

# Hyper Kvasir Detection Overview

## 1. Group Members

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## 2. Dataset Name& Link:

- . Dataset : Kvasir-SEG Data
- . <https://www.kaggle.com/datasets/debeshjha1/kvasirseg?select=Kvasir-SEG>

## 3. Problem Statement:

To develop an object detection model capable of accurately identifying and localizing polyps in colonoscopy images using the **Kvasir-SEG** dataset. The ultimate goal is to assist gastroenterologists in early diagnosis and treatment of colorectal conditions by improving polyp detection accuracy and efficiency through deep learning.

## 4. Model Used :

. Yolo5s

## 5. Results

### Yolo5s Results

#### YOLO5s Evaluation Metrics (Training and Validation)

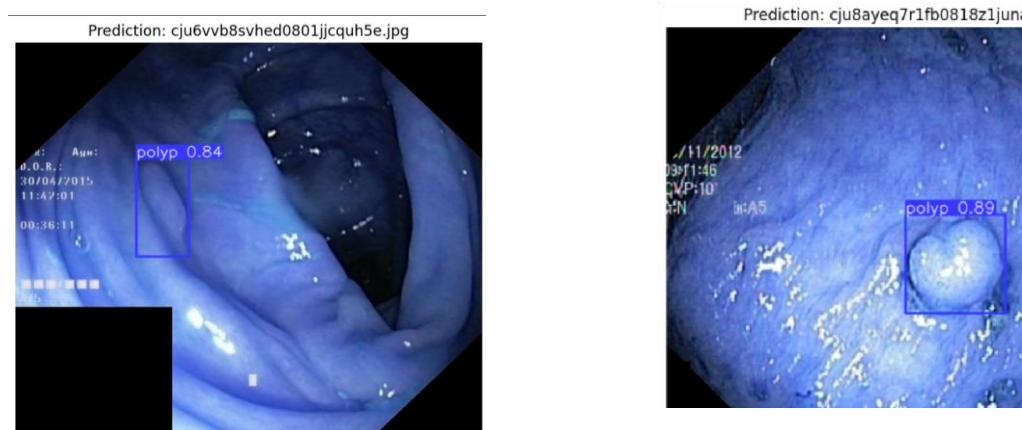
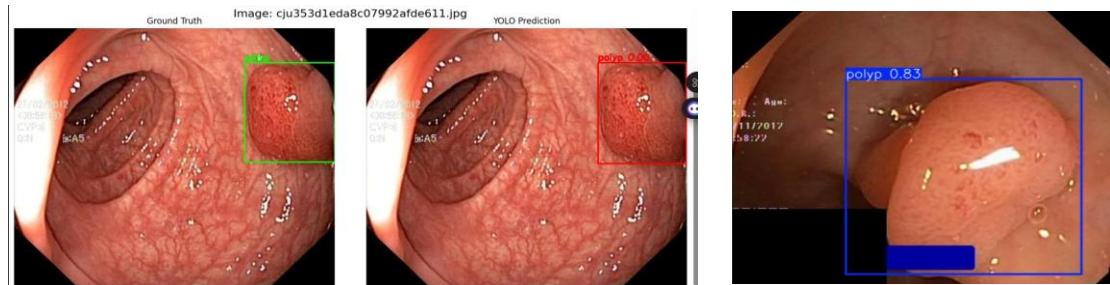
|  |        |
|--|--------|
| ◊ Precision:   | 0.9167 |
| ◊ Recall:  | 0.8853 |
| ◊ mAP@0.5 :  | 0.9552 |
| ◊ mAP@0.5:0.95:  | 0.7897 |
|  Fitness Score:     | 0.8063 |
|  Avg Targets/Image: | 317    |

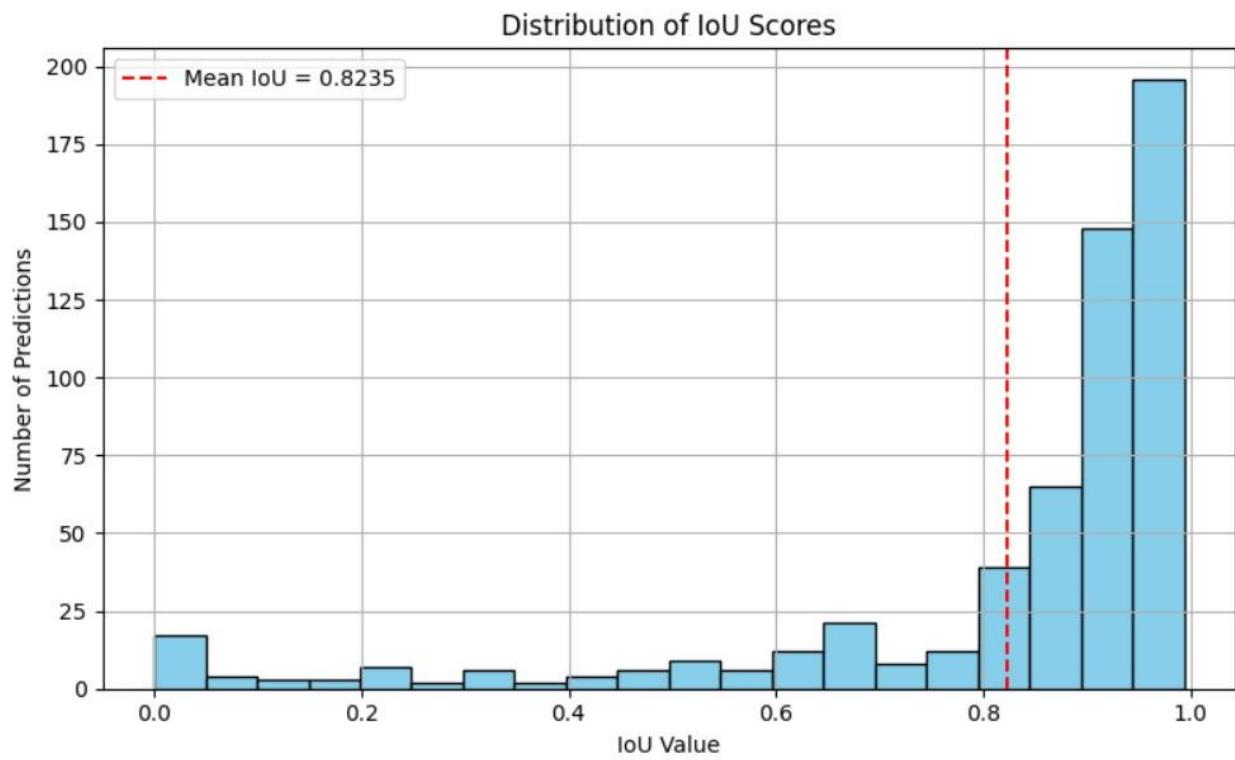
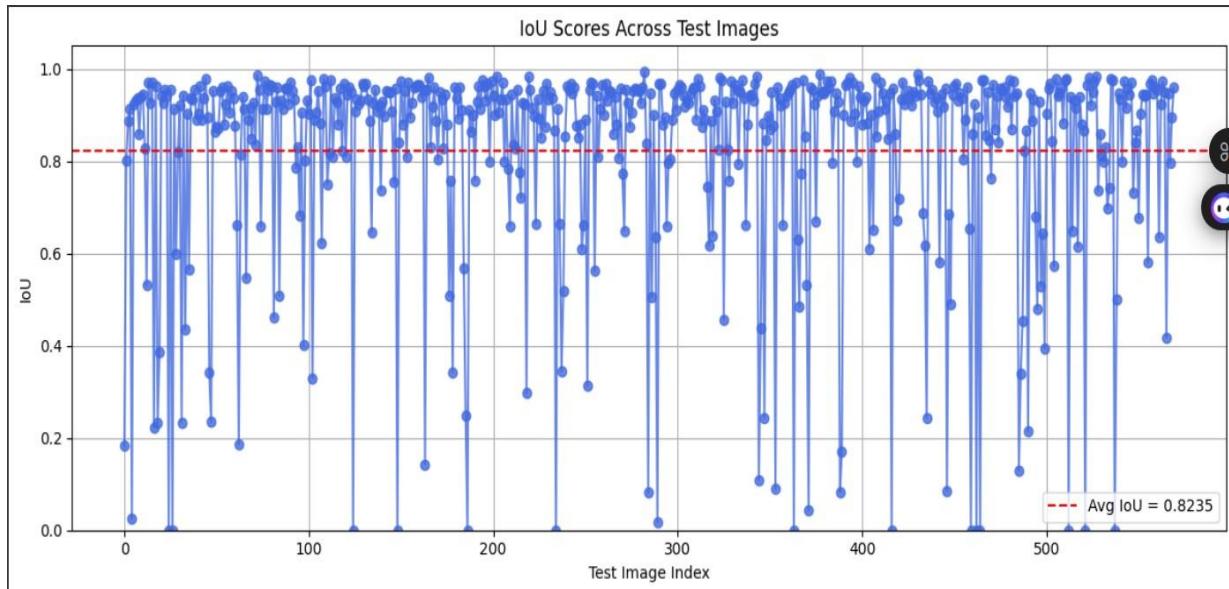
## 📄 YOLO5s Evaluation Metrics (Test set)

### 📄 Evaluation Metrics on Test Set:

- ◊ Precision: 0.8924
- ◊ Recall : 0.8773
- ◊ mAP@0.5 : 0.9358
- ◊ mAP@0.5:0.95: 0.7624
- 📊 Fitness Score : 0.7798
- 📊 Average IoU score: 0.8235

### Visuals:





## Customize yolov5–

Results:-

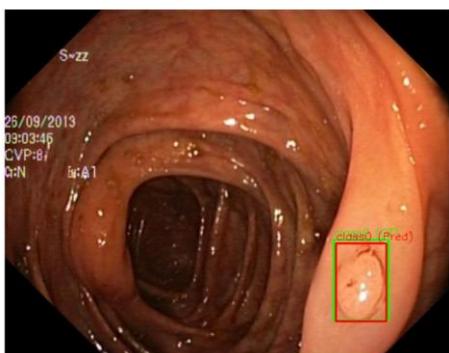
### YOLO5s Evaluation Metrics (Training and Validation)

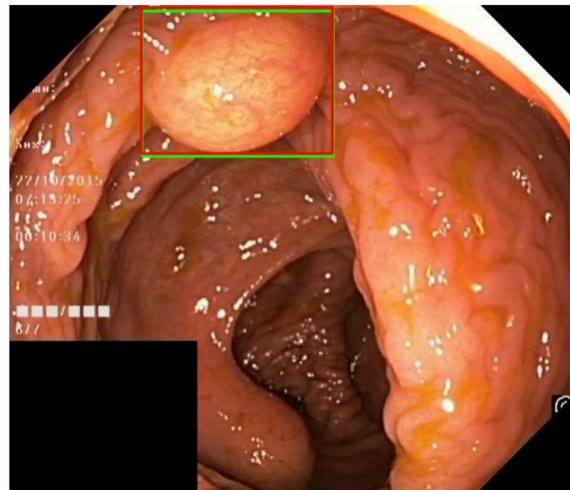
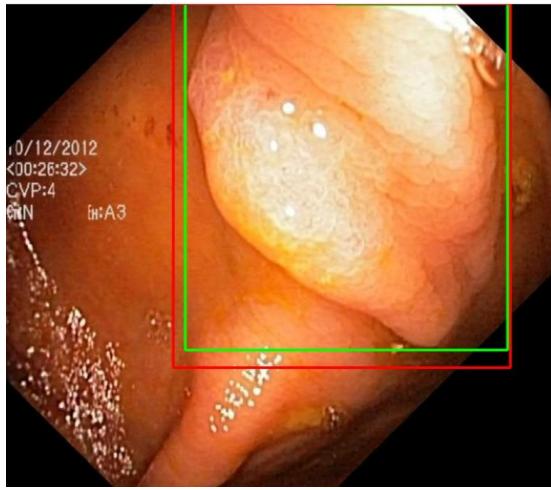
| Metric       | Score        |
|--------------|--------------|
| Precision    | <b>0.919</b> |
| Recall       | <b>0.920</b> |
| mAP@0.5      | <b>0.961</b> |
| mAP@0.5:0.95 | <b>0.781</b> |

### YOLO5s Evaluation Metrics (Test set)

| Metric    | Score         |
|-----------|---------------|
| Precision | <b>0.9434</b> |
| Recall    | <b>0.9486</b> |
| mAP@0.5   | <b>0.9758</b> |

mAP@0.5:0.95 **0.7942** Visuals:





## Summary:

This project focused on object detection in the **HyperKvasir dataset** using the **YOLOv5s model**. Initially, the pre-trained YOLOv5s model was evaluated to establish a baseline. To improve performance, a **customized YOLOv5s architecture** was developed by modifying network layers, tuning hyperparameters, applying advanced data augmentation, optimizing anchor boxes, and extending the training epochs.

The **custom YOLOv5s model** achieved significantly higher precision, recall, and mAP scores compared to the pre-trained version, demonstrating that **model customization is highly effective for medical image object detection** in the HyperKvasir dataset.

| Model                          | Precision     | Recall        | mAP@0.5       | mAP@0.5:0.95  |
|--------------------------------|---------------|---------------|---------------|---------------|
| YOLOv5s Pretrained (Train/Val) | 0.9167        | 0.8853        | 0.9552        | 0.7897        |
| YOLOv5s Pretrained (Test)      | 0.8924        | 0.8773        | 0.9358        | 0.7624        |
| YOLOv5s Custom (Train/Val)     | 0.919         | 0.920         | 0.961         | 0.781         |
| YOLOv5s Custom (Test)          | <b>0.9434</b> | <b>0.9486</b> | <b>0.9758</b> | <b>0.7942</b> |