

# FEASIBILITY OF COLONIC POLYP CLASSIFICATION WITH CNN BASED ON BLUE LASER AND LINKED COLOR IMAGING

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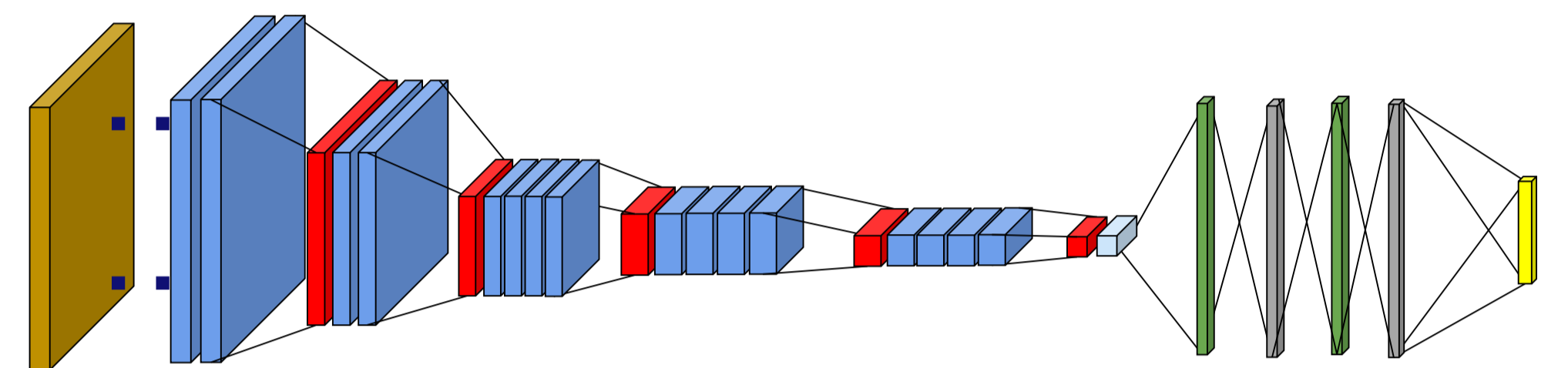
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2. Catharina Ziekenhuis, Eindhoven (CZE)

## Introduction

Visual differentiation of benign and pre-malignant colonic polyps is an on-going challenge in clinical endoscopy routine. White Light Endoscopy (WLE) is the most common technique to visually assess lesions in the intestinal tract but is arguably unreliable due to hampering in polyp classification. LED-based enhanced techniques like Blue Laser Imaging (BLI) and Linked Color Imaging (LCI) are potentially promising alternatives to avoid the use of chemical stains and to obtain enhanced visual classification results.

In this work, a Convolutional Neural Network (CNN) is trained to automatically classify colorectal polyps between benign and pre-malignant tissue using three image acquisition modalities: White Light Imaging (WL), Blue Laser Imaging (BLI) and Linked Color Imaging (LCI).

## VGG19-Network



1

Train with **Kvasir Dataset**

2

Fine tune with **CZE Dataset**

## Methods

### Kvasir Dataset

- 8000 WL
- 8 classes

- Dyed lifted polyps
- Dyed resection margins
- Esophagitis
- Normal cecum
- Normal pylorus
- Normal z-line
- Bowel polyps
- Ulcerative-colitis

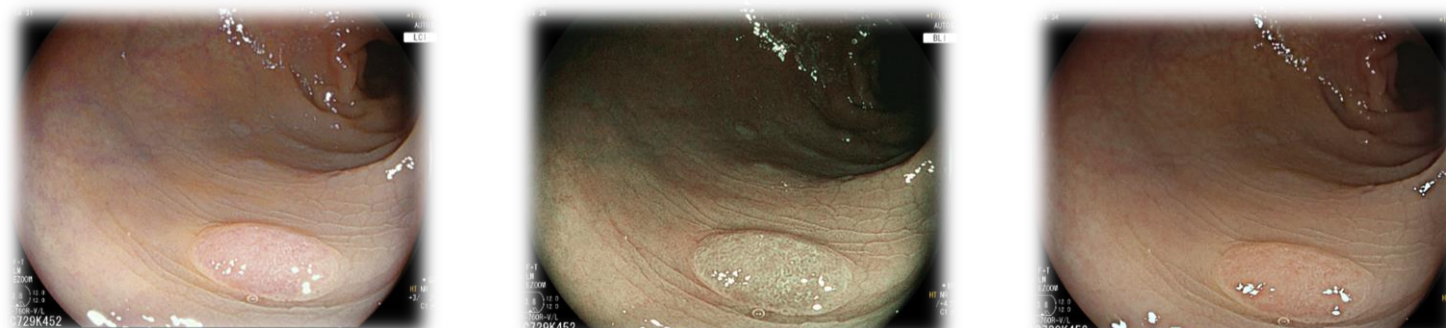
### Catharina Ziekenhuis Eindhoven (CZE) Dataset

- 60 patients (49 Pre-Malignant, 11 Benign)
- White Light (**WL**), Blue Light Laser Imaging (**BLI**), Linked Color Imaging (**LCI**)

### Pre-malignant



### Benign



LCI

BLI

WL

## Results

1

### Multiclass classification → Micro-Average results

Accuracy (%)	Precision (%)	Recall (%)	F1-Score
<b>92.87</b>	92.87	92.87	92.87

2

### Binary Classification → Average results

Accuracy (%)	Sensitivity (%)	Specificity (%)	FPR (%)	FNR (%)
<b>87.25±10.0</b>	94.44±4.39	58.32±22.67	41.68±33.67	5.56±4.39

## Conclusion

- High pre-malignant detection rate
- 50% benign polyps
- Improvement of current medical workflow

## Future Work

- Balance class distribution
- Improve benign classification
- Train in a single model