

# Deep Learning in Ophthalmology

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# RetinAI AG

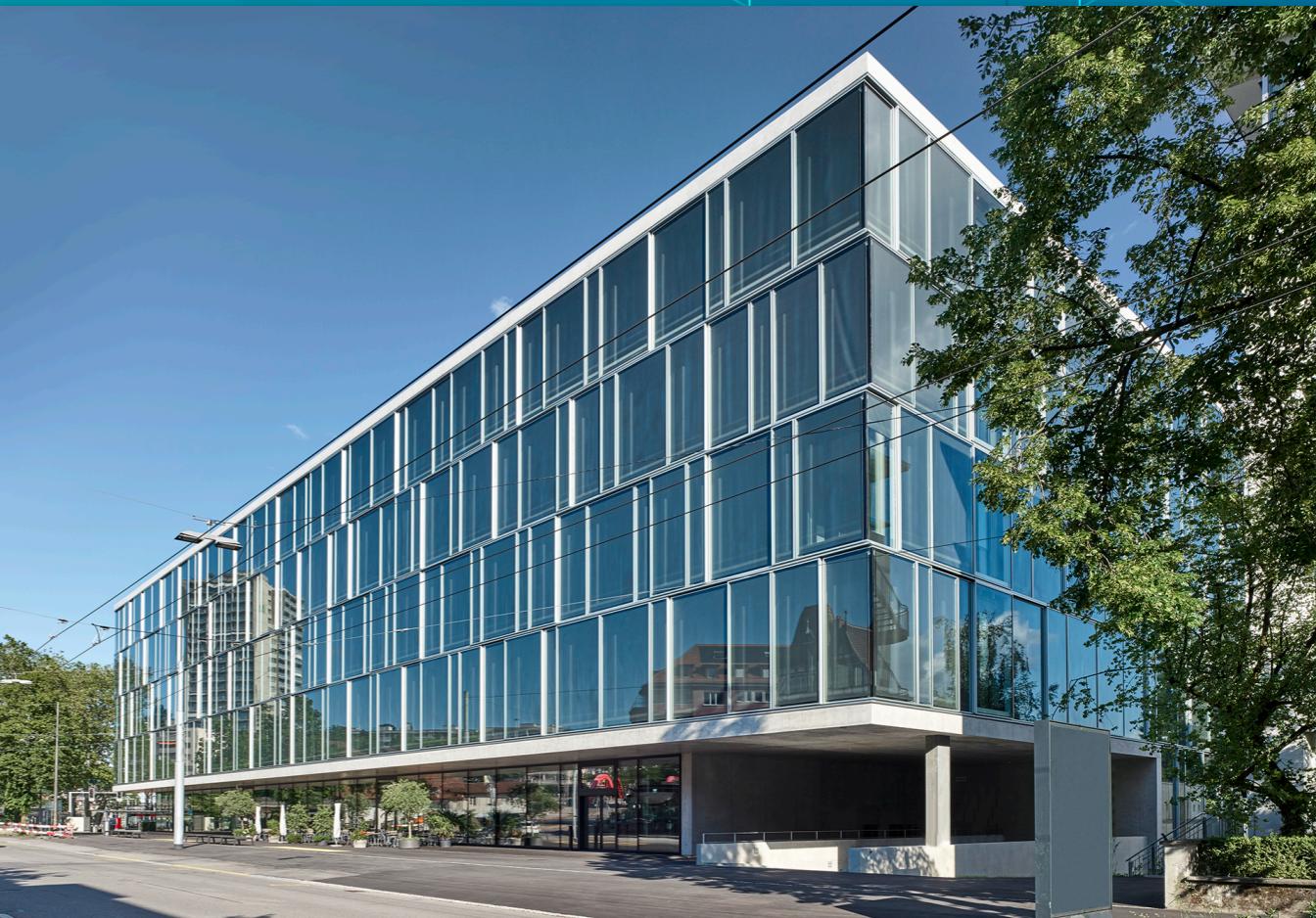
2.5 years

11 employees

Based in Bern

CV & ML

Ophthalmology



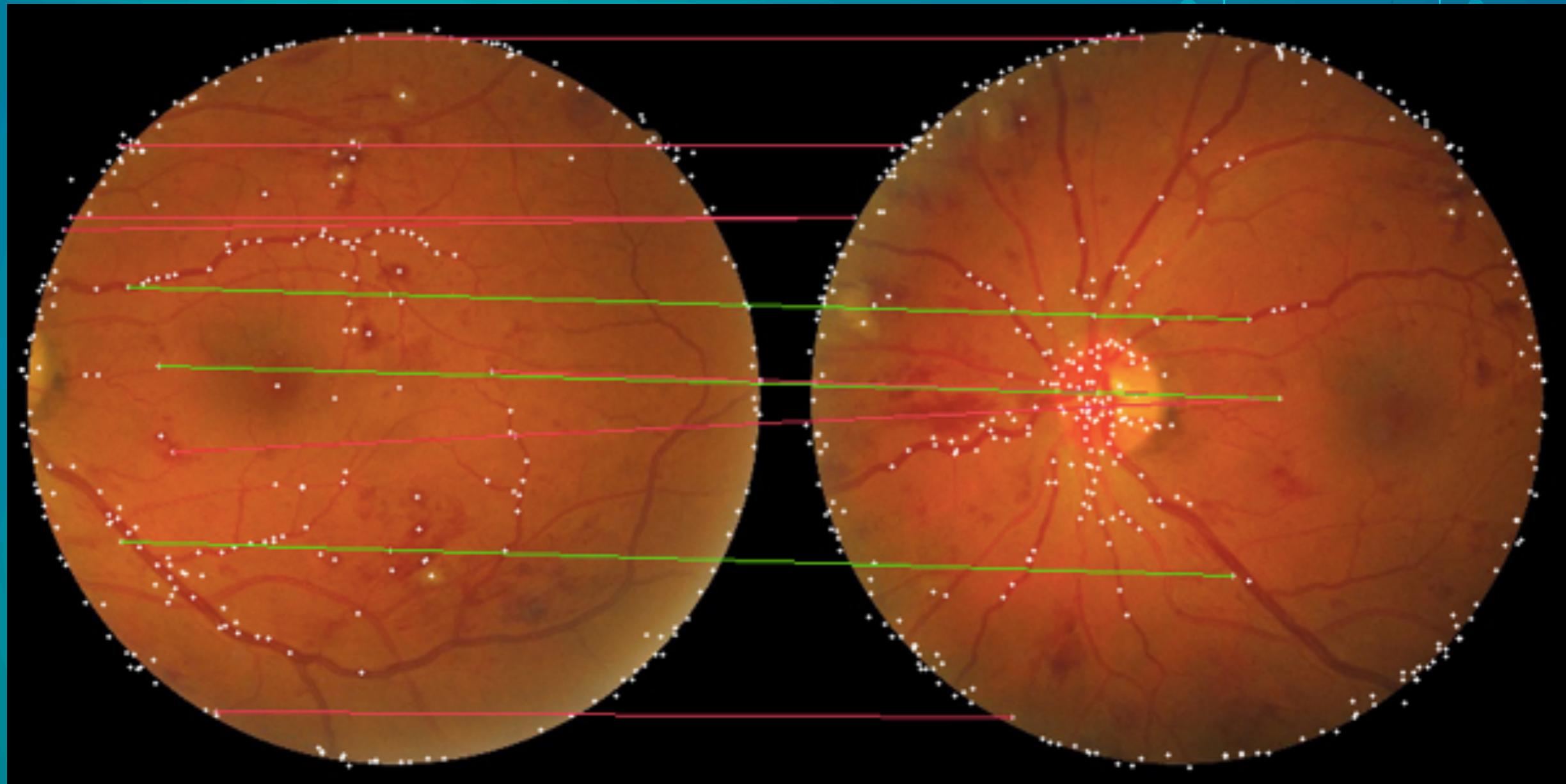
# Vision

RetinAI optimises and simplifies  
clinical and pharmaceutical  
research workflows to improve  
healthcare in ophthalmology.

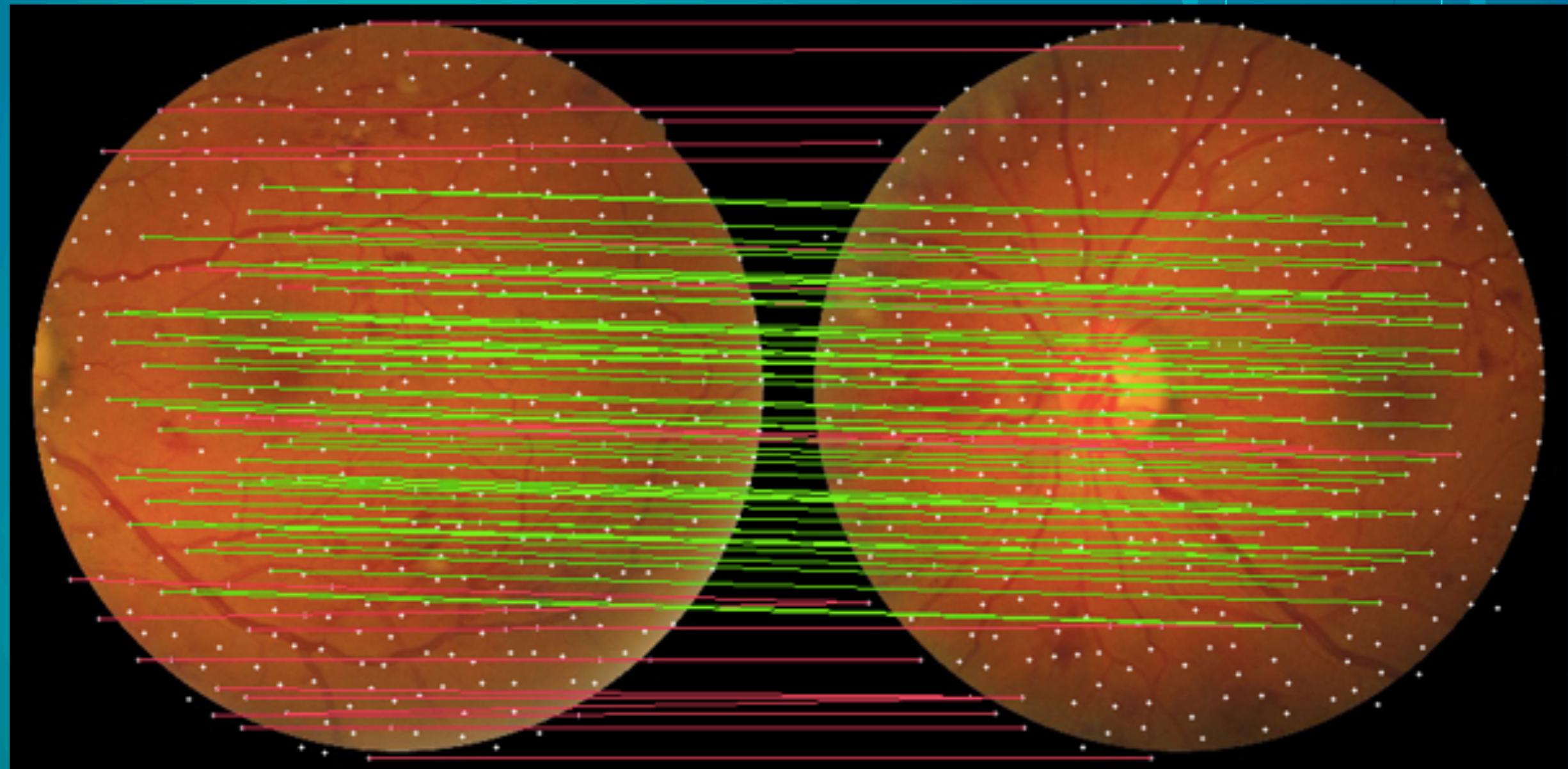
# Fundus Panorama



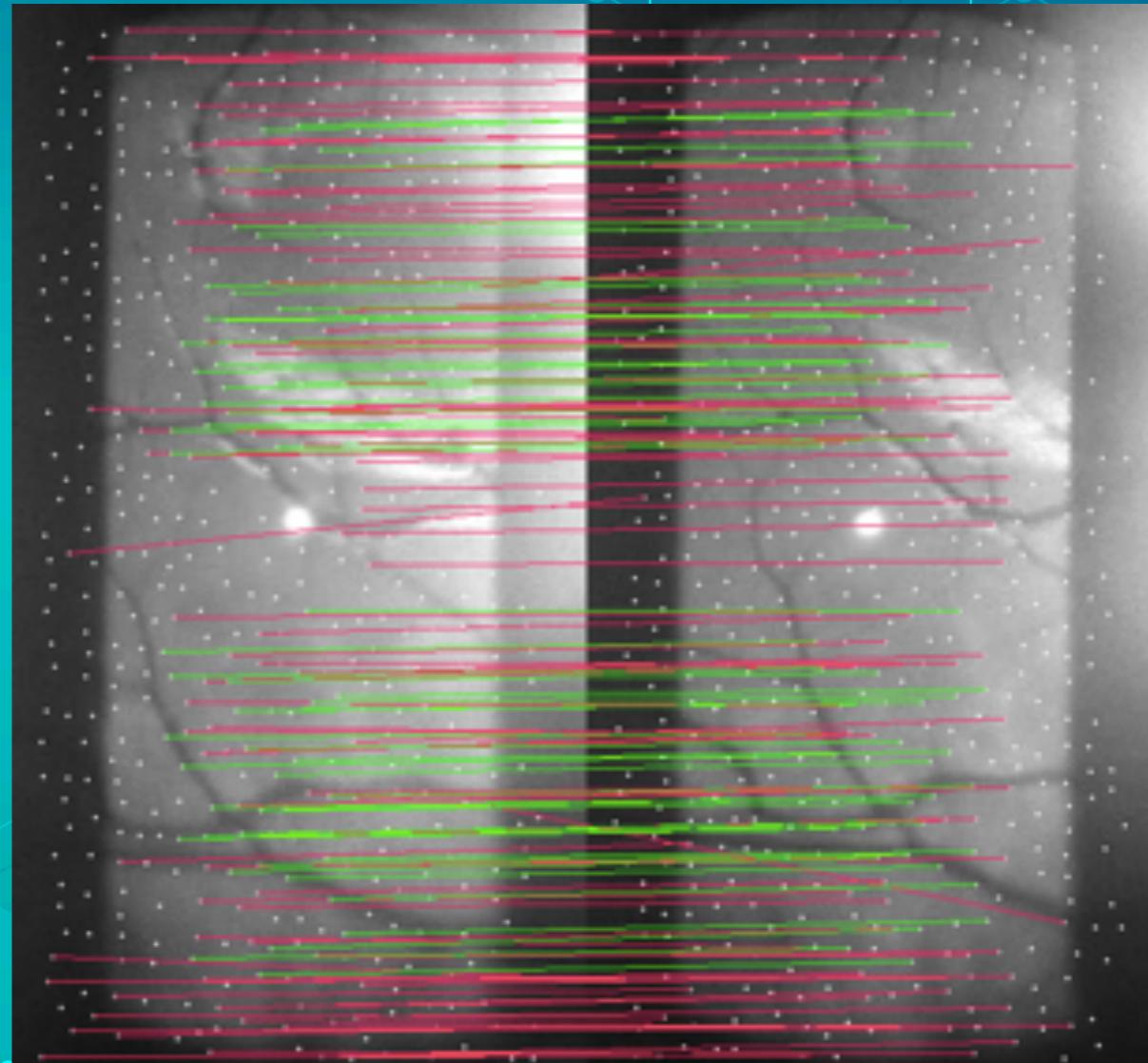
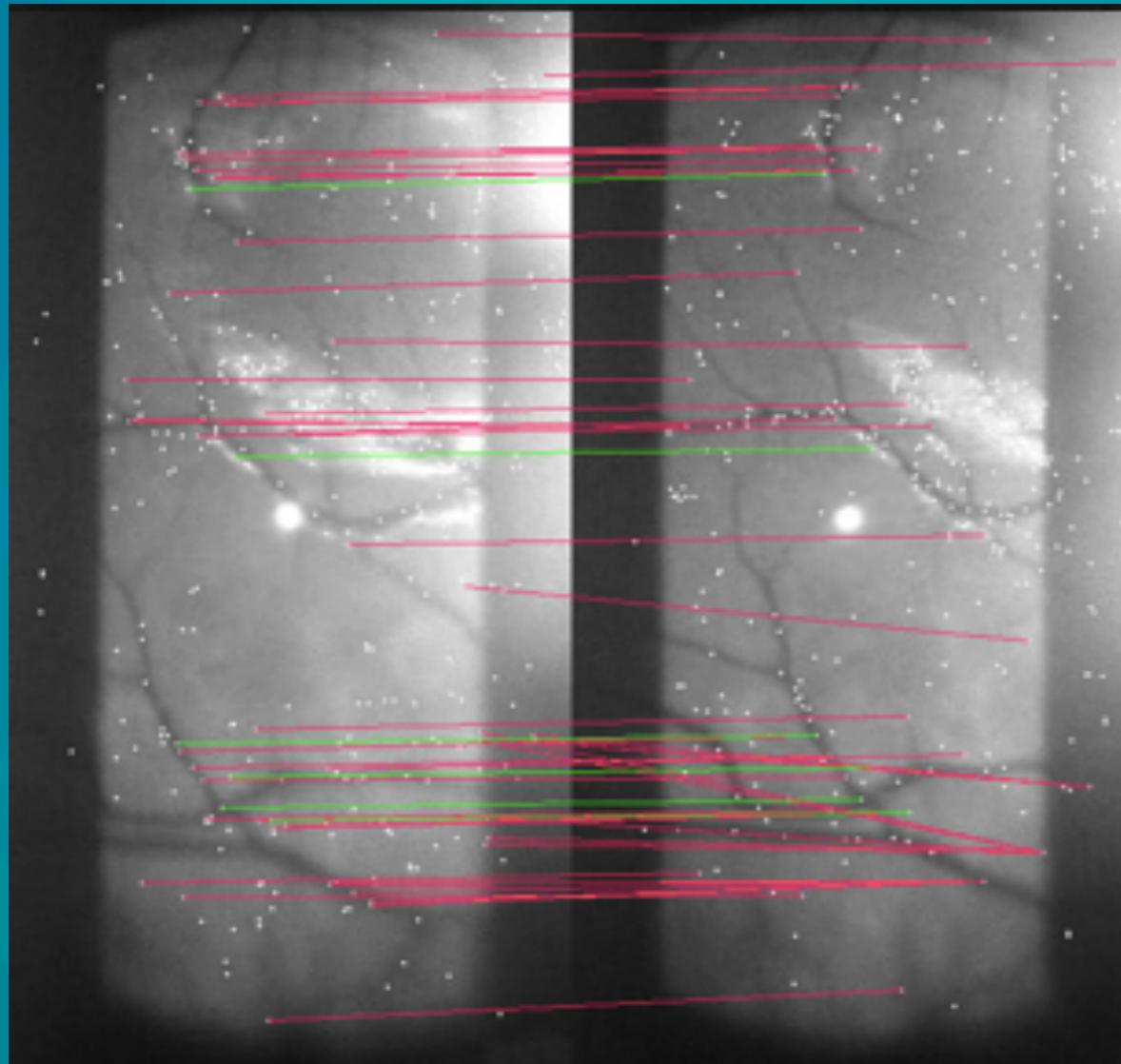
# SOTA - SIFT



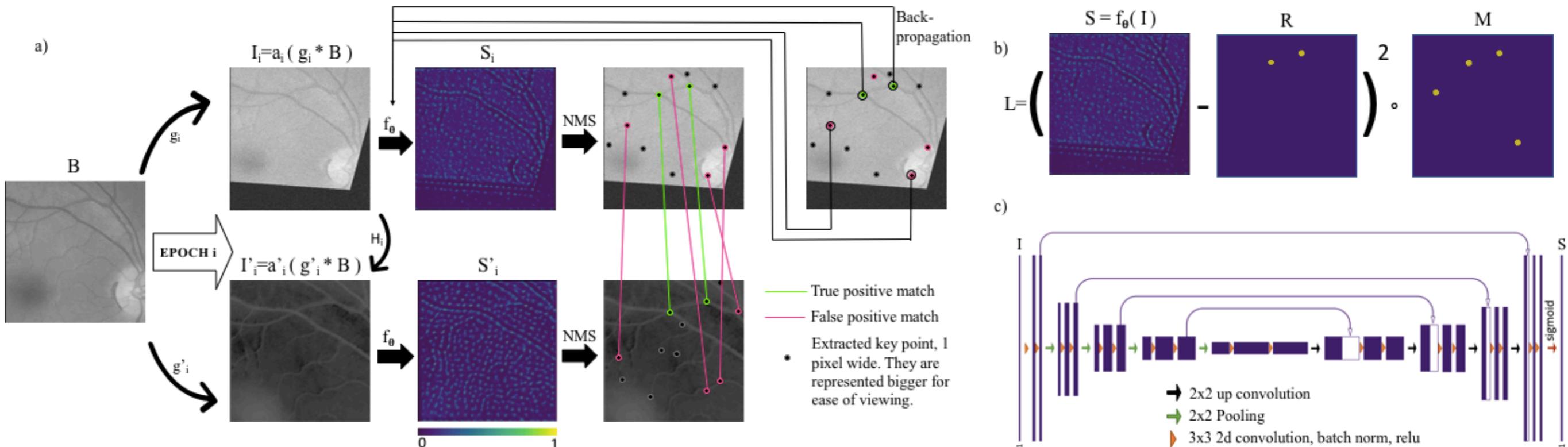
# RetinAI - GLAMpoints



# Slitlamp comparison



# Method

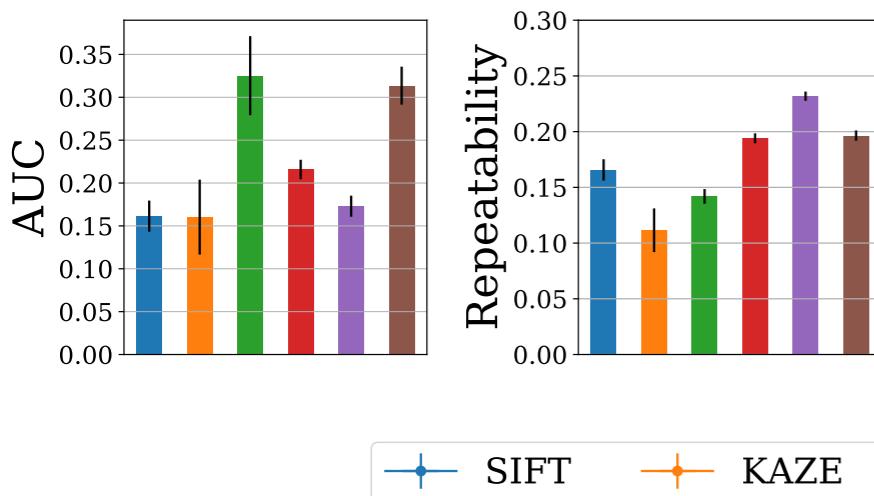


# Matching accuracy

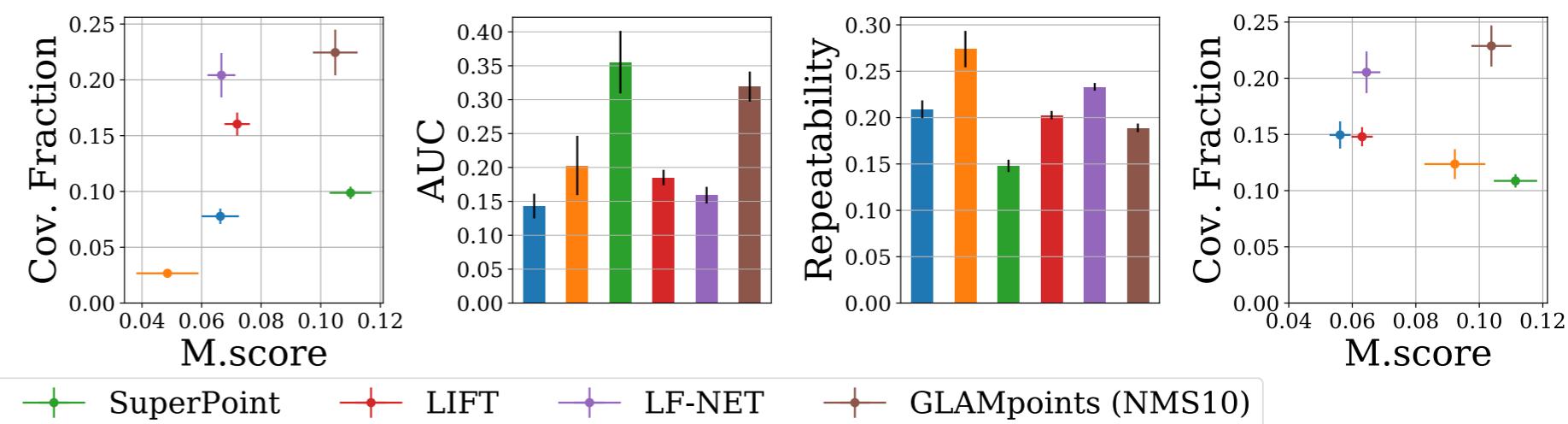
Detector	Failed [%]	Inaccurate [%]	Acceptable [%]
ORB	9.71	83.01	7.28
GLAMpoints (ORB)	0.0	88.35	<b>11.65</b>
BRISK	16.99	66.02	16.99
GLAMpoints (BRISK)	1.94	75.73	<b>22.33</b>
SIFT	1.94	47.75	50.49
KAZE	1.46	54.85	43.69
KAZE (SIFT)	4.37	57.28	38.35
SuperPoint	7.77	51.46	40.78
SuperPoint (SIFT)	6.80	54.37	38.83
LIFT	0.0	39.81	60.19
LF-NET	0.0	36.89	63.11
LF-NET (SIFT)	0.0	40.29	59.71
GLAMpoints (SIFT)	0.0	31.55	<b>68.45</b>
Random grid (SIFT)	0.0	62.62	37.38

# Method

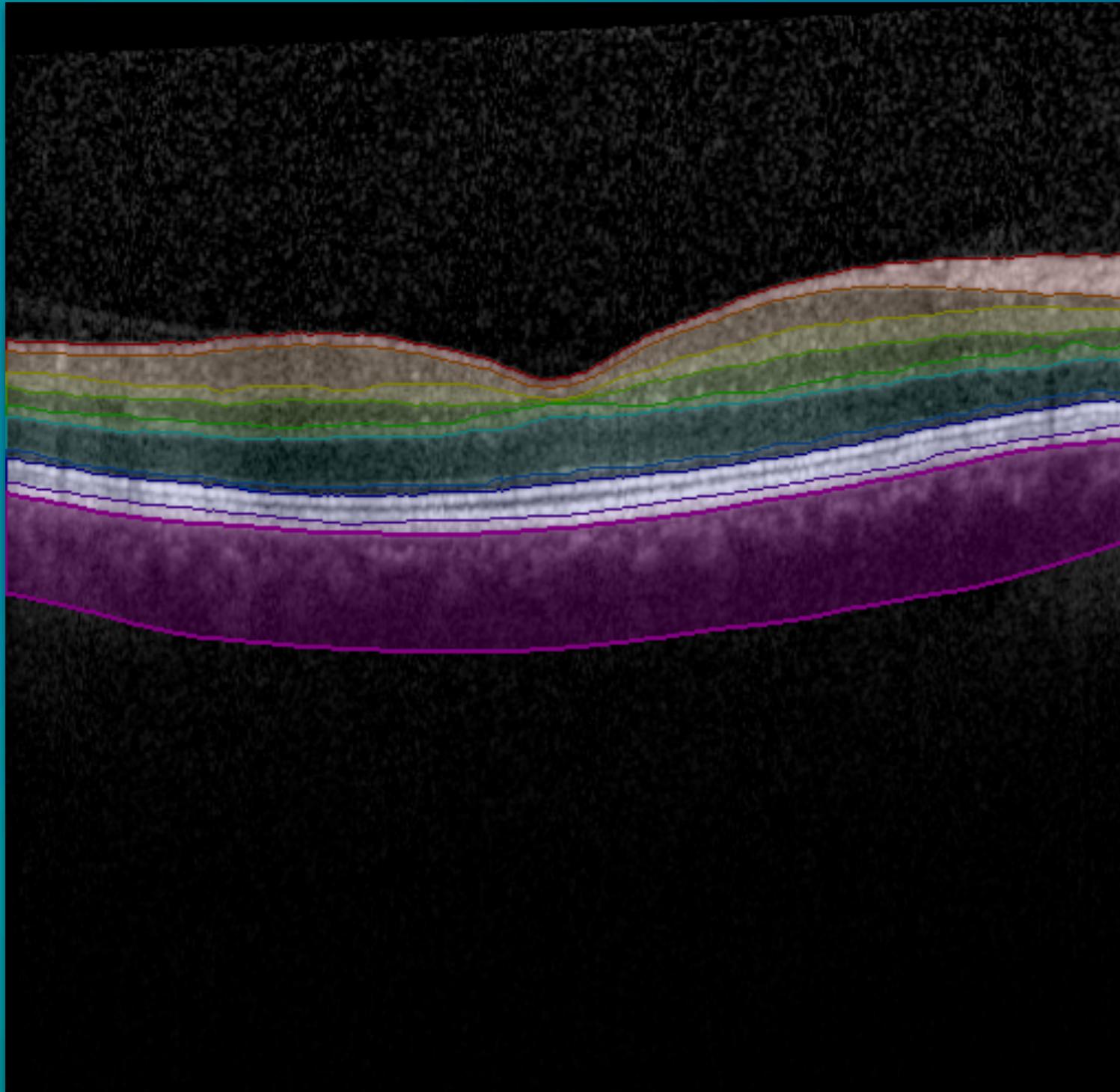
a) Non pre-processed data



b) Pre-processed data



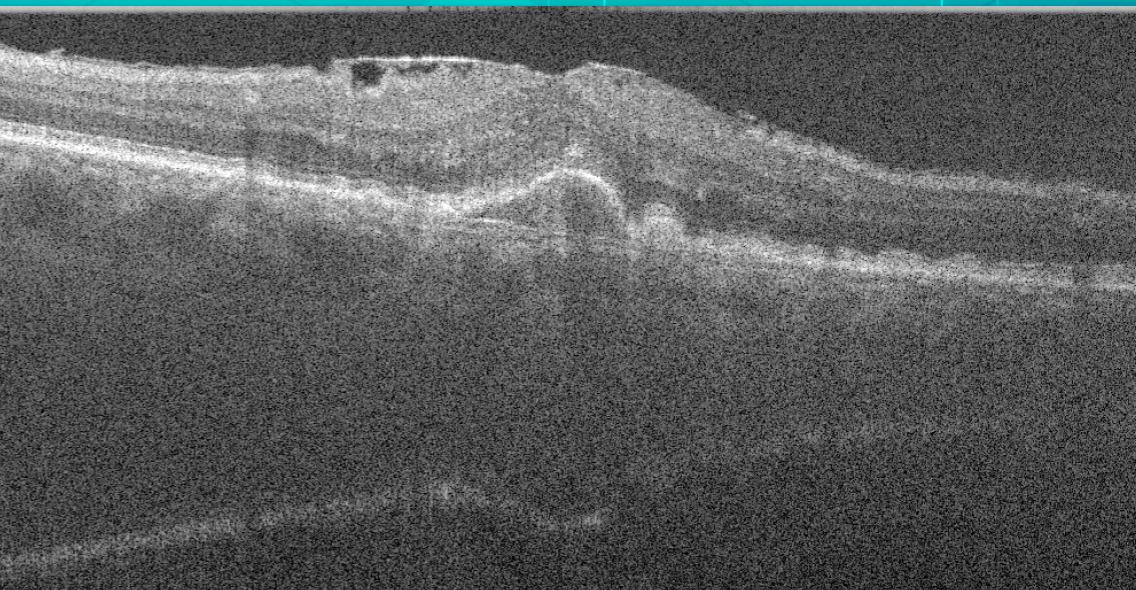
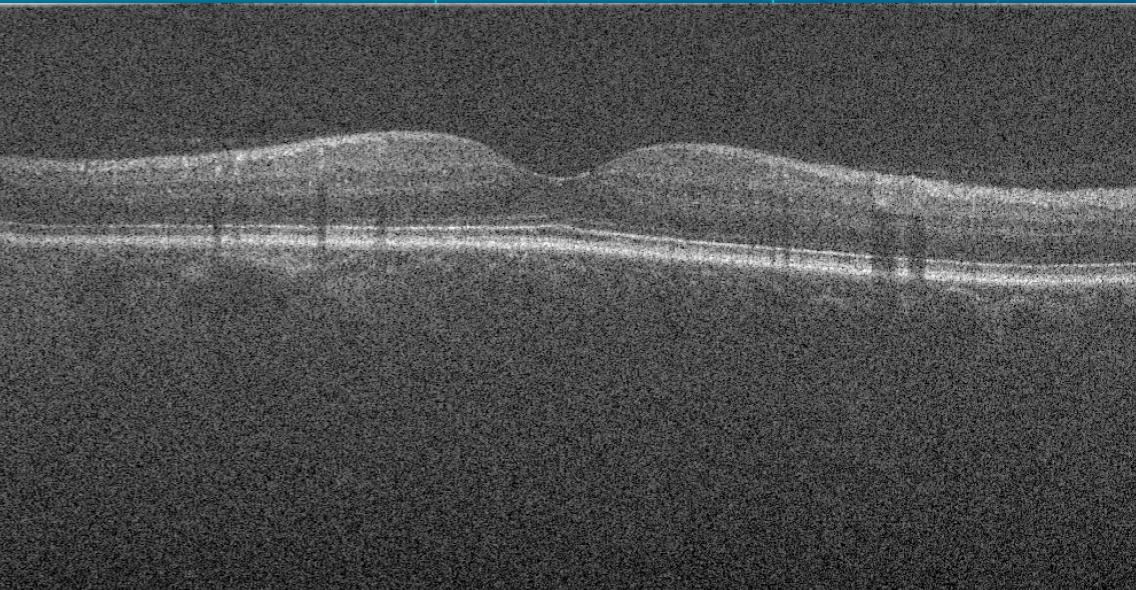
# Layer segmentation



# Layer Segmentation

Challenges:

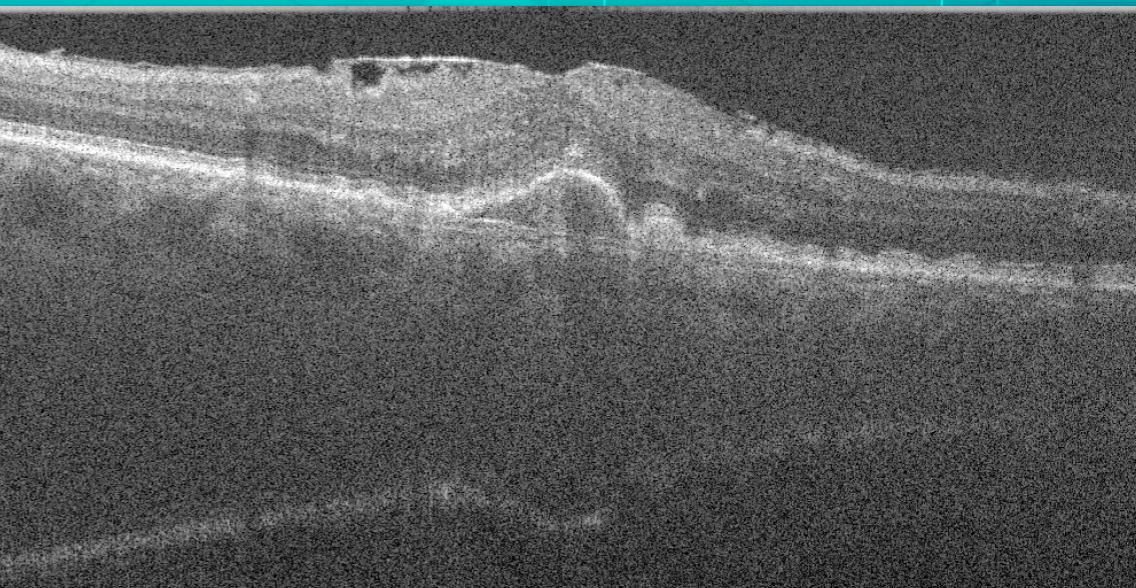
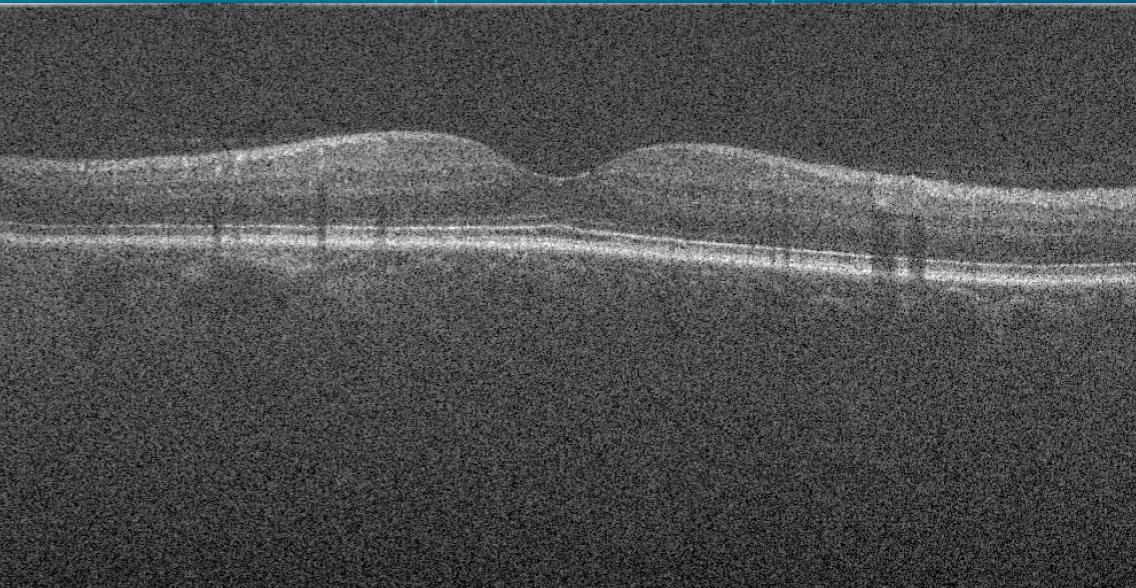
- Noise
- Disease Patterns
- Multiple devices
- Annotation



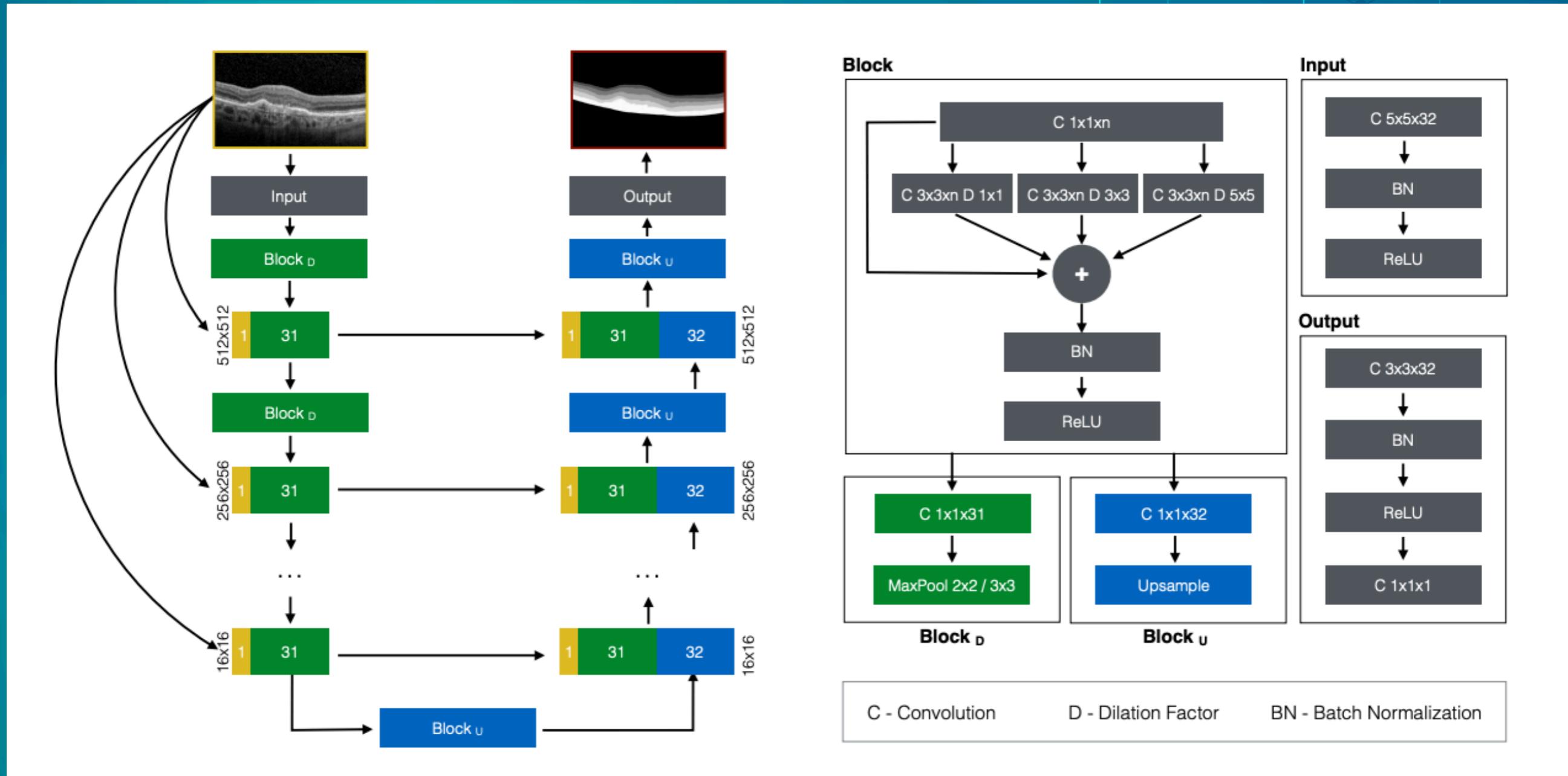
# Layer Segmentation

Solutions:

- UNet-like network for multi-class segmentation
- Strong augmentation
- Regularization



# Method - BRUNet



# Results

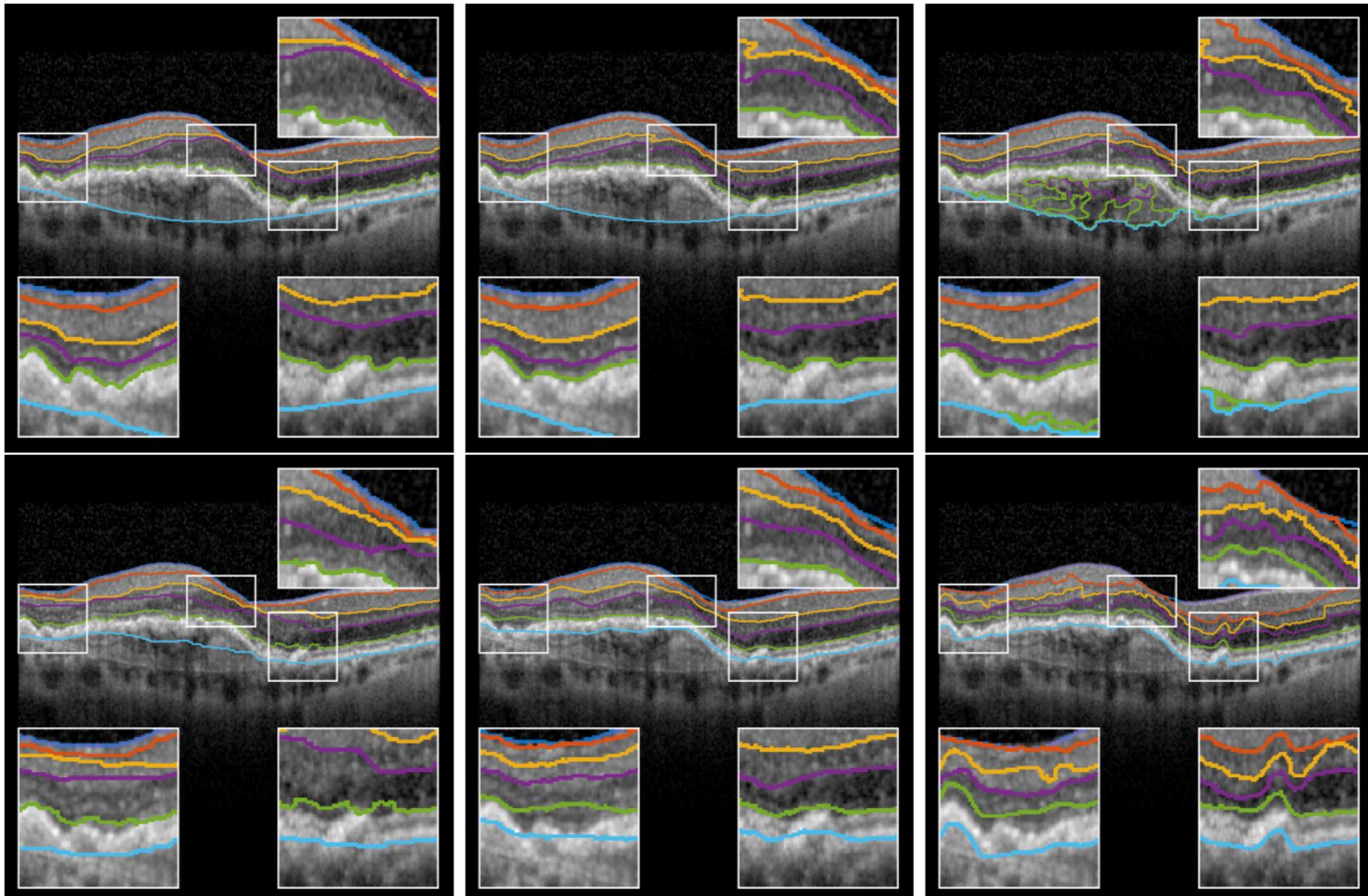
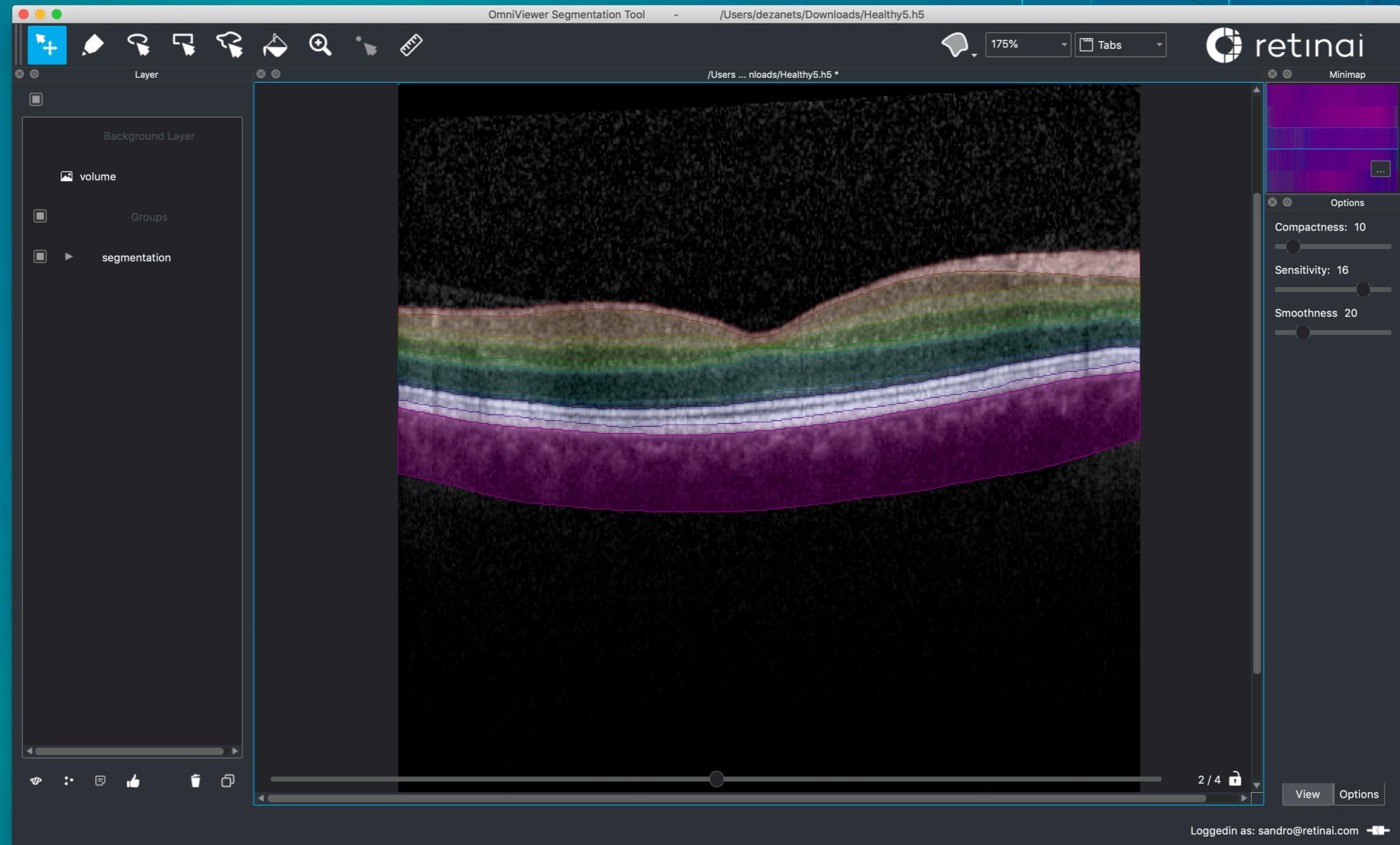


Figure 3: Qualitative comparison of each segmentation approach. Top row, left to right: ground truth, BRU-net, U-net; bottom row, left-to-right: Dufour et al., Chen et al., Mayer et al. Only BRU-net is able to segment the BM layer under the pathological region. The smaller receptive field of U-net results in discontinuities. Further qualitative results are provided in the supplementary material.

# Annotation Tool



# Links and Contact

- GLAMpoints: <https://arxiv.org/abs/1908.06812>
- BRUNet: <https://arxiv.org/abs/1707.04931>
- RetinAI AG: [retinai.com](http://retinai.com)
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