Endoscopic Artefact Detection

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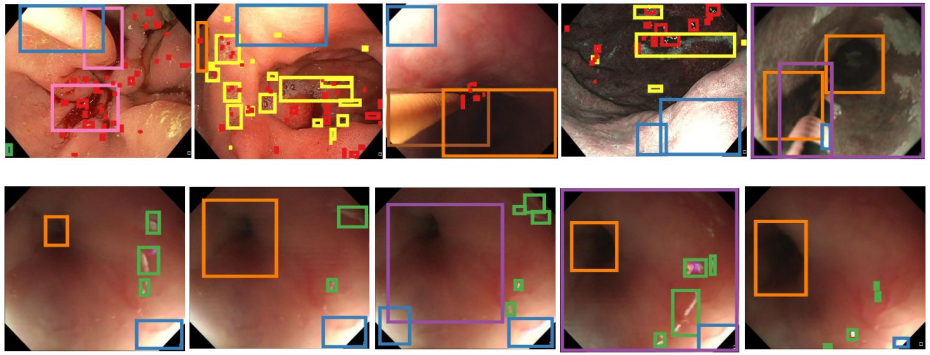
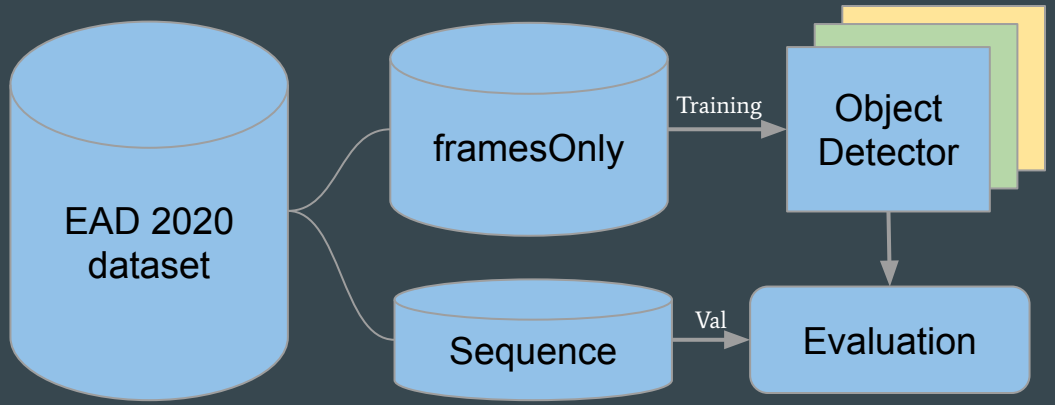
The Endoscopy Computer Vision Challenge (EndoCV2020)

EndoCV2020 is a crowd-sourcing initiative to address fundamental problems in clinical endoscopy and consists of: **1) Endoscopy artefact detection and segmentation (EAD2020)**, and 2) Endoscopy disease detection and segmentation (EDD2020). Among the two sub-challenges, EAD2020 is an extended sub-challenge of EAD2019, however, unlike EAD2019 it includes both frame and sequence data with an addition of nearly 1000 frames and 41,832 annotations.

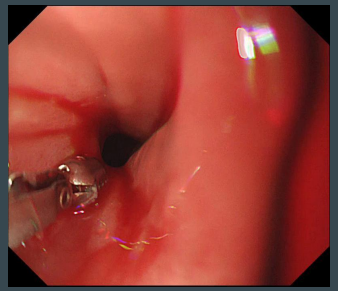


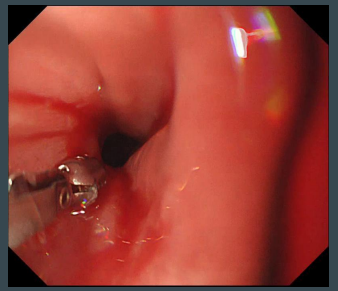
Dataset

The datasets used for this project contained 2200 images with annotations for the training set (framesOnly), and 330 images with annotations in the validation set (Sequence).



Classes	
'specularity'	'saturation'
'artifact'	'blur'
'contrast'	'bubbles'
'instrument'	'blood'





Object Detection Models

Faster RCNN

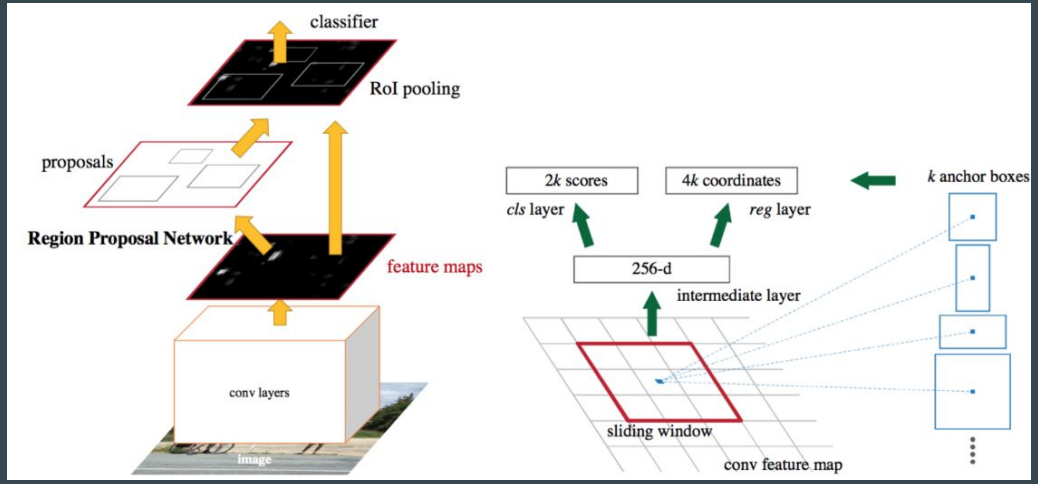


Image source: Ren et al., 2016

Toolbox based on PyTorch

- **Modular Design**

  We decompose the detection framework into different components and one can easily construct a customized object detection framework by combining different modules.

- **Support of multiple frameworks out of box**

  The toolbox directly supports popular and contemporary detection frameworks, e.g. Faster RCNN, Mask RCNN, RetinaNet, etc.

- **High efficiency**

  All basic bbox and mask operations run on GPUs. The training speed is faster than or comparable to other codebases, including Detectron2, maskrcnn-benchmark and SimpleDet.

- **State of the art**

  The toolbox stems from the codebase developed by the MMDet team, who won COCO Detection Challenge in 2018, and we keep pushing it forward.

Training

Faster-RCNN

Backbone: ResNET

Epochs: 12

Batch: 2

Learning rate = 0.0025

Momentum = 0.9

Optimizer: SGD

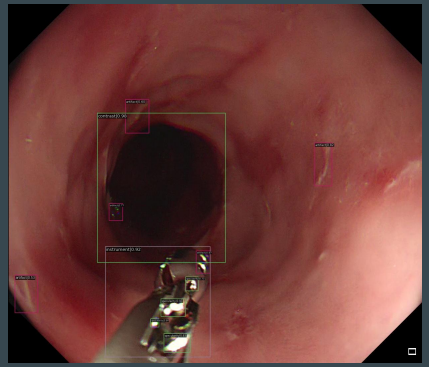
Data Aug: Resize, RandomFlip, Pad

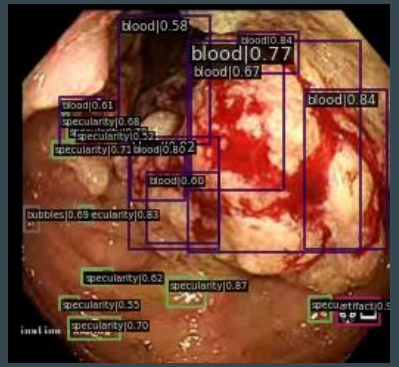
Results

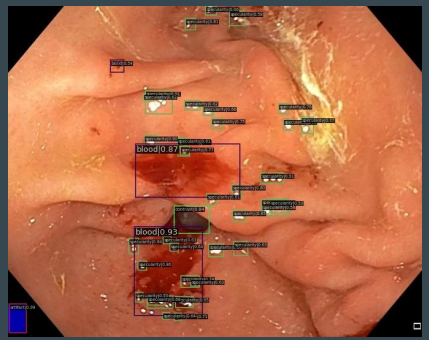
Faster-RCNN

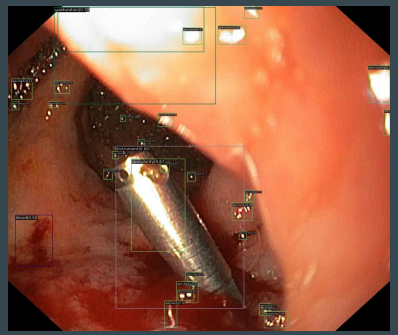
mAP@0.5 =	0.2900
mAP@0.75 =	0.1080
mAP@0.25:0.75:0.05 =	0.2927
FPS =	17.9721

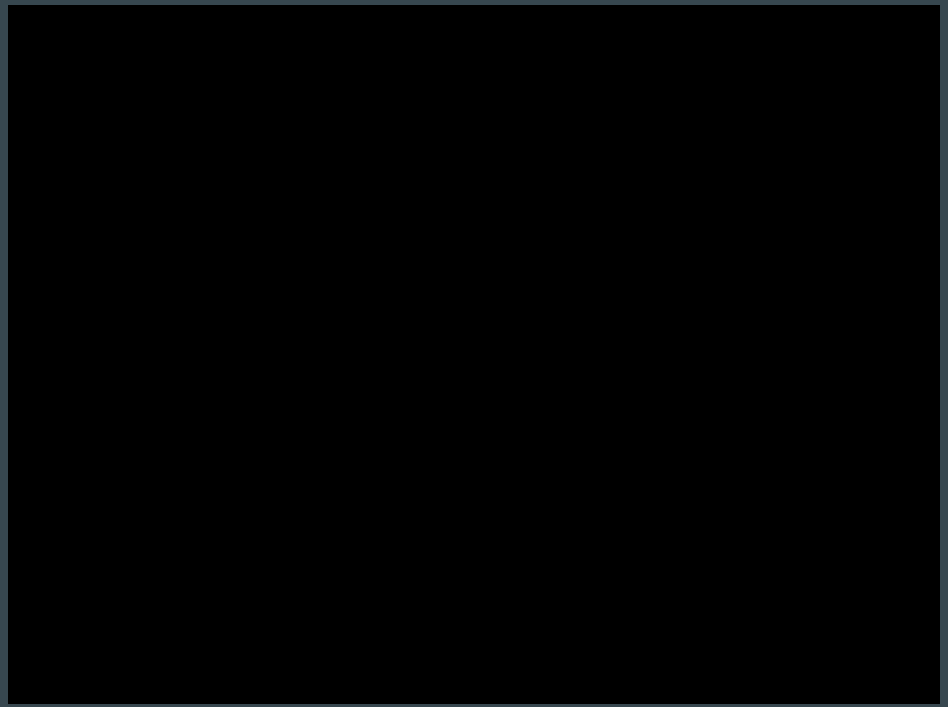
Inferences in the Sequence EAD2020_MP with Faster-RCNN











Inferences in the Sequence EAD2020_MP with Faster-RCNN