Etiam vehicula hendrerit aliquet. Donec sed nulla dapibus.

