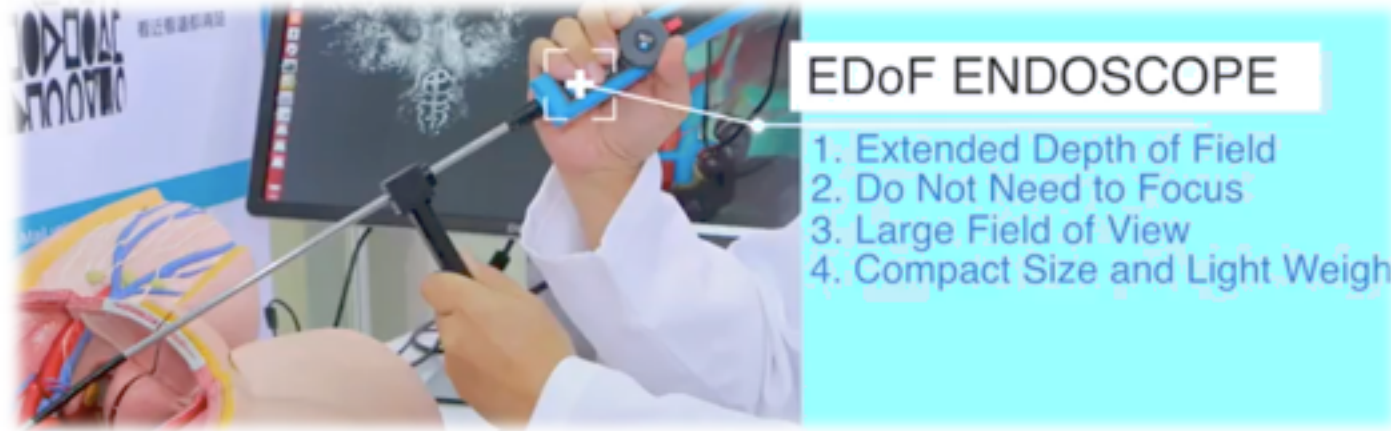


2nd Augmented Intelligence and Interaction (AII) Workshop

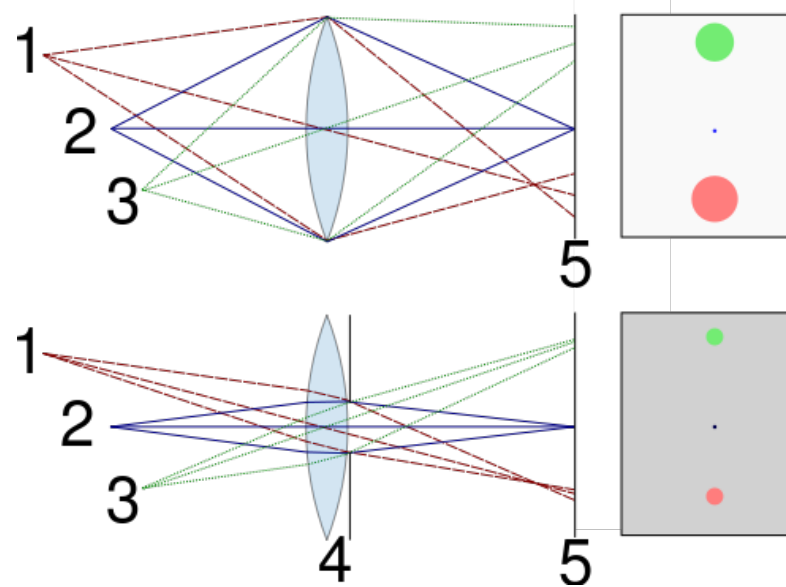
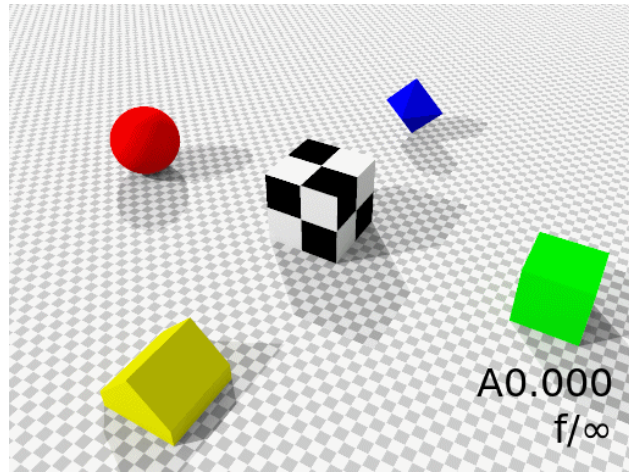
EDoF Endoscopic Video Enhancement Using Deep Image Priors

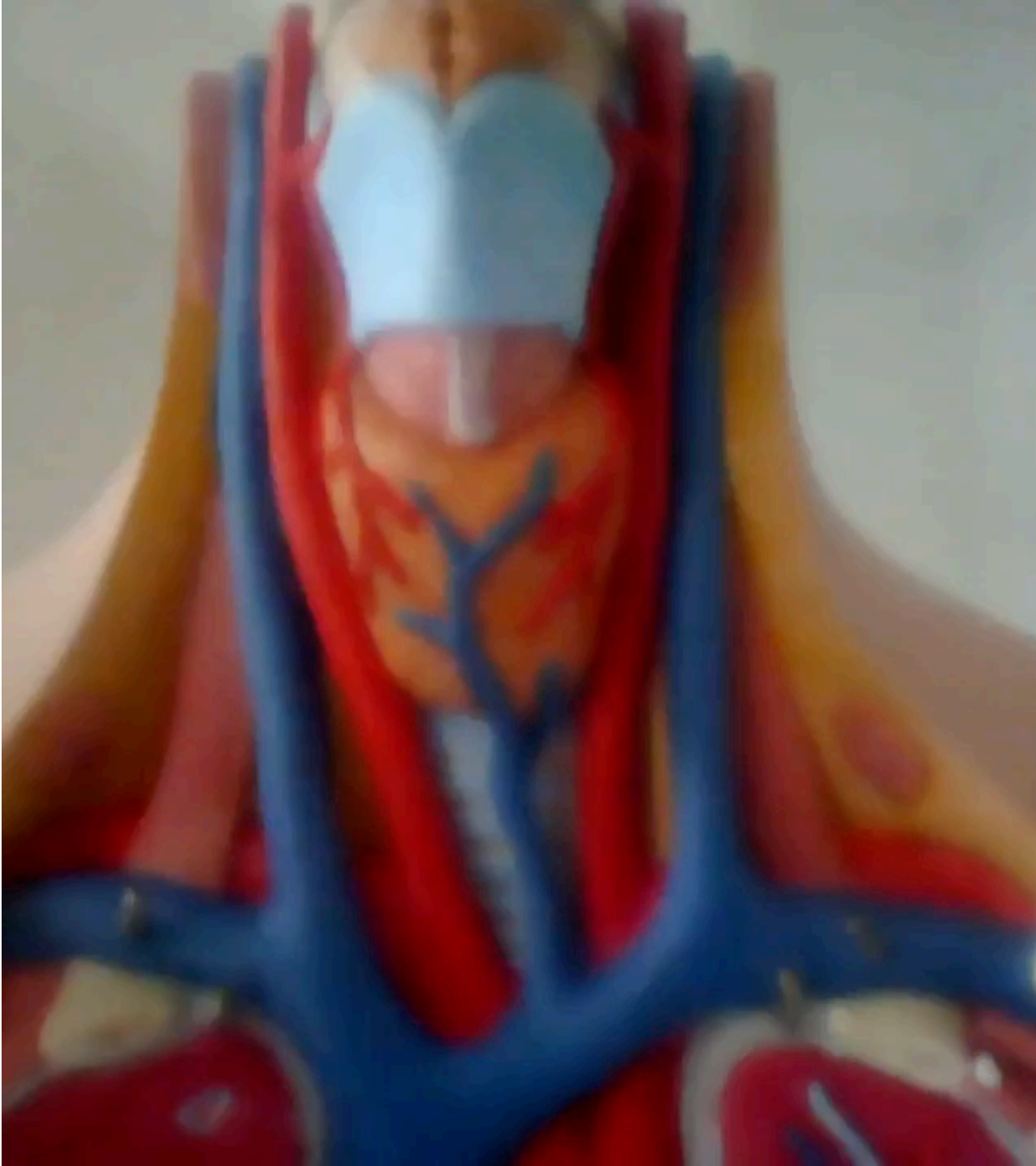
Yi-Chun Lin, Wen-Chi Chin, Tzu-Wei Huang, Yung-Sung Lan
Hwann-Tzong Chen





Extended Depth of Field

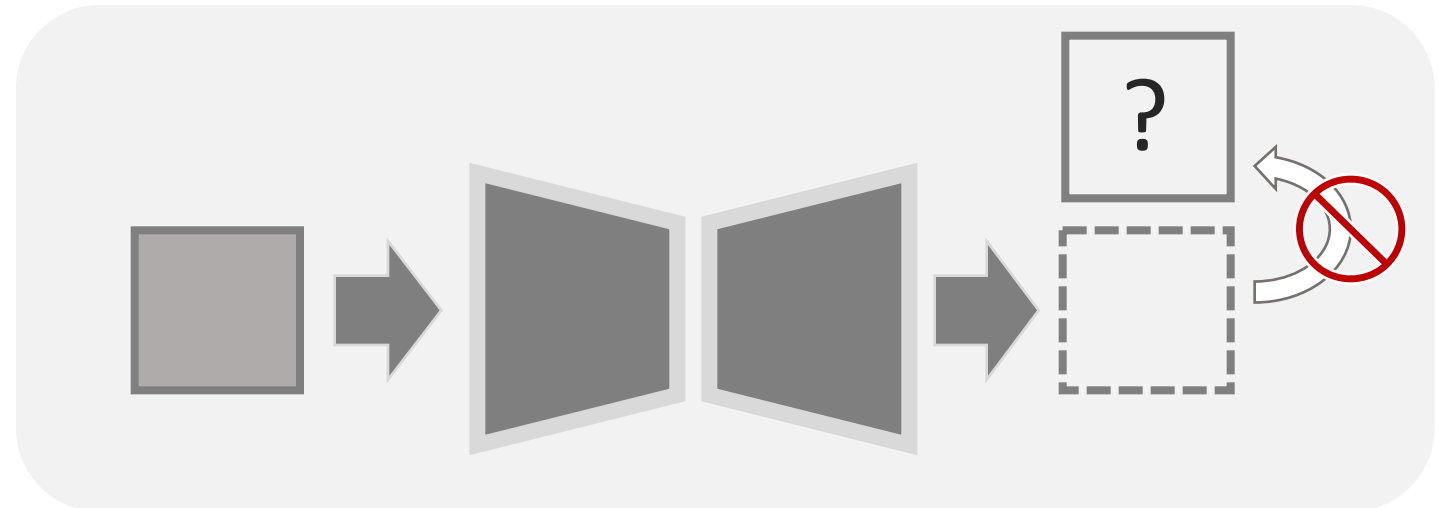




Supervised Learning?

Only EDoF out-of-focus video frames are available.

No corresponding clear, in-focus ground truth.



Deep Image Prior

Dmitry Ulyanov
Skolkovo Institute of Science
and Technology, Yandex
dmitry.ulyanov@skoltech.ru

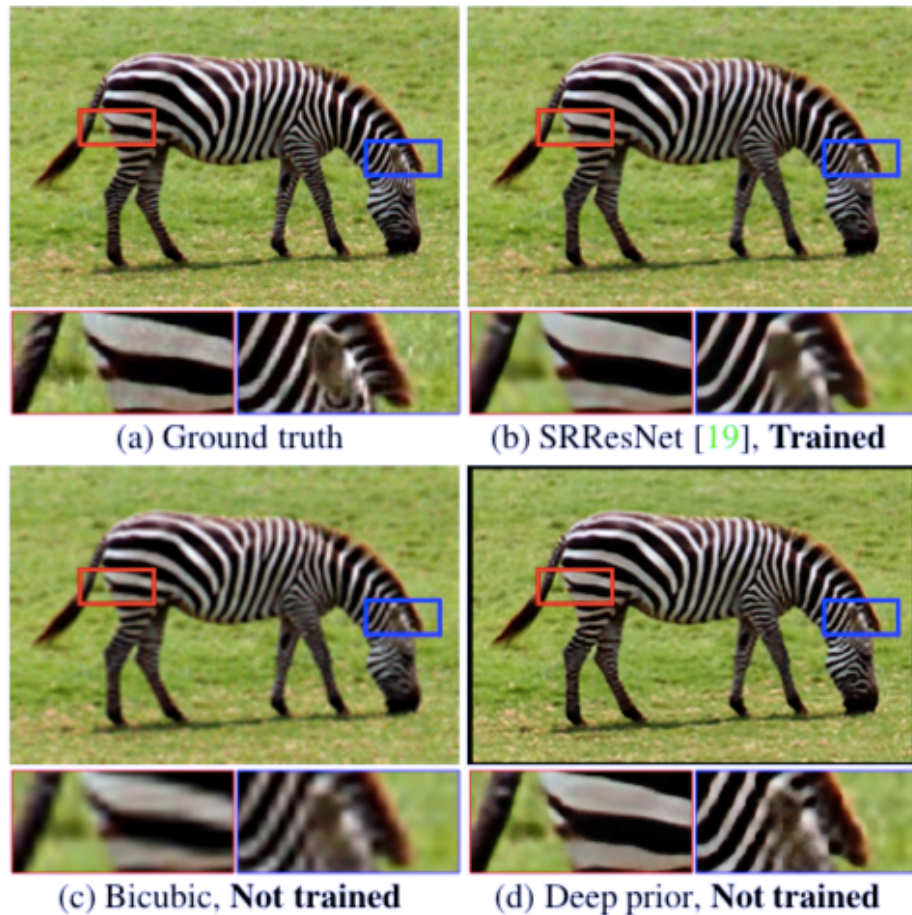
Andrea Vedaldi
University of Oxford
vedaldi@robots.ox.ac.uk

Victor Lempitsky
Skolkovo Institute of Science
and Technology (Skoltech)
lempitsky@skoltech.ru

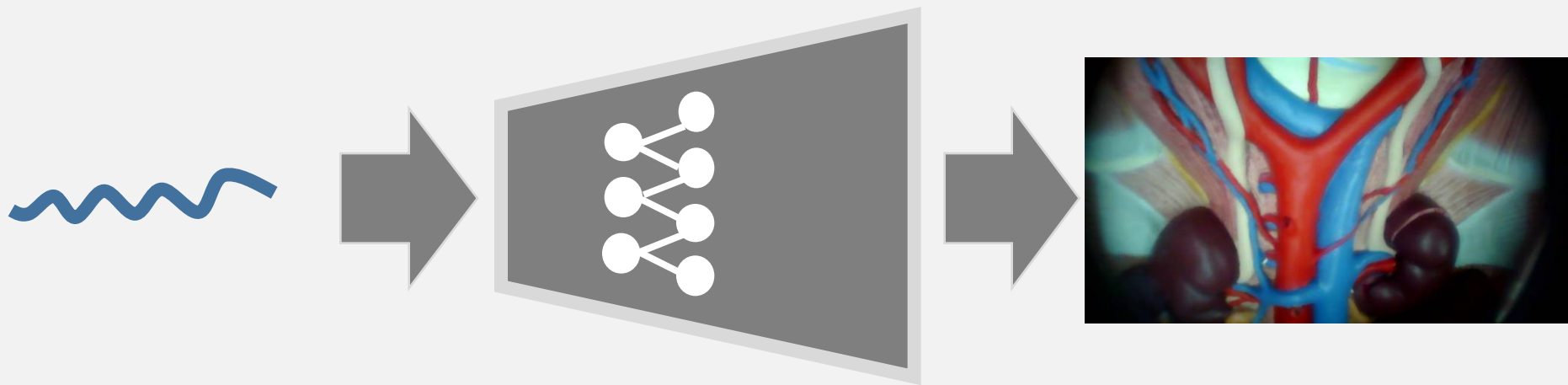
Abstract

Deep convolutional networks have become a popular tool for image generation and restoration. Generally, their excellent performance is imputed to their ability to learn realistic image priors from a large number of example images. In this paper, we show that, on the contrary, the structure of a generator network is sufficient to capture a great deal of low-level image statistics prior to any learning. In order to do so, we show that a randomly-initialized neural network can be used as a handcrafted prior with excellent results in standard inverse problems such as denoising, super-resolution, and inpainting. Furthermore, the same prior can be used to invert deep neural representations to diagnose them, and to restore images based on flash-no flash input pairs.

Apart from its diverse applications, our approach highlights the inductive bias captured by standard generator network architectures. It also bridges the gap between two very popular families of image restoration methods:

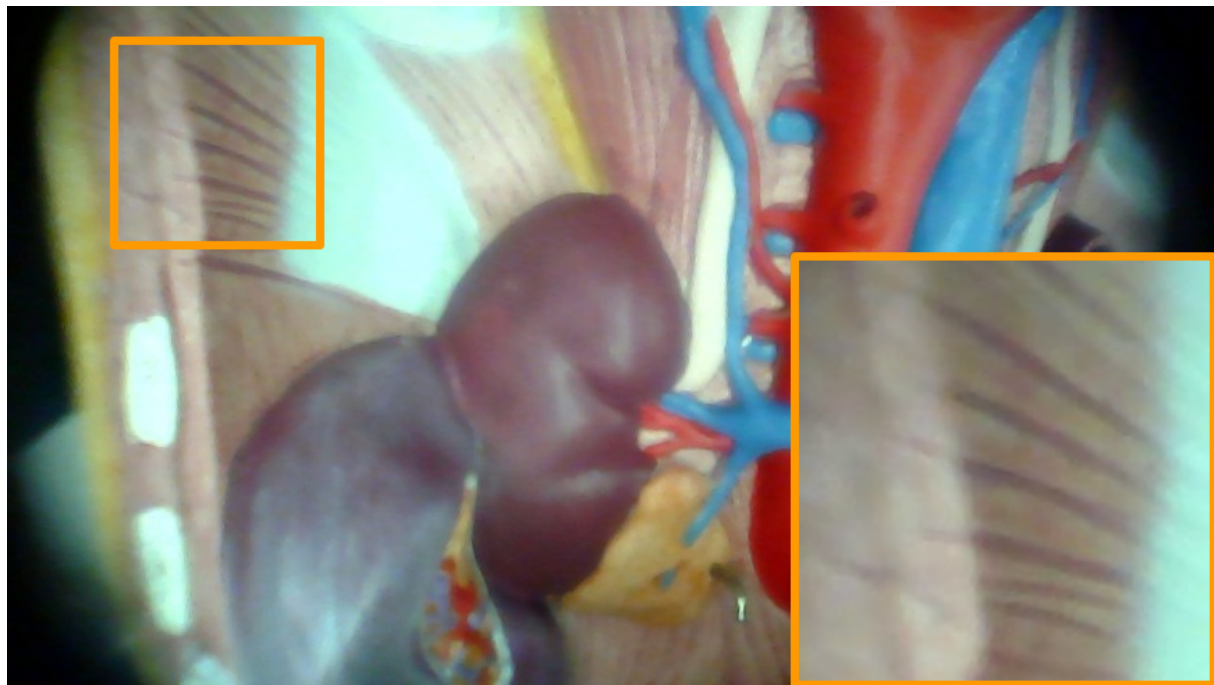


Deep Image Prior

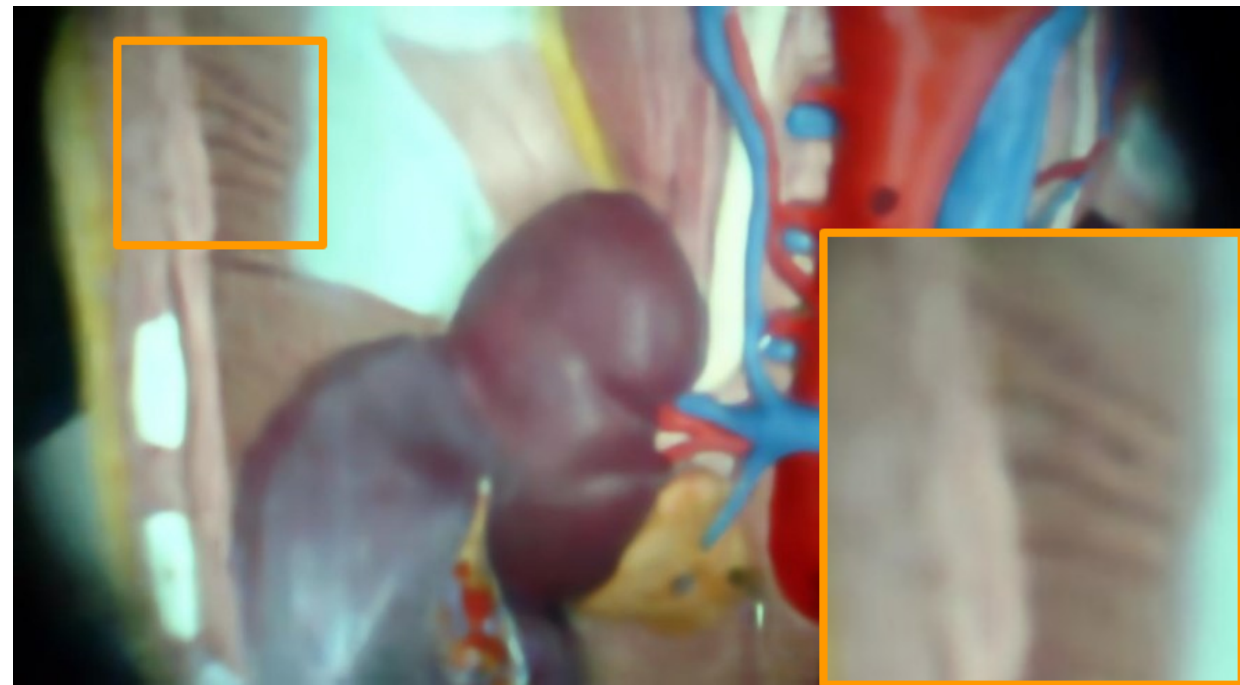


Training a network using a single image (in ~3 minutes)

Mapping a random vector to the target image



Raw EDoF image

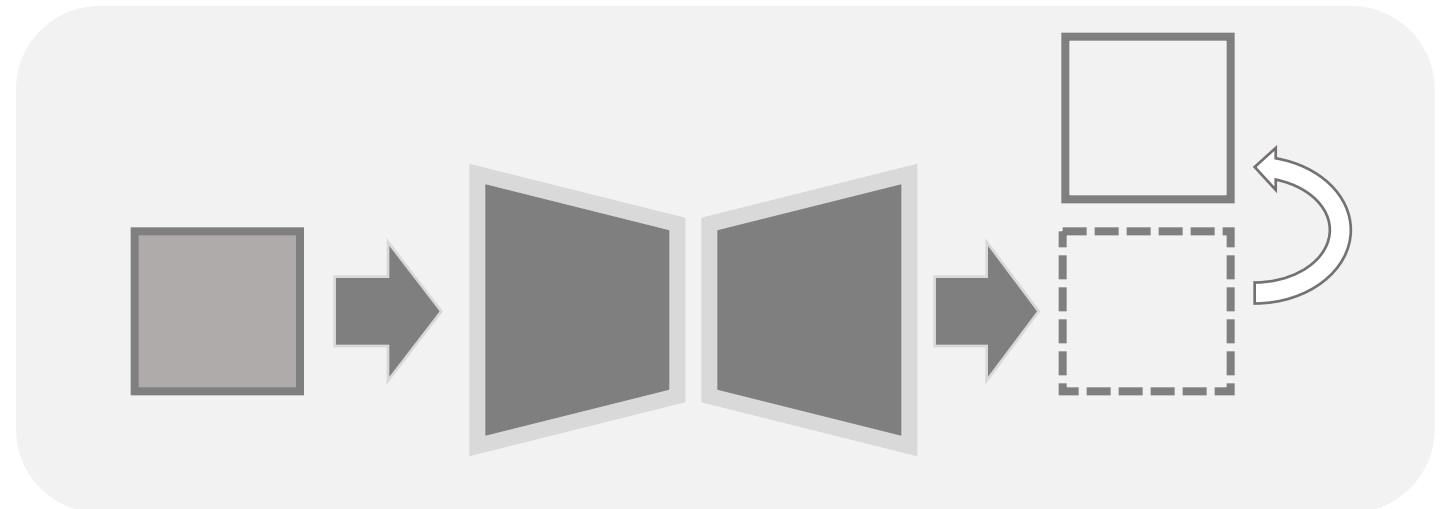


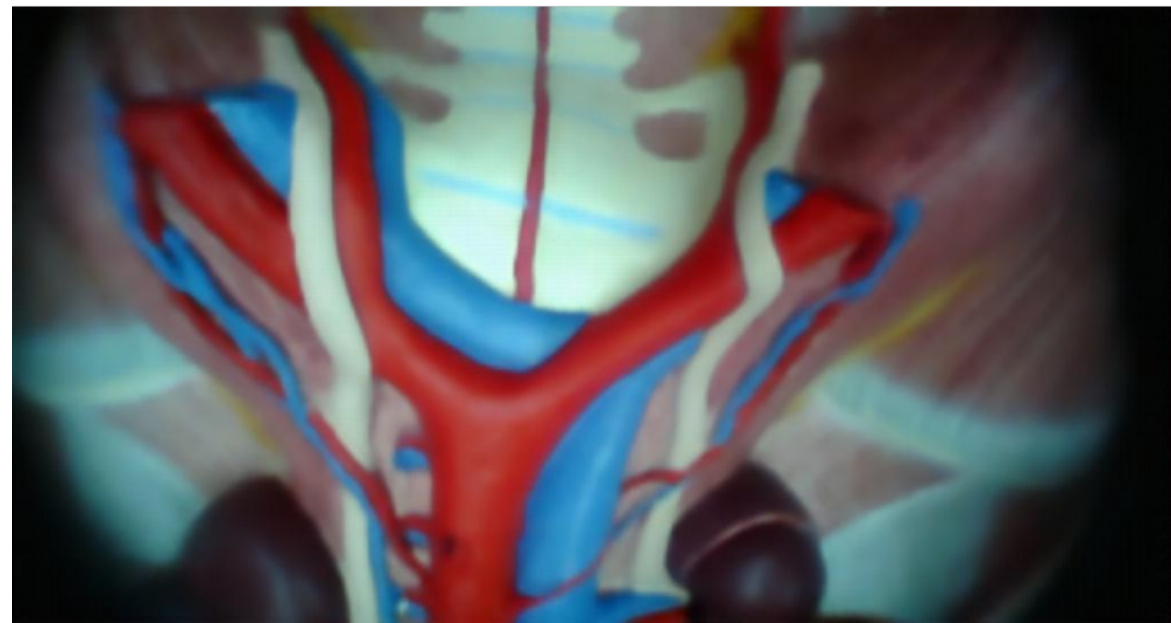
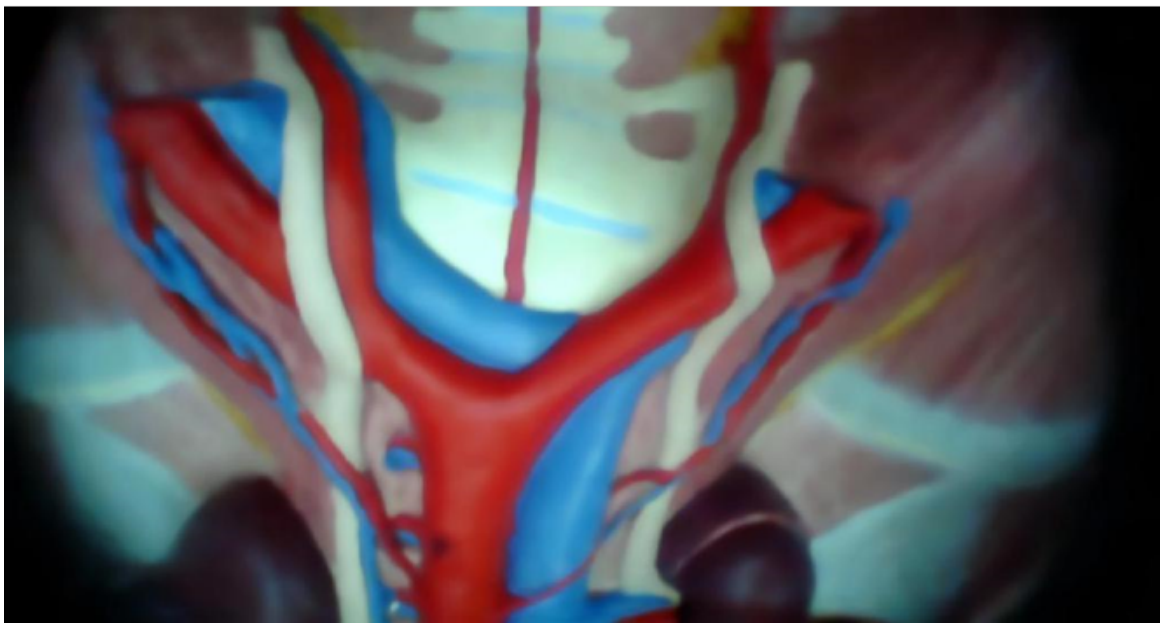
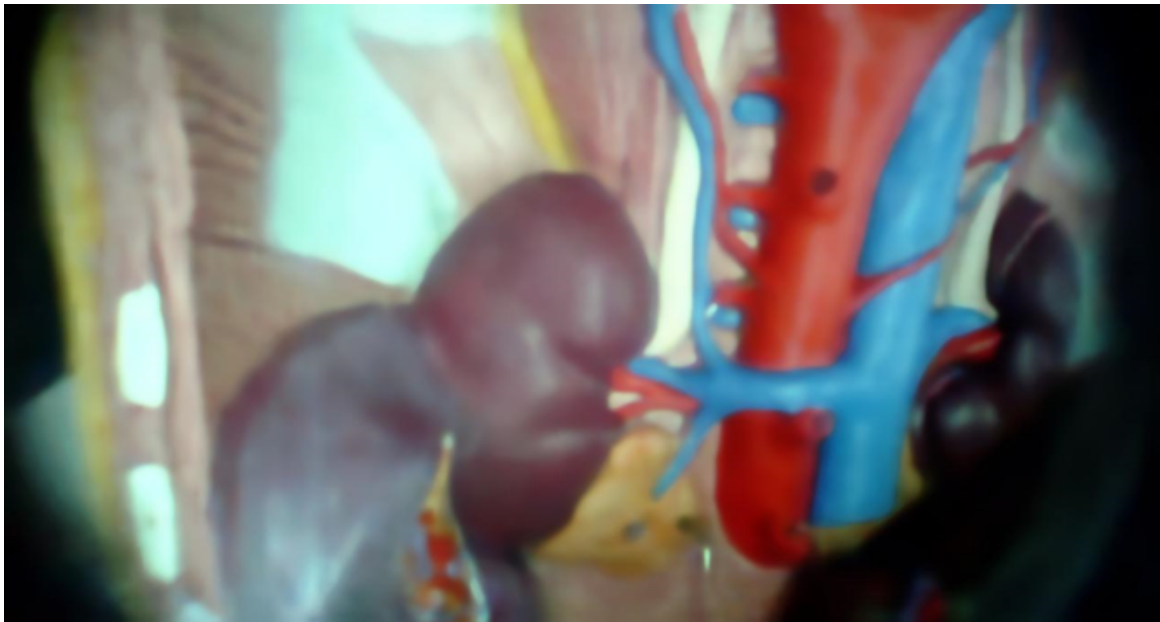
Prior image

Supervised Learning for Image Priors

Generate a set of deep image priors as the ground truths using a few frames from the video.

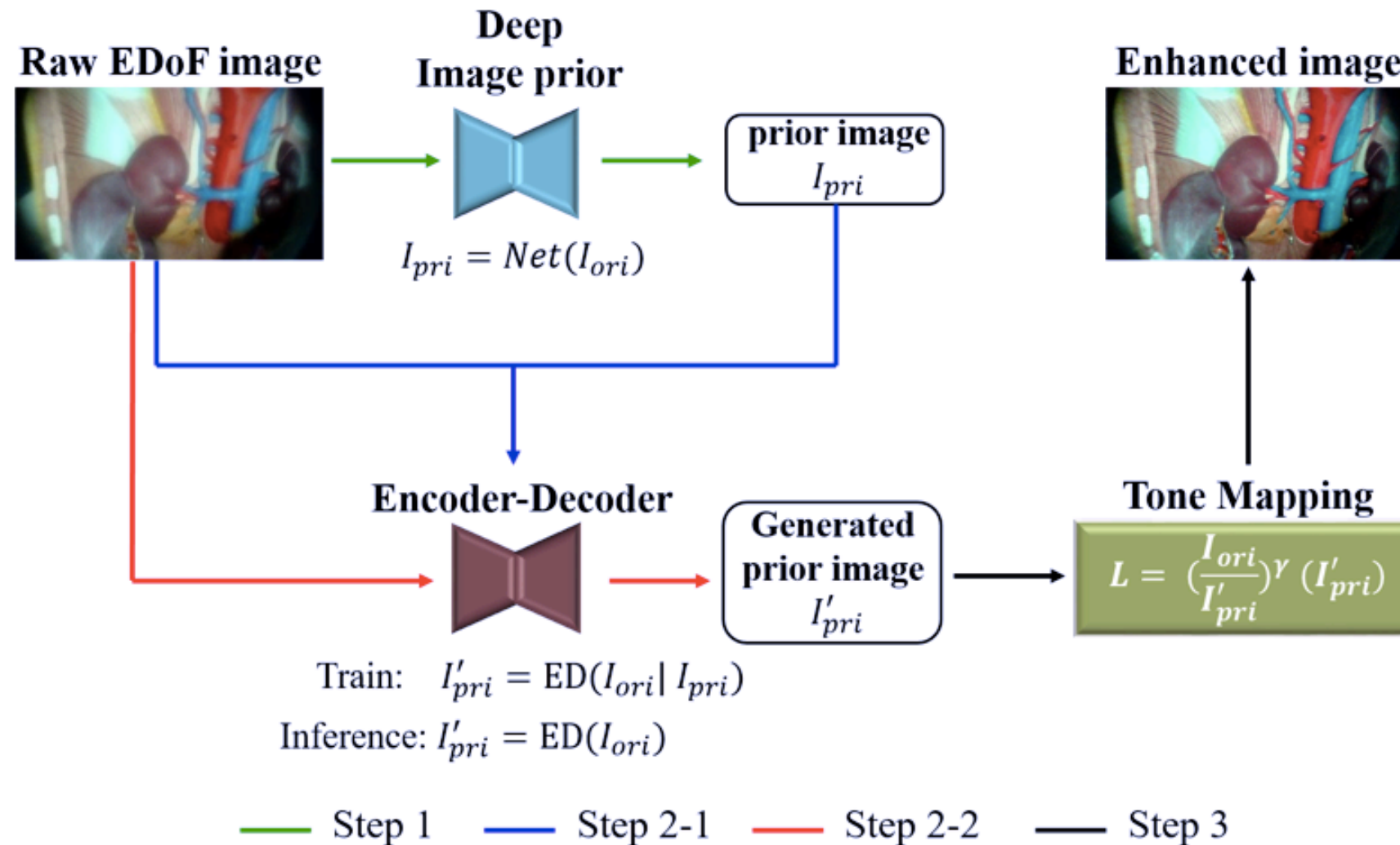
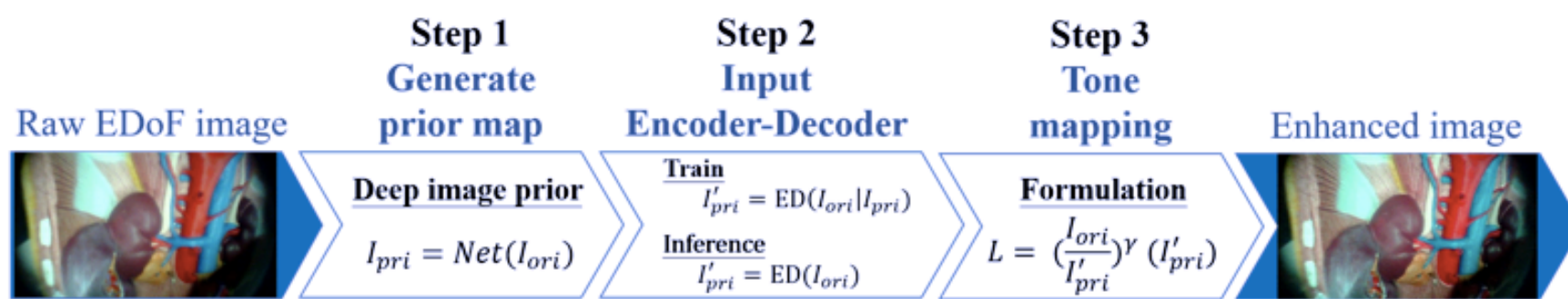
Train an encoder-decoder network that imitates priors.

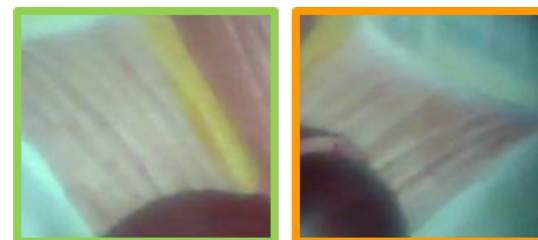
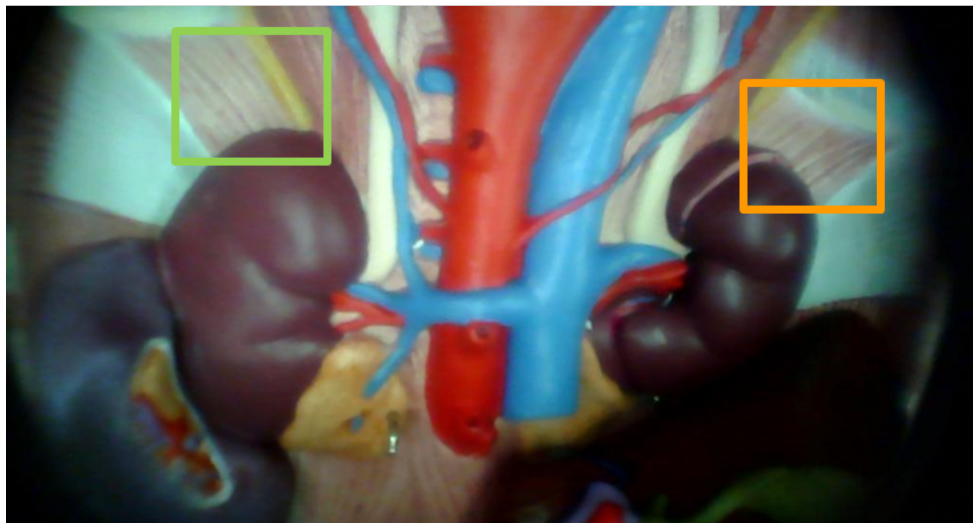




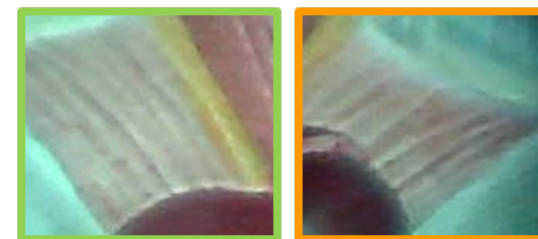
Deep image prior

Imitated prior by or model (~0.1sec)

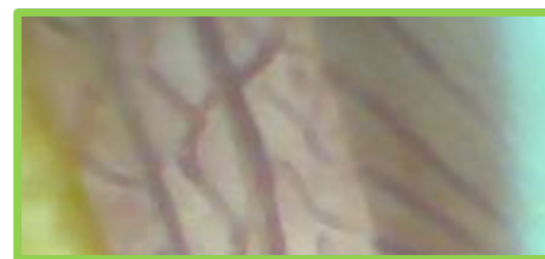
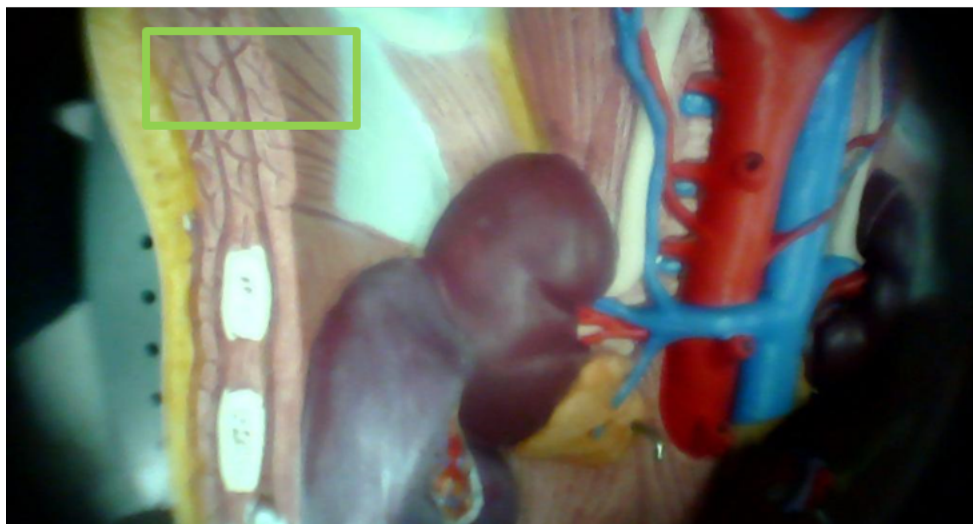




Raw EDoF image



Enhanced image



Raw EDoF image



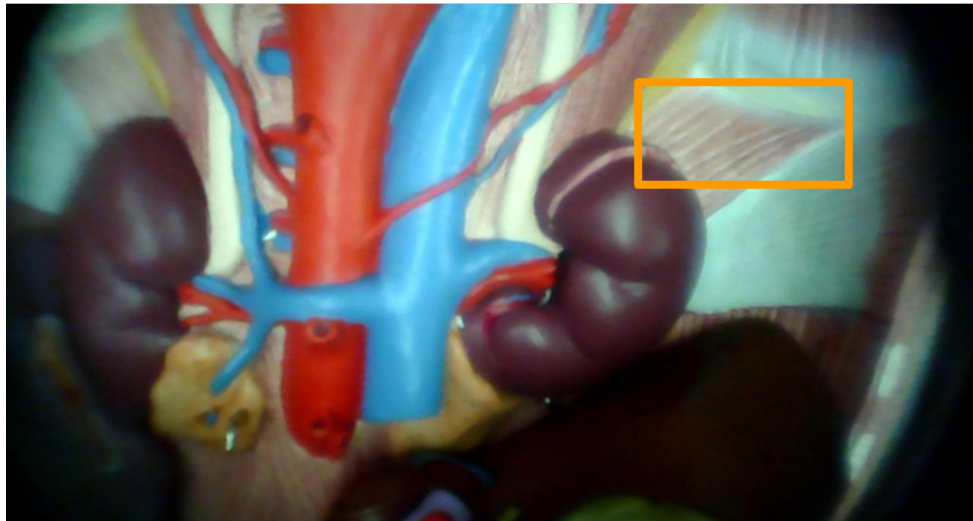
Enhanced image



Raw EDoF image



Enhanced image



Raw EDoF image



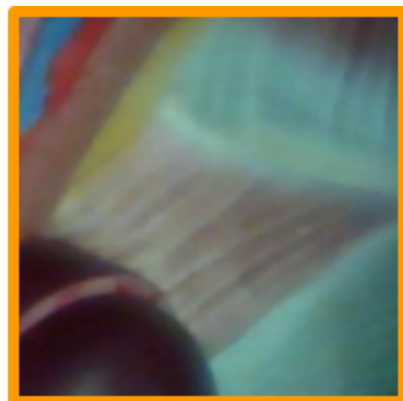
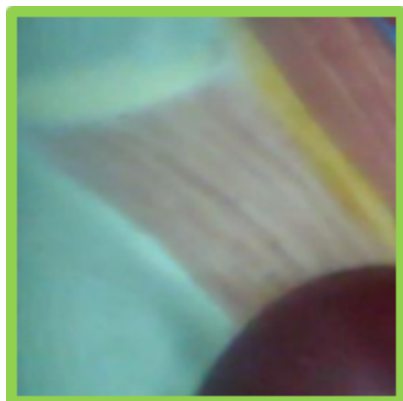
Enhanced image



Our results



OpenCV

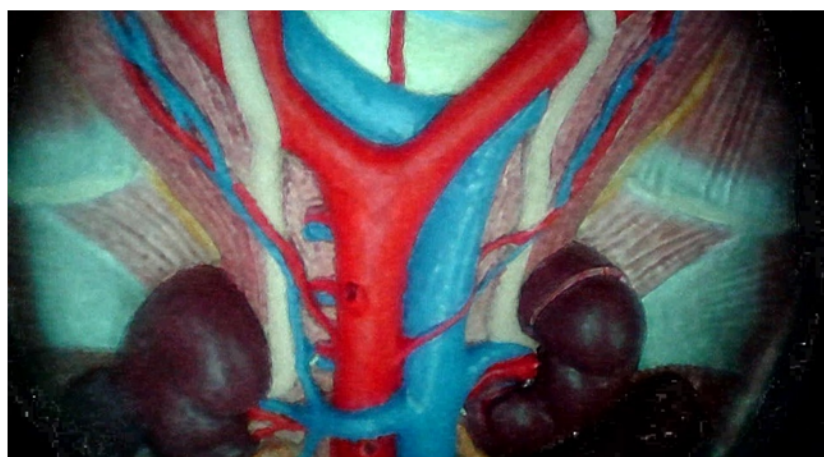
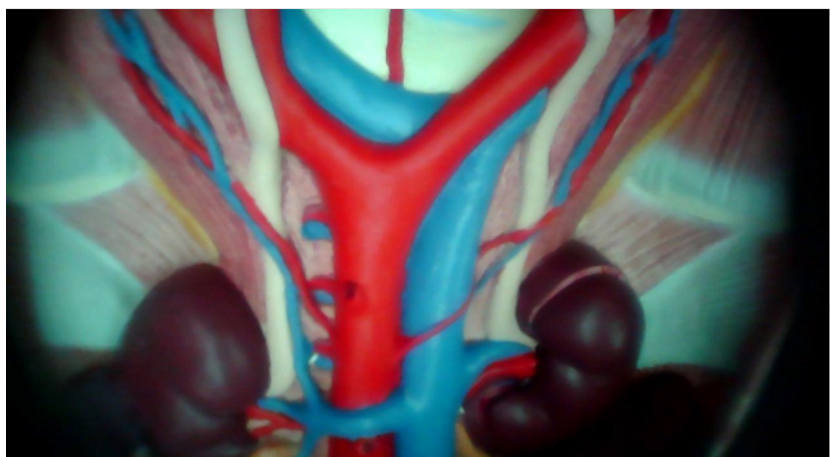
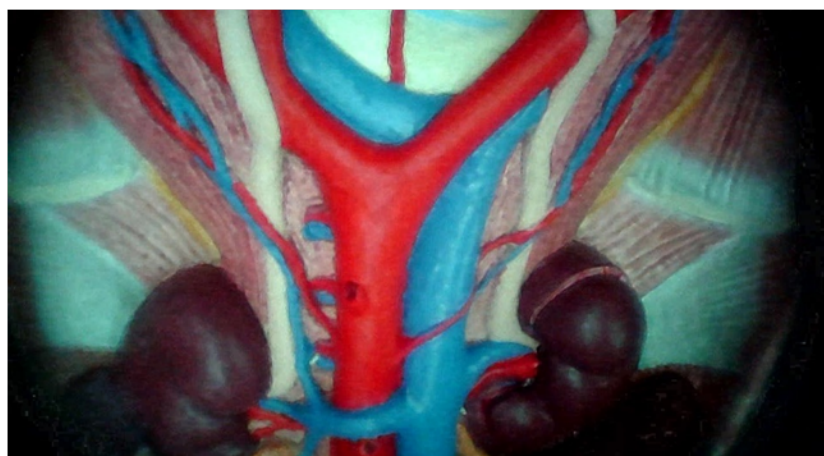
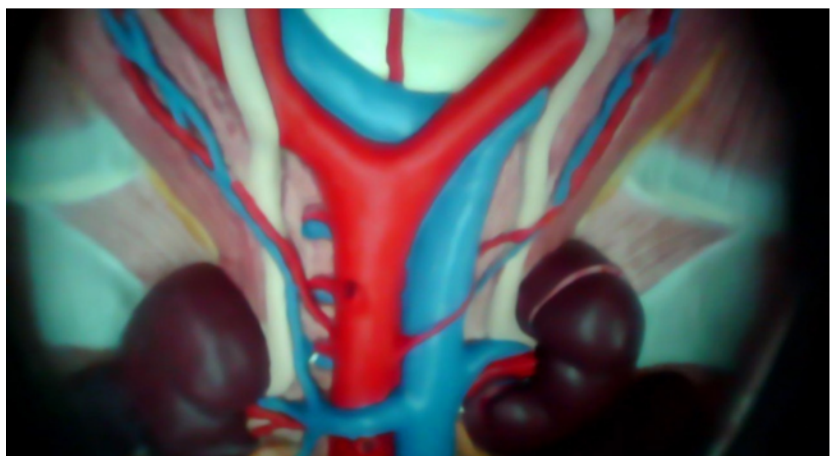
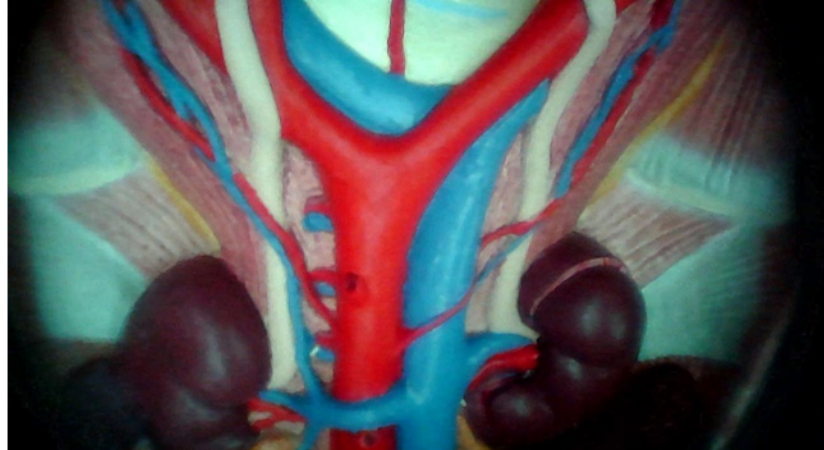
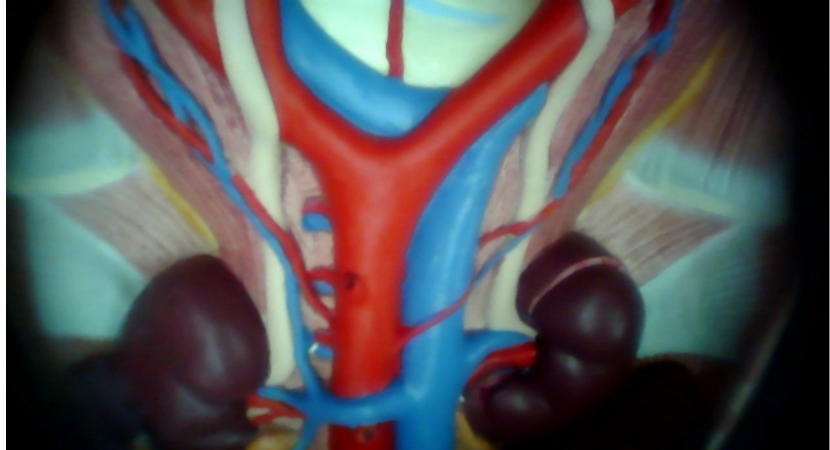


Deep video deblurring



SPMC VideoSR

Different Gamma



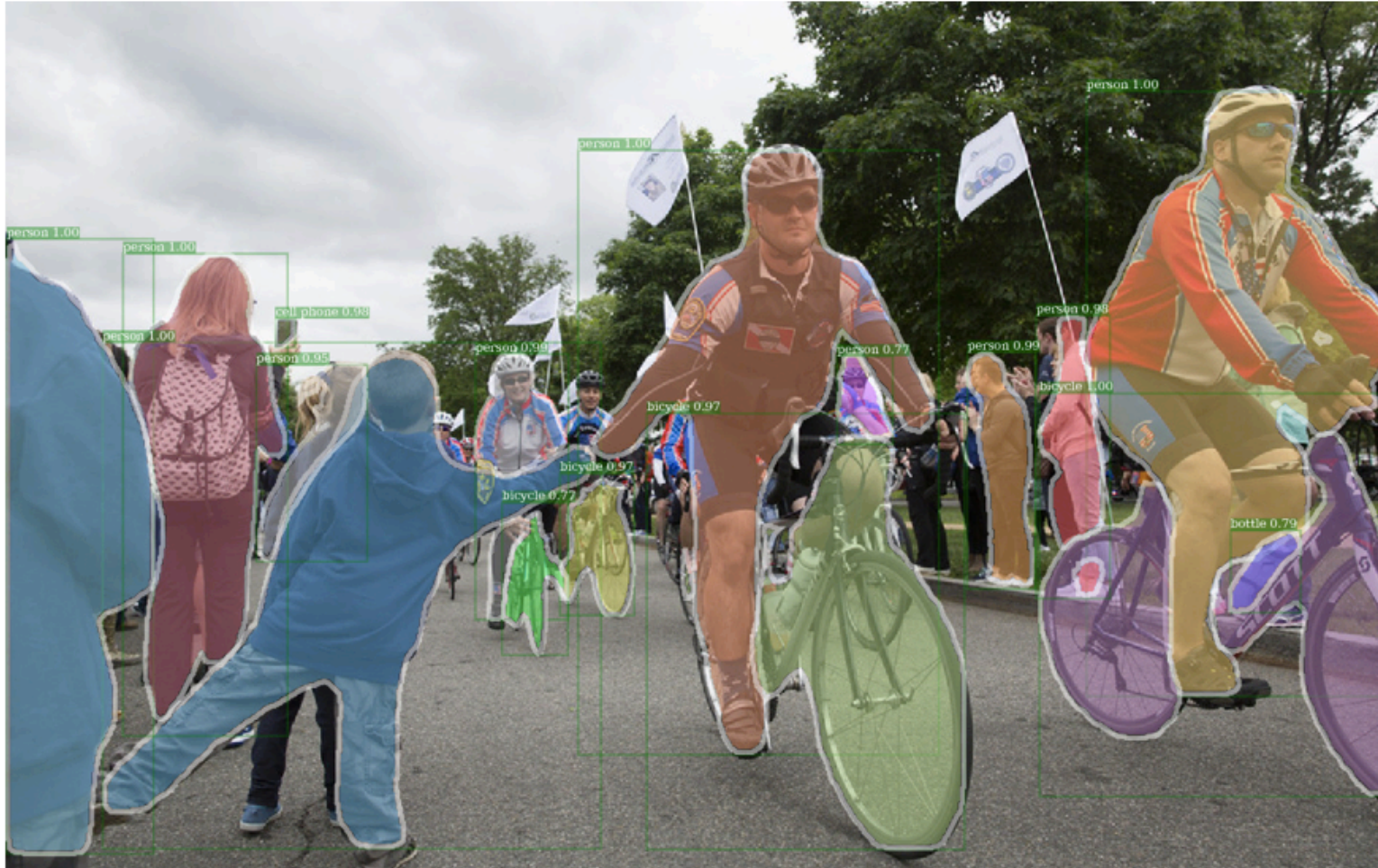
Thank You!

a few more slides ...

<https://github.com/roytseng-tw/Detectron.pytorch>

A Pytorch Implementation of Detectron

build passing



Example output of e2e_mask_rcnn-R-101-FPN_2x using Detectron pretrained weight.



Roy
roytseng-tw





Yann LeCun

14 hrs · 🌐

Detectron in pure PyTorch.
By Roy Tseng.



royseng-tw/Detectron.pytorch

Detectron.pytorch - A pytorch implementation of Detectron. Both training from scratch and inferring directly from pretrained Detectron weights are available.

GITHUB.COM

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 Comment



Dexter Huang Roy Tseng


Like · Reply · 14h



Roy Tseng wow, really appreciate the share !  1

Like · Reply · 7h

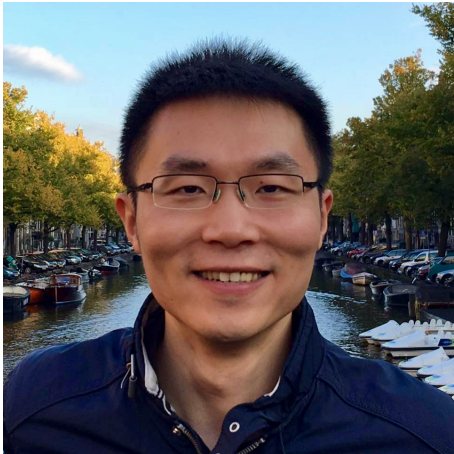


Yann LeCun Thanks for your work, Roy.  1

Like · Reply · 6h

Vision and Learning Summer School 2018

August 6-10 @ NTHU



Jia Deng
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