PolyDeep

https://www.polydeep.org/

February 2024

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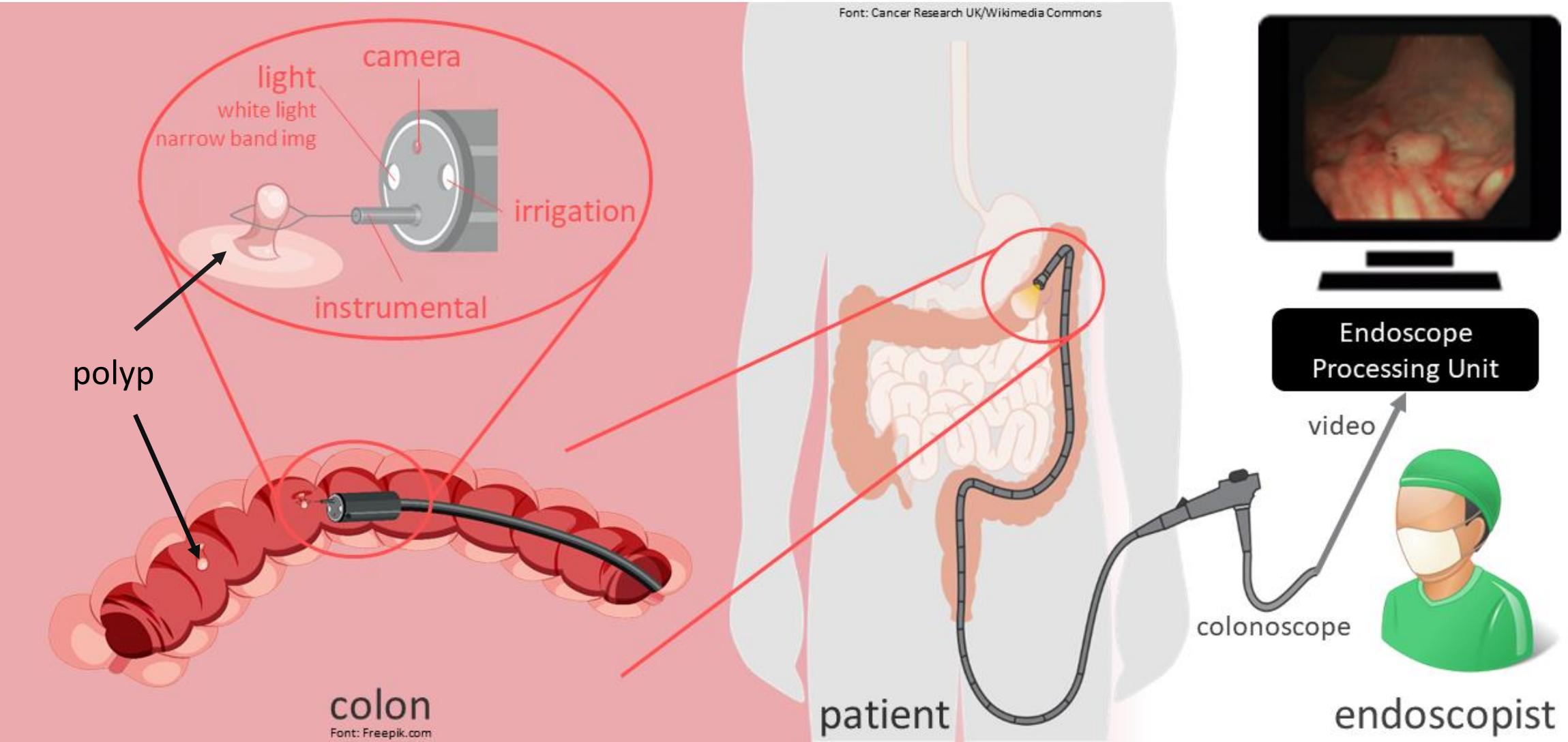
Introduction

Introduction



Introduction

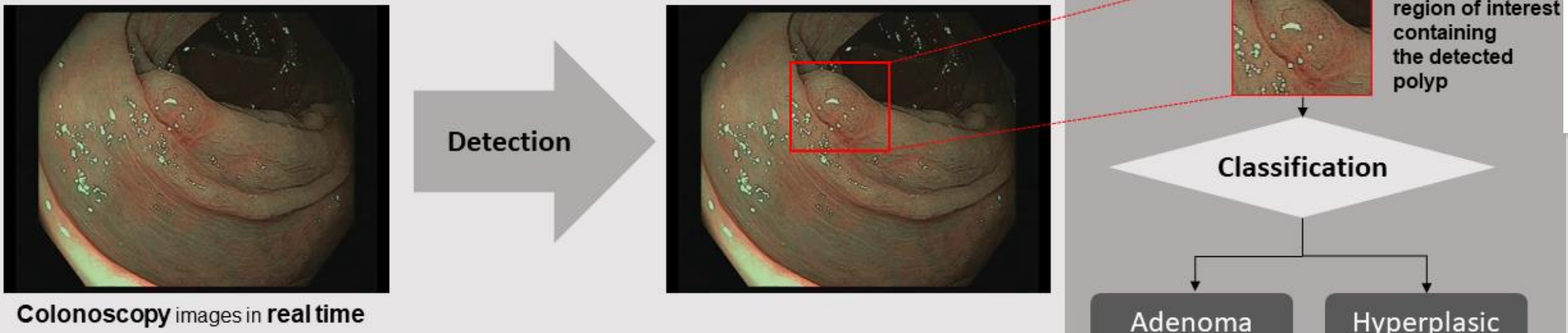
SINGG
Upgrading your knowledge

+

GIODO
Grupo de Investigación en
Oncología Digestiva de Ourense

Objectives

Objectives



Colonoscopy images in **real time**

Detection model

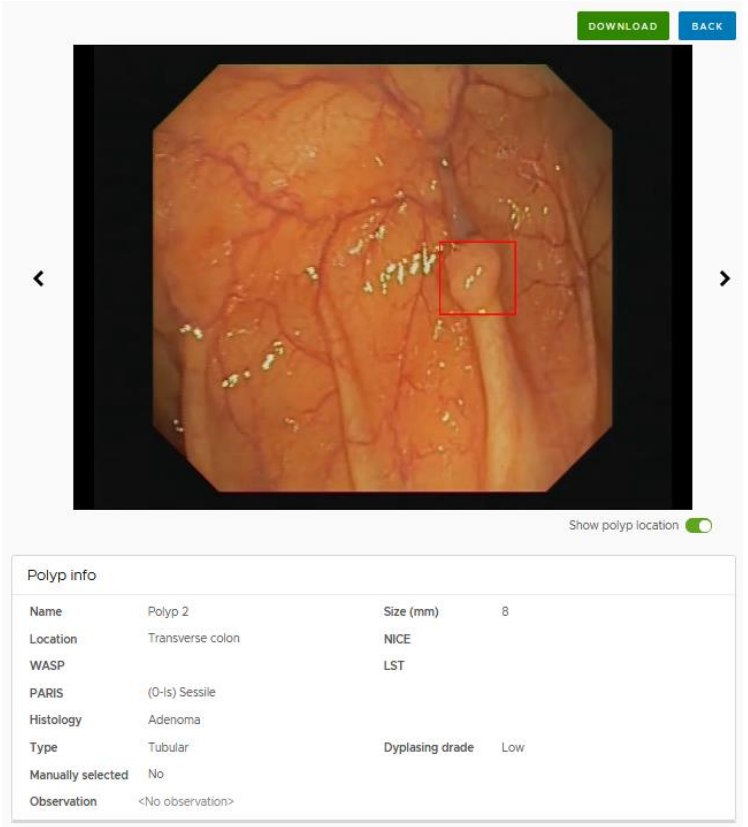
Classification model of the histological type

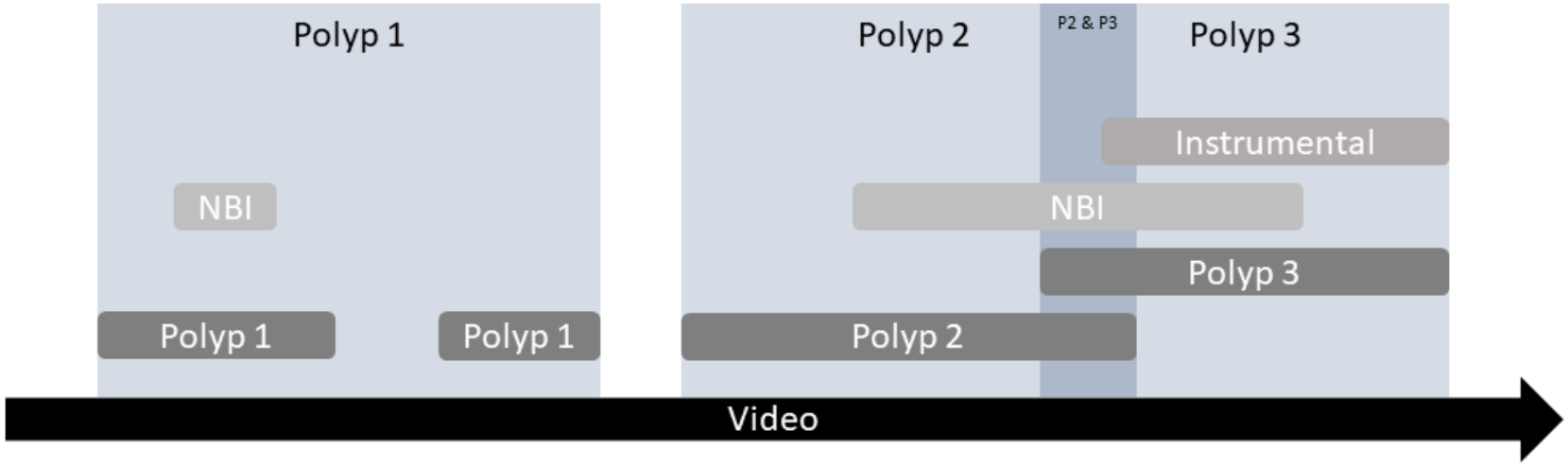
Results

Polyp Image Bank (PIBA)

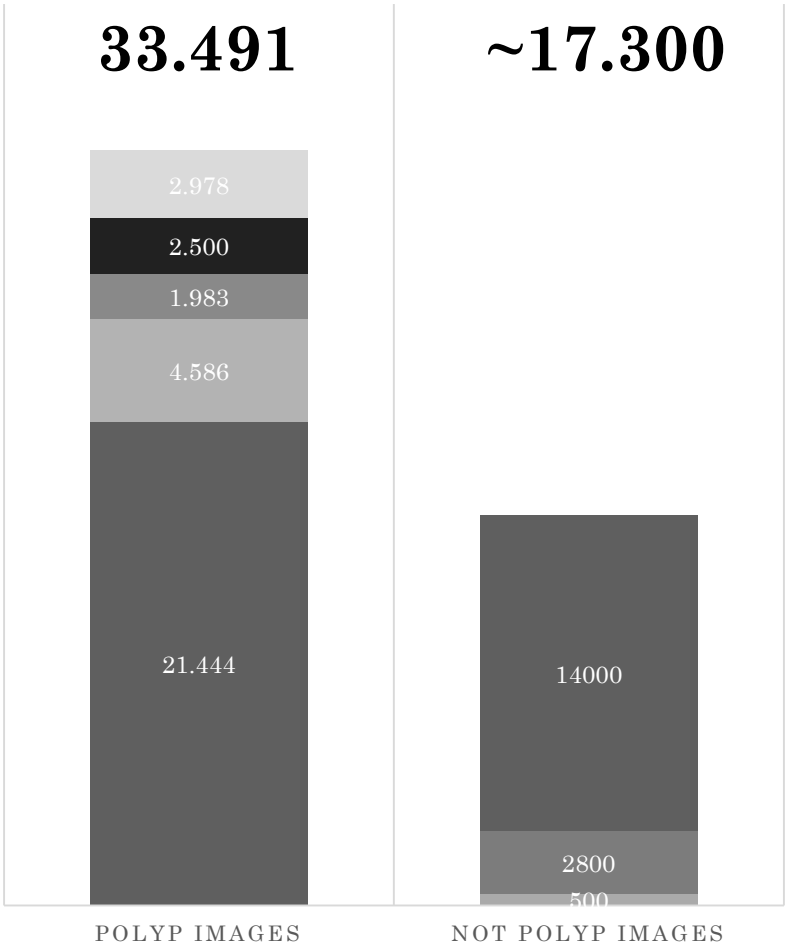
Polyp Image BAnk

- Video annotation
- Histological information
- Easy access to information
- Image galleries

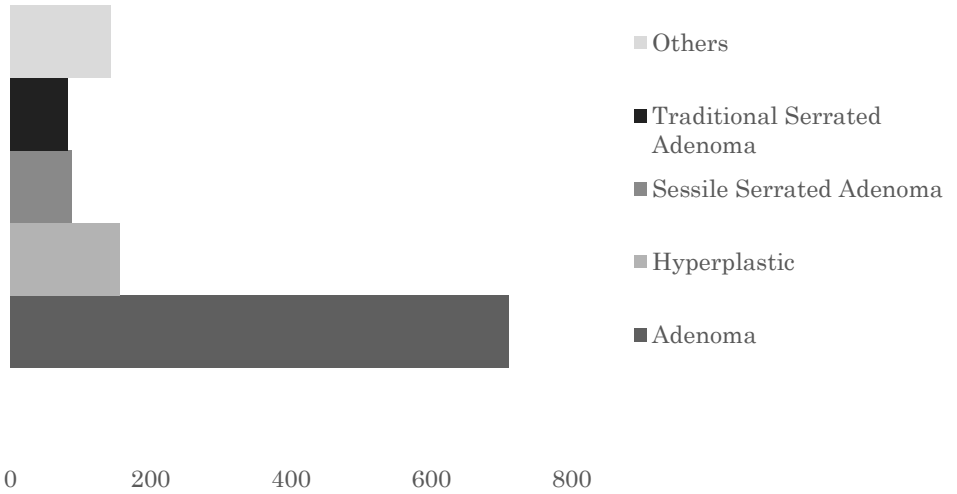


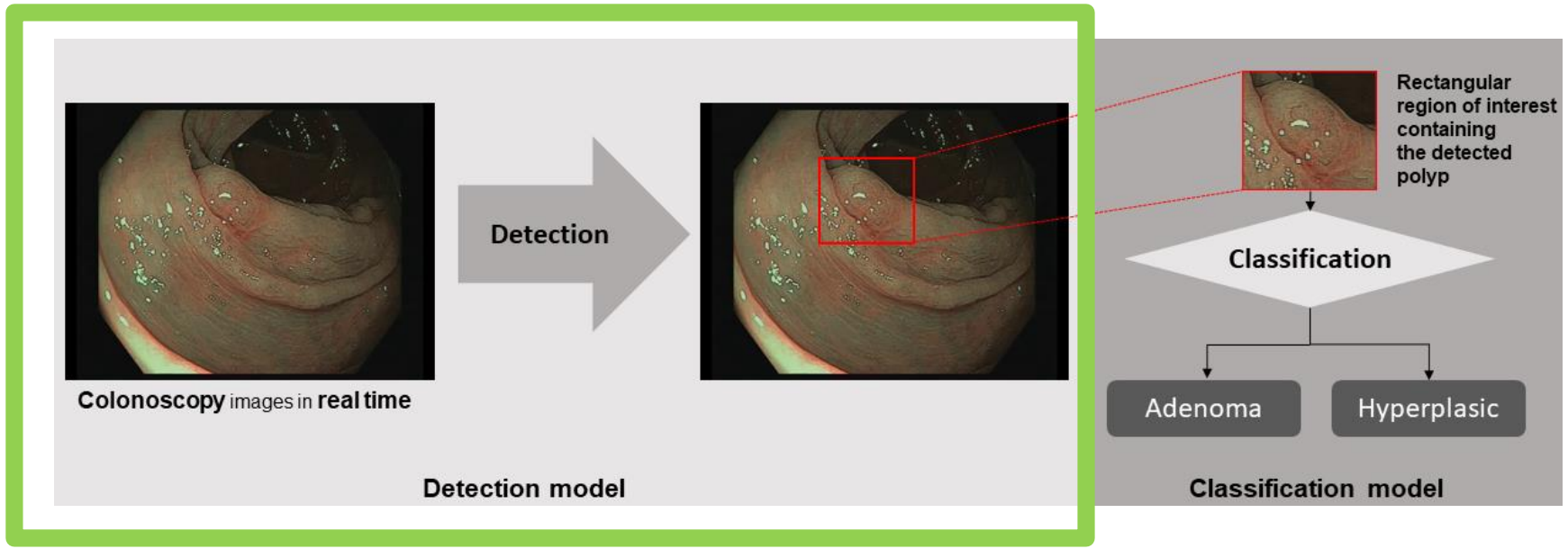


Polyp Image BAnk



Total Polyps: 1.180





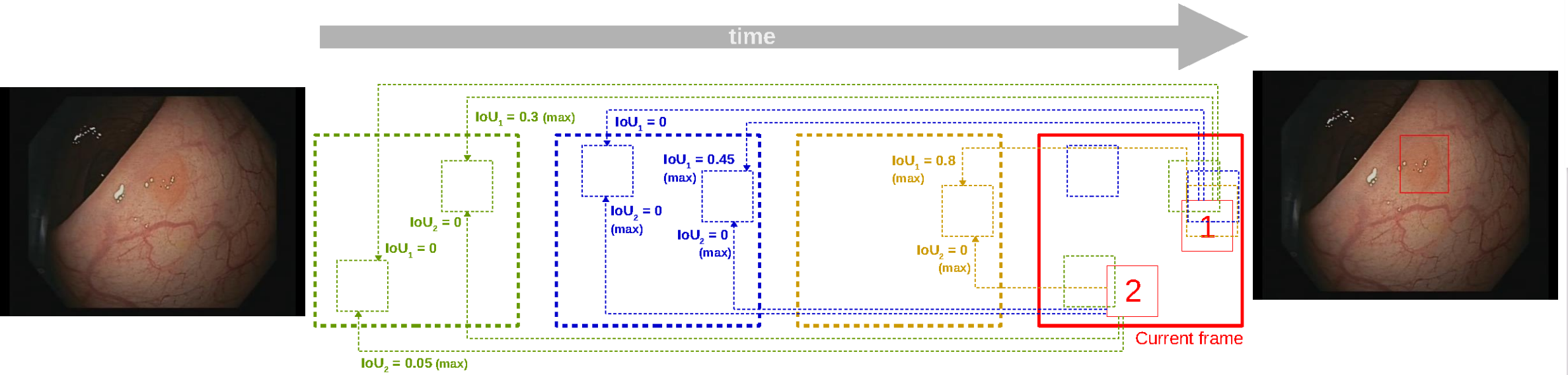
Results

Detection model

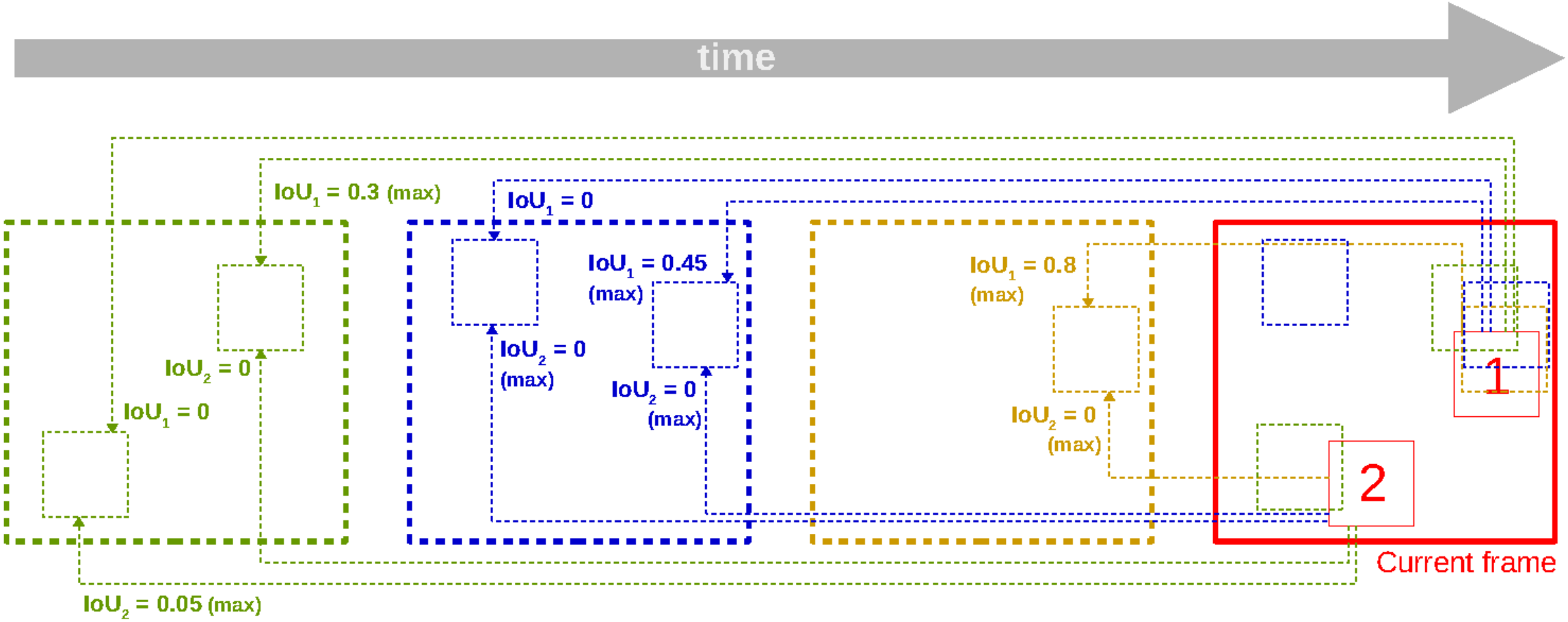
Detection model

YOLOV3 ✚ **Fine tuning** ✚ **Object-Tracking**

pretrained ImageNet | **with PIBAdb** | **Algorithm**

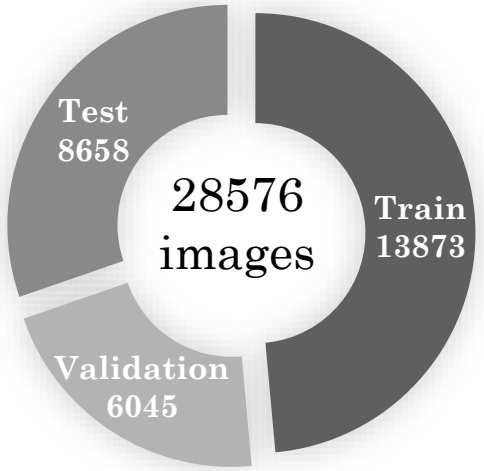


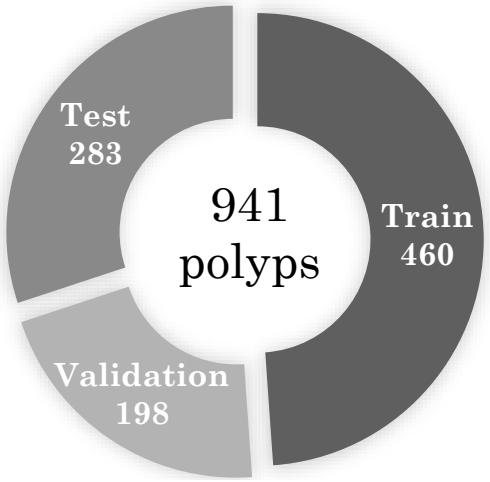
Detection model

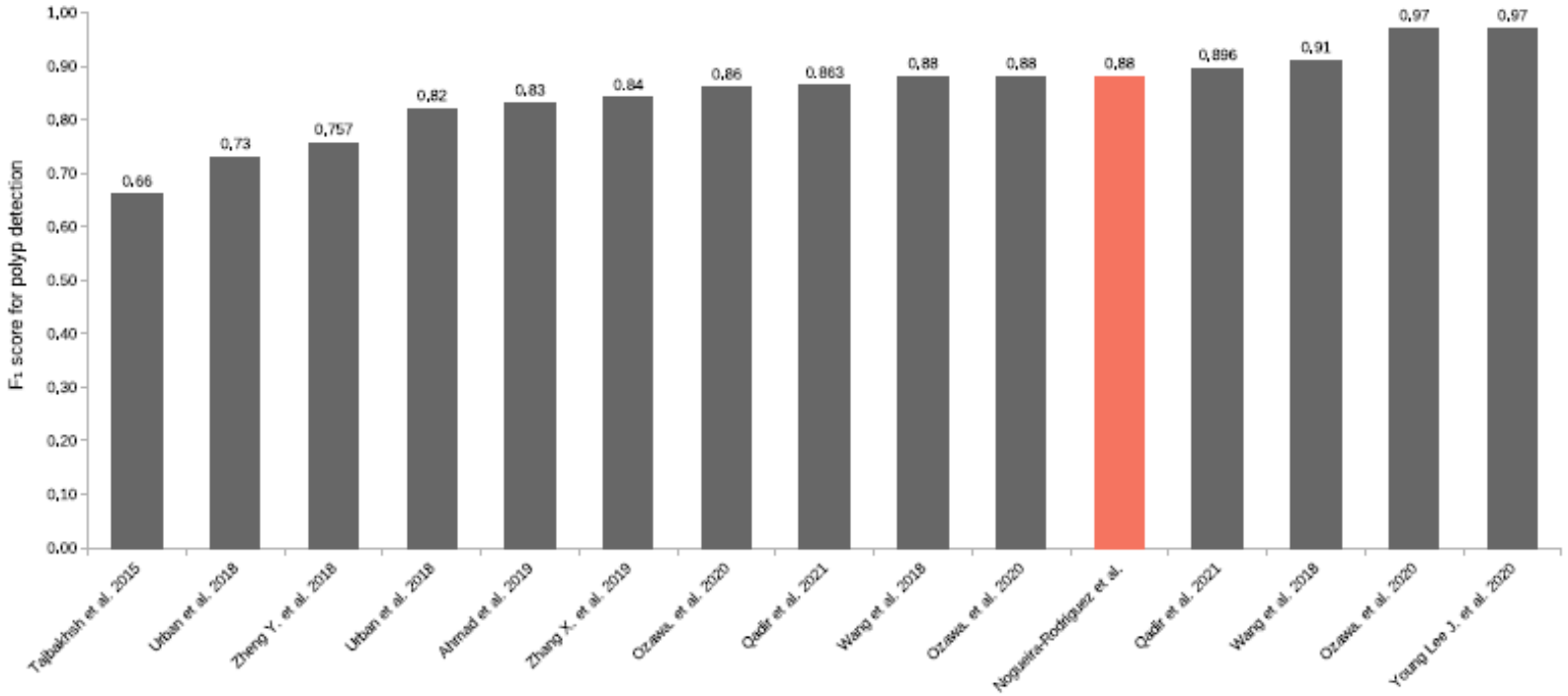


Detection model

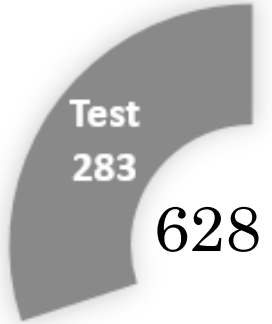
- Image-based validation
  - **F_1 0.881**
  - Recall 87.2%
  - Precision 89%







Detection model

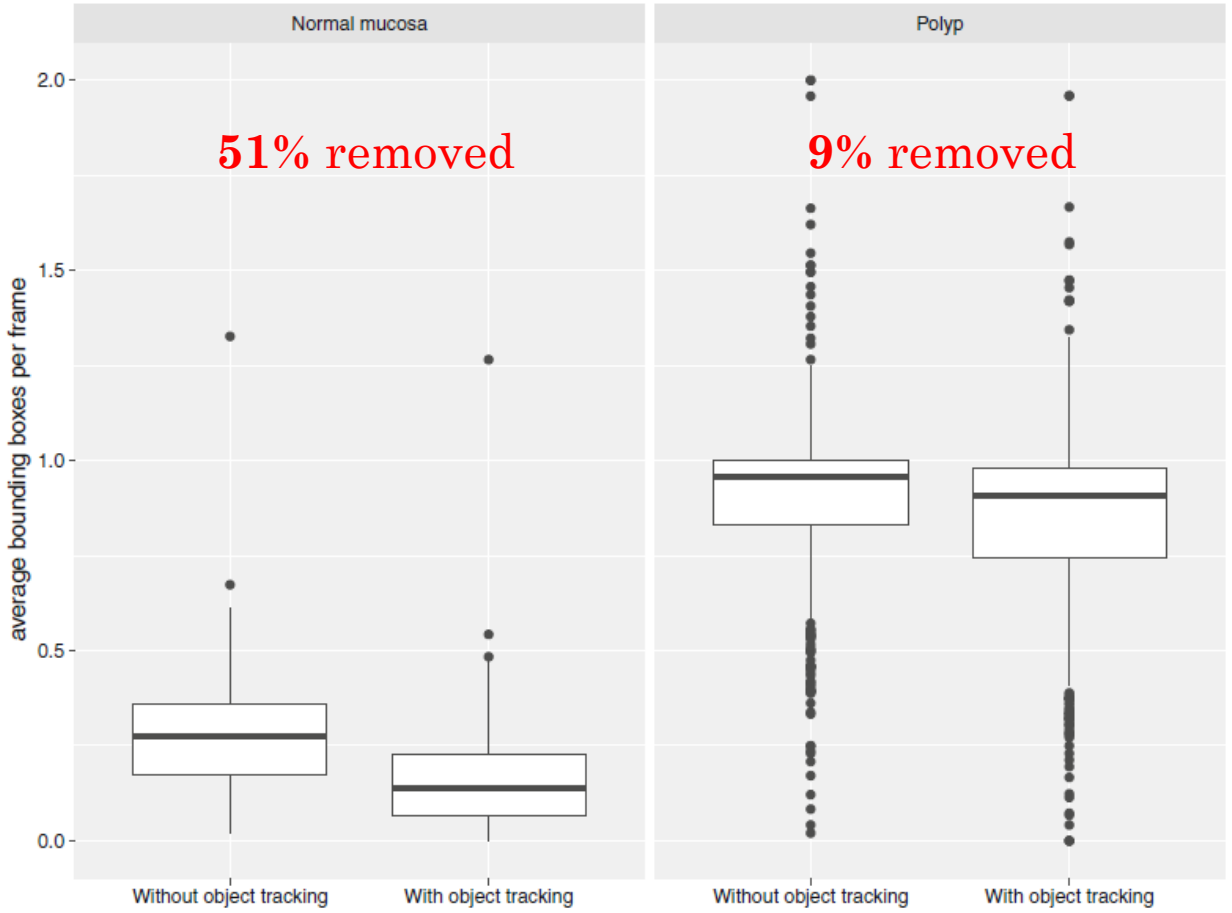


628 polyp videos

✚

171 normal mucosa videos

Object-tracking filtering performance



Detection model on polyp video

and

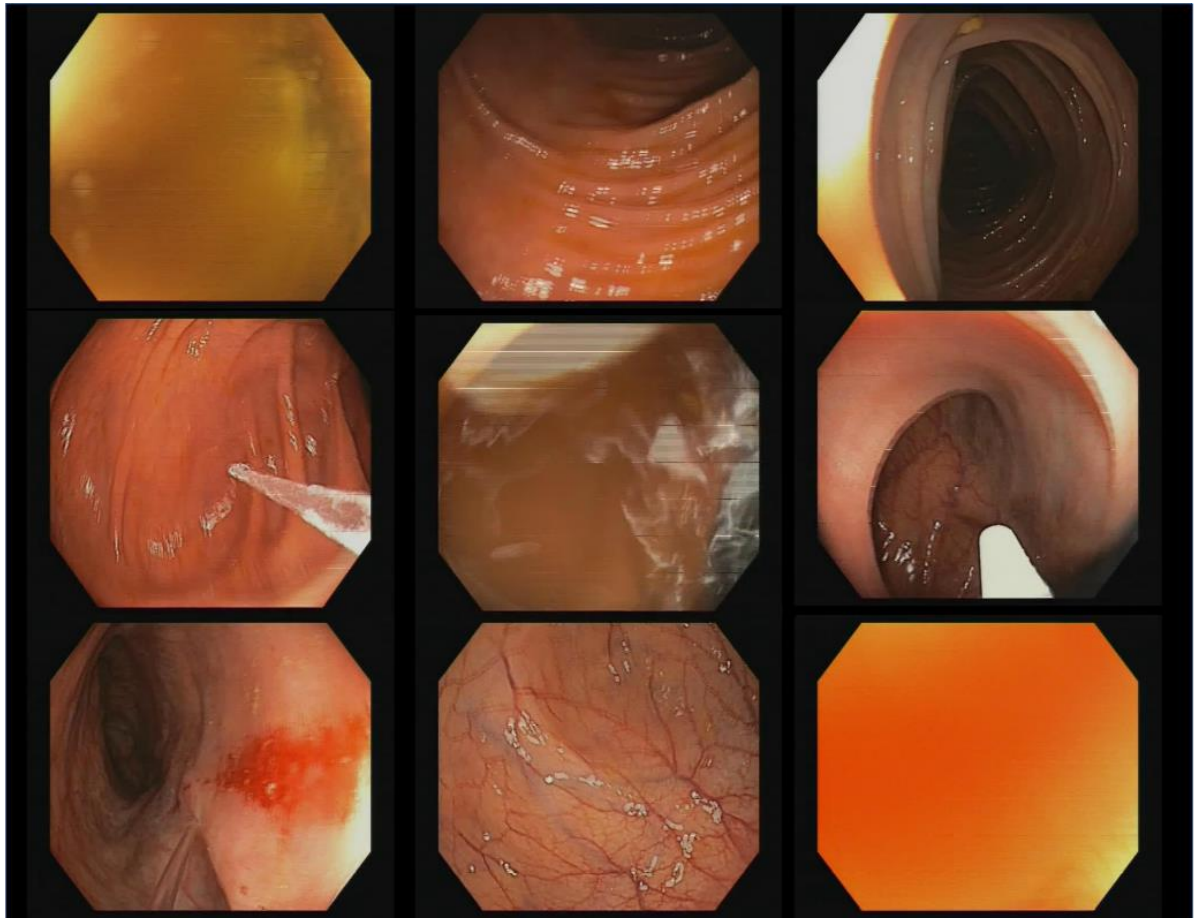
Detection model on not polyp video

Reduce false positives

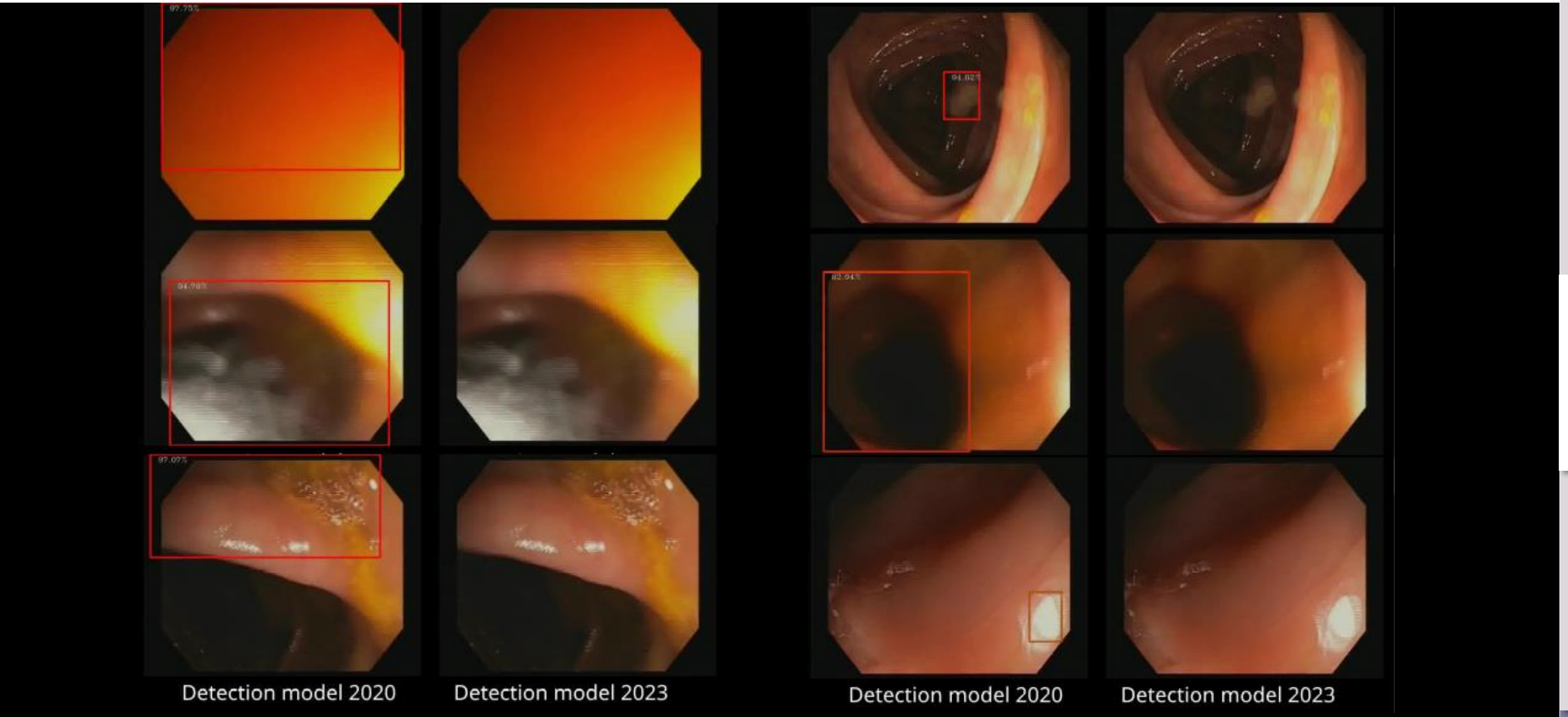
- Image-based validation with 2020 detection model
  - **F_1 0.881**
  - Recall 87.2%
  - Precision 89%

+4497 not-polyp images

- Image-based validation with retrained 2023 detection model
  - **F_1 0.895**
  - Recall 88.0%
  - Precision 91%



Reduce false positives

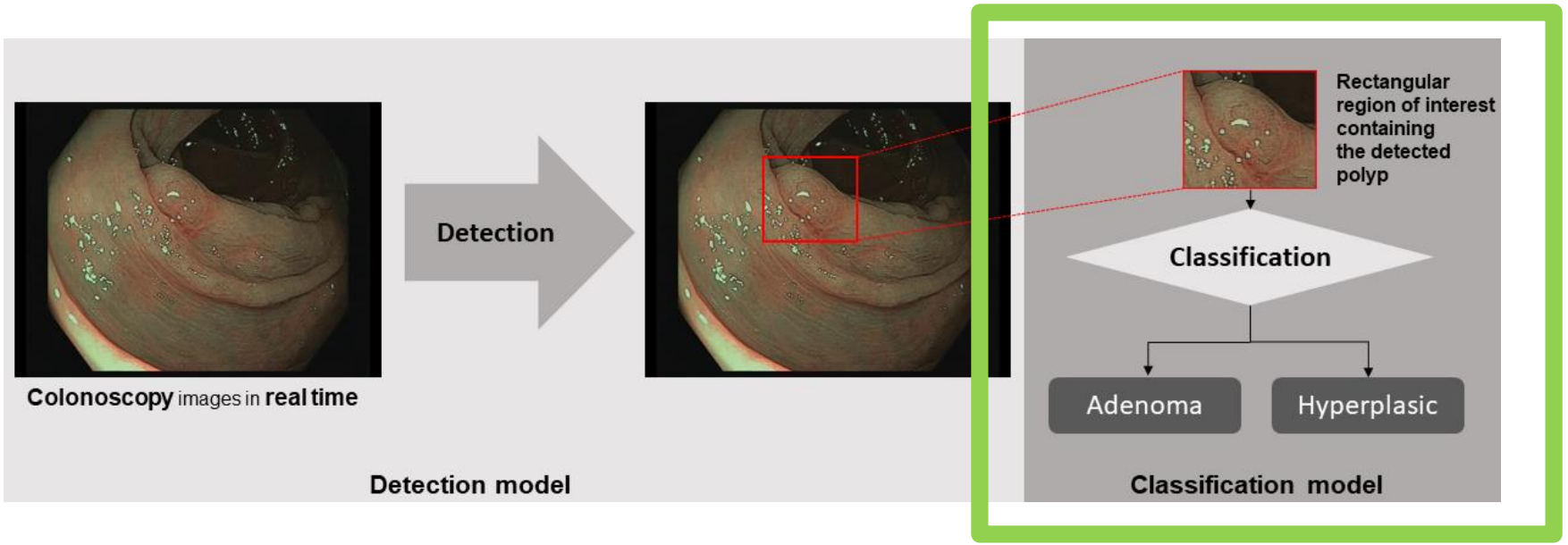


Detection model on polyp video

and

Detection model on not polyp video

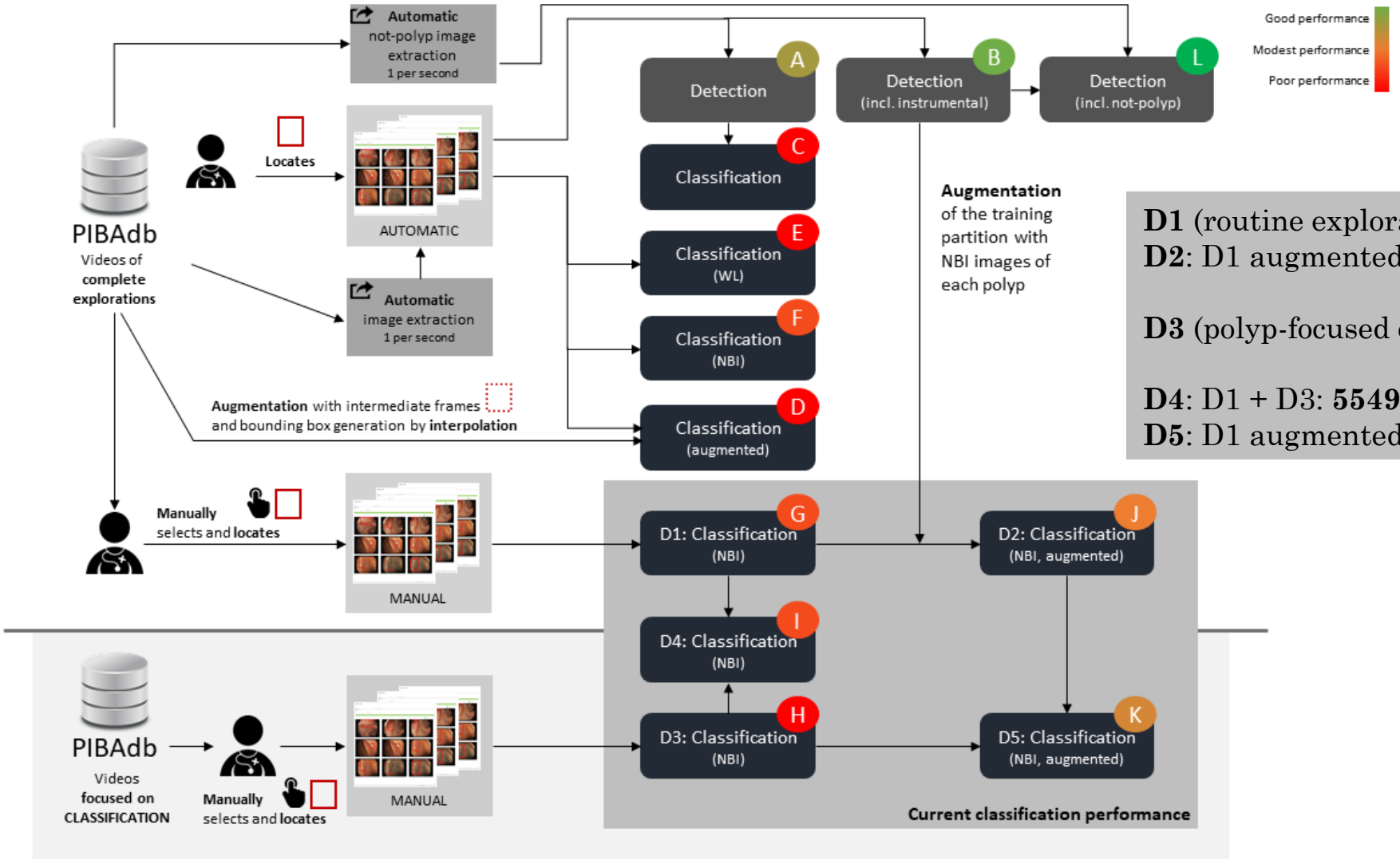
with **model 2020** and **retrained** model



Results

Classification model

Classification model



D1 (routine explorations): **8391** images
D2: D1 augmented

D3 (polyp-focused explorations): **1568** images

D4: D1 + D3: **5549** images
D5: D1 augmented + D3

Classification model

ResNet50
VGG19
InceptionV3
Pretrained on ImageNet

+

Fine tuning
with PIBAdb datasets

- Only NBI images (5549 images)
- Classes:
  - Adenoma+TSA+SSA (positive)
  - Hyperplastic (negative)
- 5-fold cross-validation
- Balanced in train oversampling
- Augmented in train

Performance by dataset (average of the 3 CNN models)			
D5	Sensitivity	Specificity	Youden
	90.58%	49.54%	**0.40**

Currently

... and future directions

Currently

- PolyDeepAdvance
  - More polyps
  - Network retraining
  - Clinical validation
- Improve the polyp classification model
  - Exhaustive error analysis
- Estimate the improvements of the classification model
  - Polyp classification model vs. expert endoscopists
  - NICE

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