

Cascade Dual-branch Deep Neural Networks for Retinal Layer and fluid Segmentation of Optical Coherence Tomography Incorporating Spatial priors

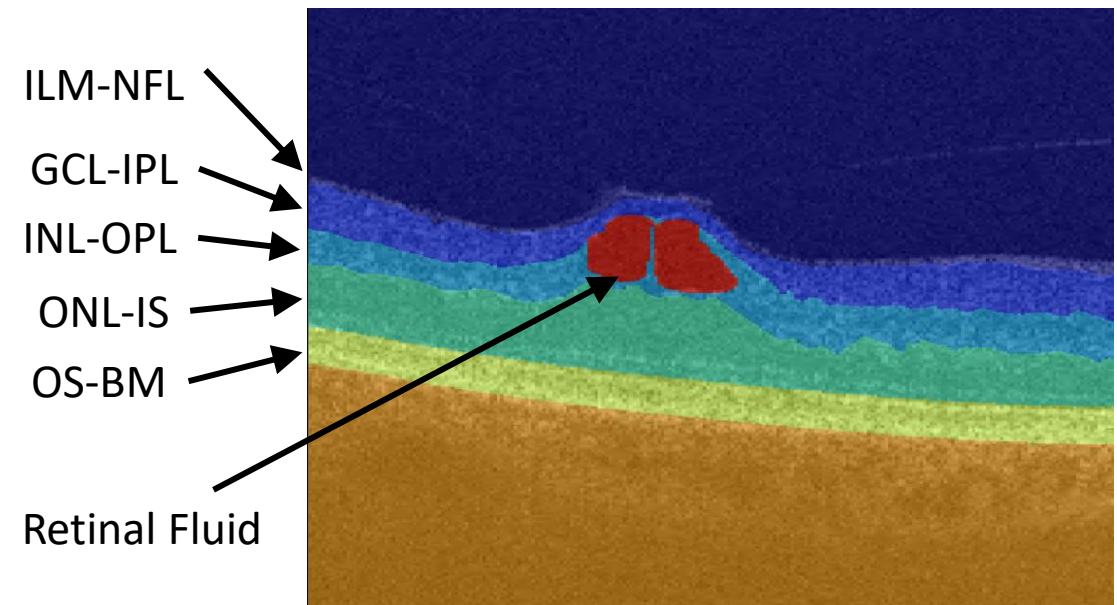
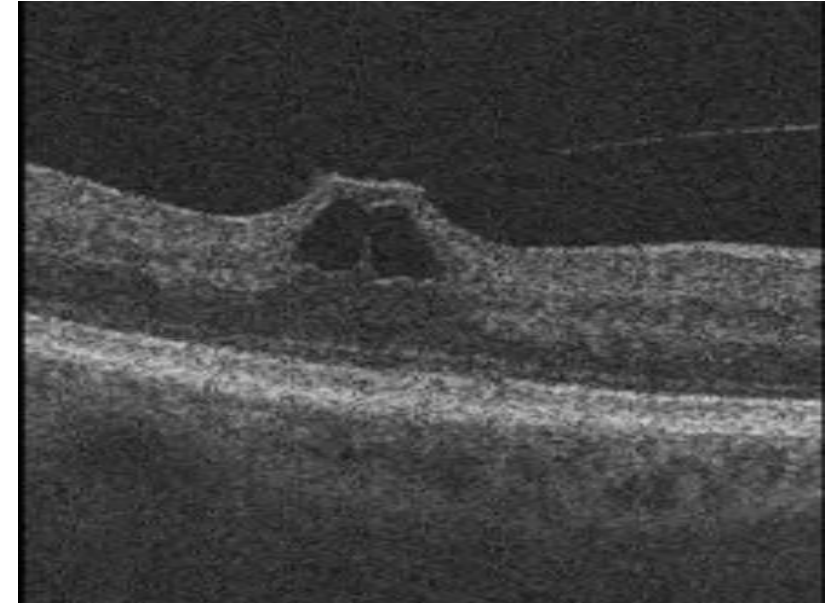
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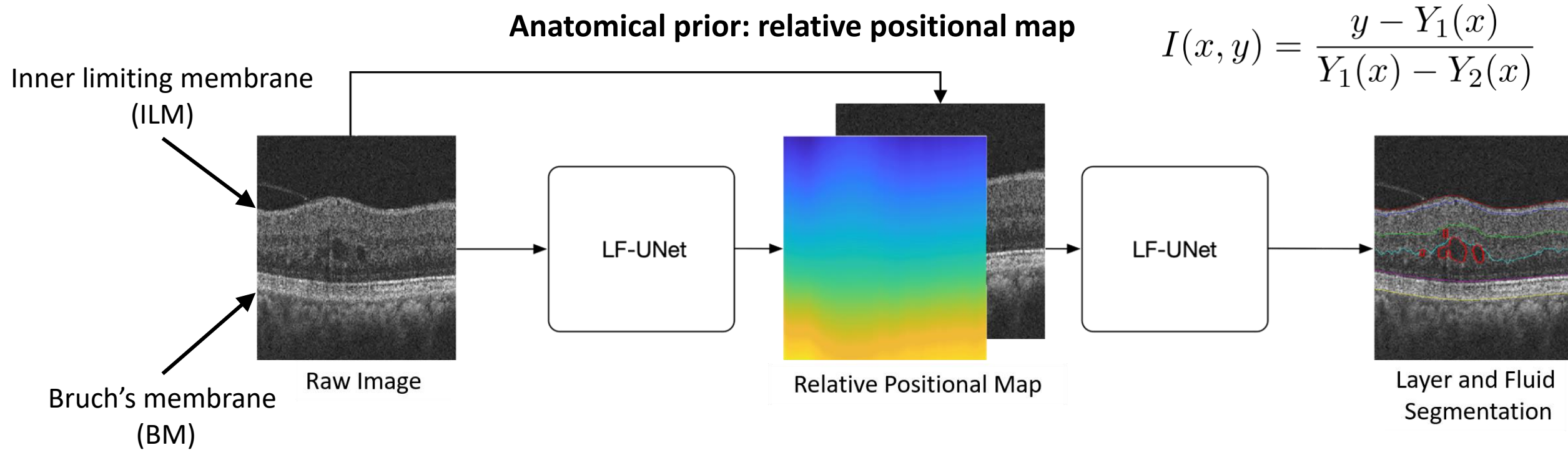
Background

- Optical Coherent Tomography (OCT)
- Retinal pathology
 - layer thinning
 - fluid accumulation
- Retinal Layer and Fluid segmentation
 - LF-UNet



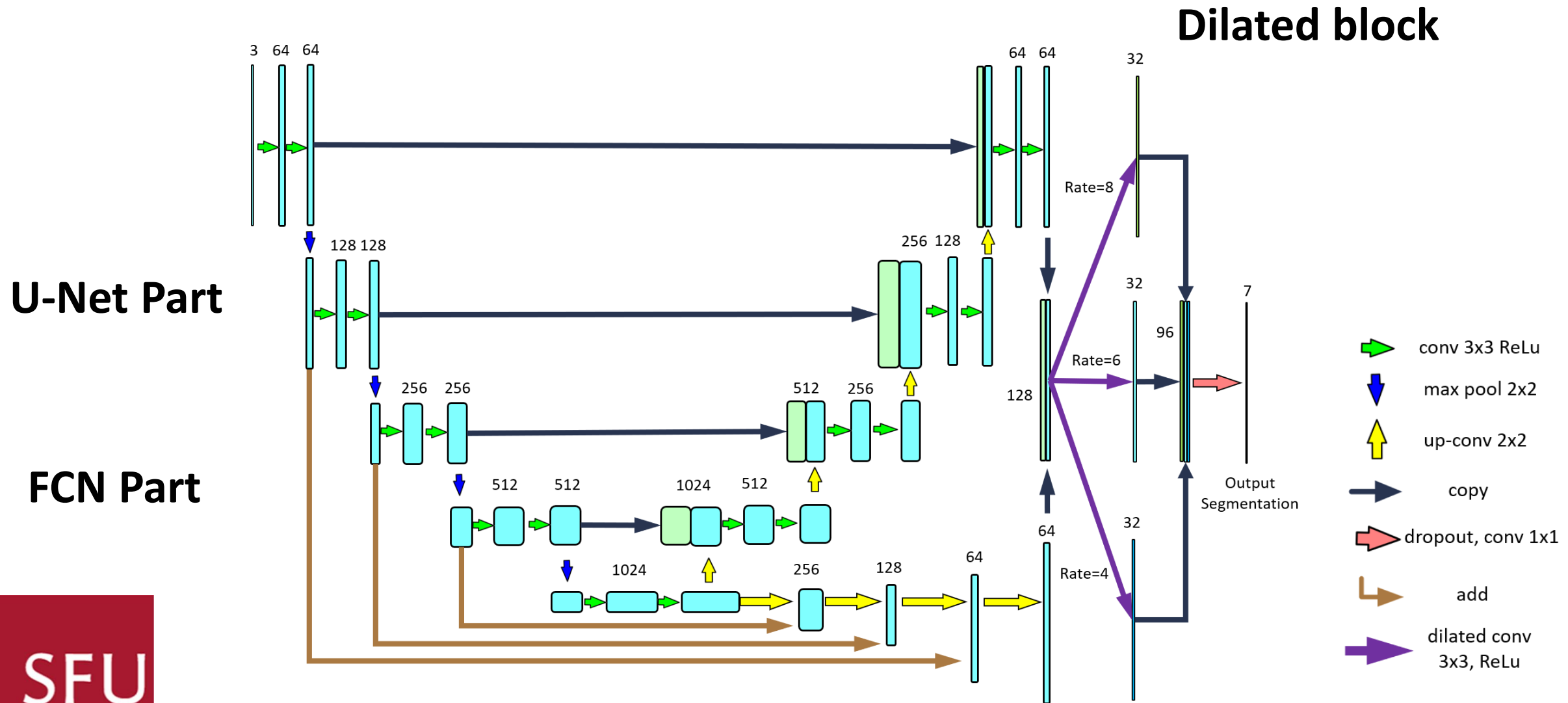
Methods

Proposed cascaded framework



Methods

Dual-branch Neural Network Architecture



Methods

Training & Evaluation

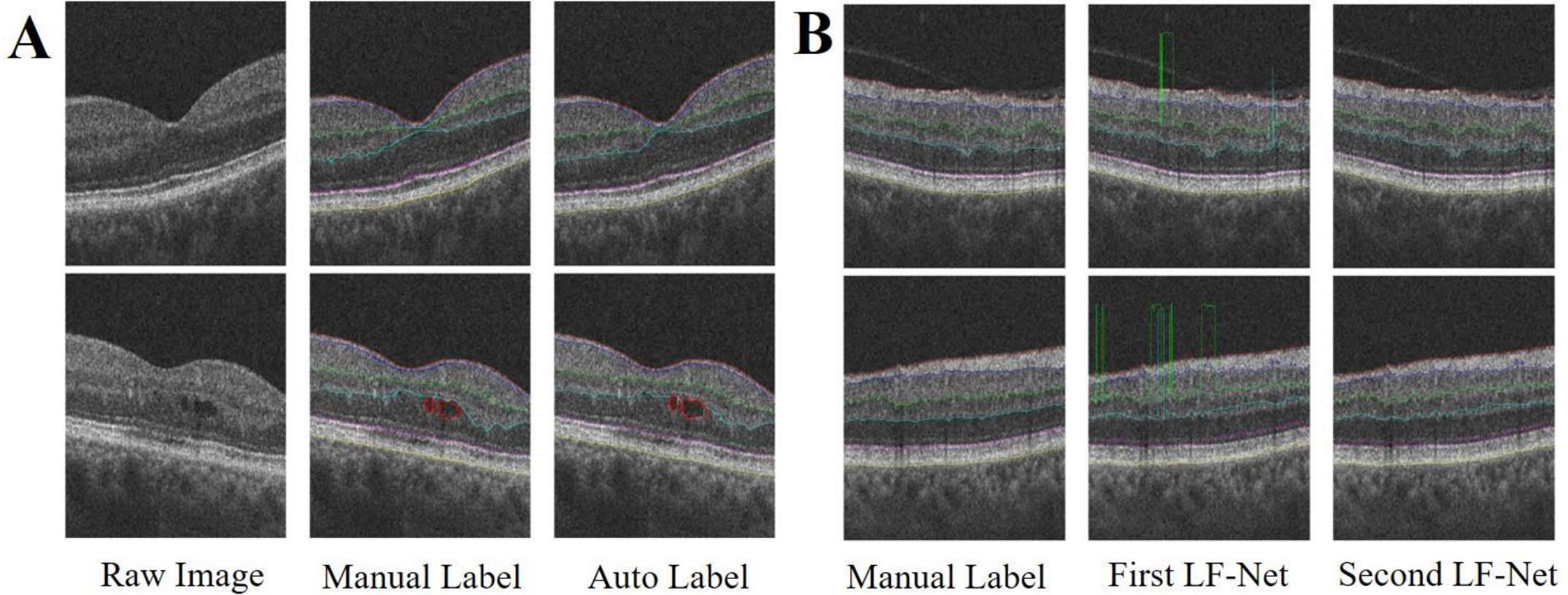
- Input: three adjacent B-scan slices
- Loss function: Weighted Dice Loss + weighted logistic loss

$$Loss_{log} = \lambda_1 Loss_{Dice} + \lambda_2 Loss_{log}$$

- Optimization: Adaptive Moment Estimation (Adam) + Early stopping
- Experiment data: 58 OCT volumes¹ (25 from Diabetic patients)
- Evaluation: 10-fold volume-stratified cross-validation

Results

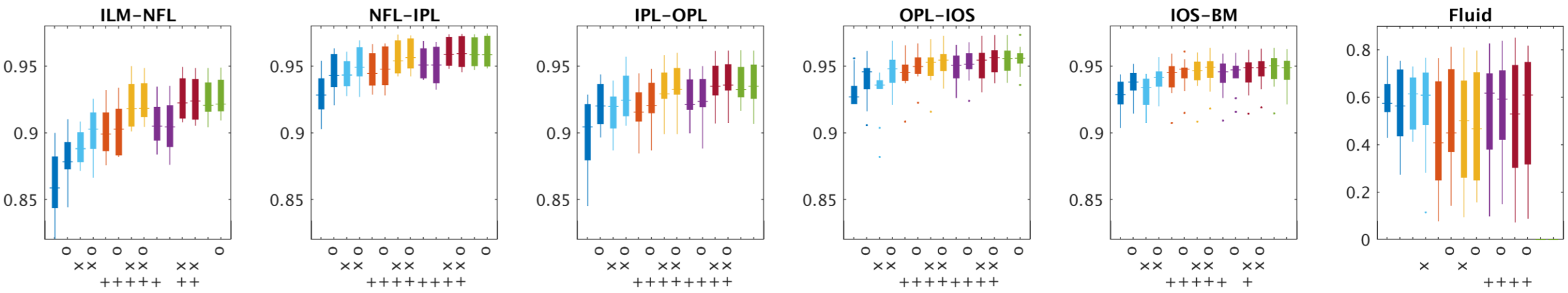
Sample segmentation outputs



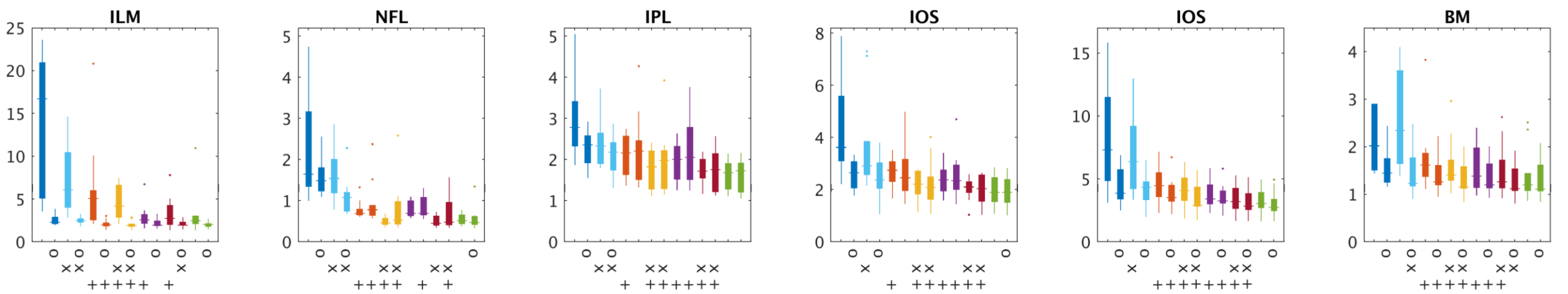
Results - performance evaluation

Legend: significant improvement using
O: Spatial prior (Relative Positional Map)
X: Multi-channel of adjacent B-scan slices
+: Network Architecture Change

Dice Index



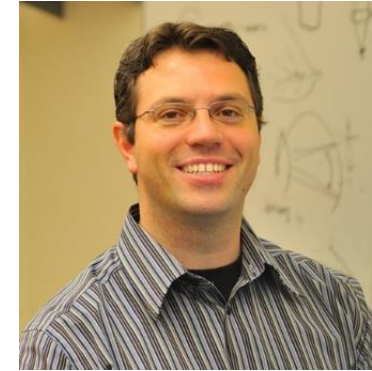
Surface distance



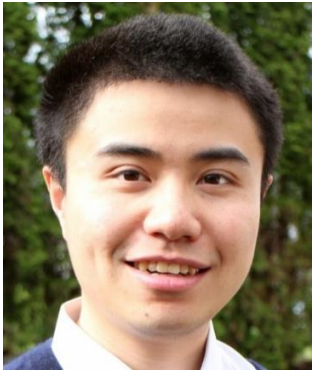
Thank You !



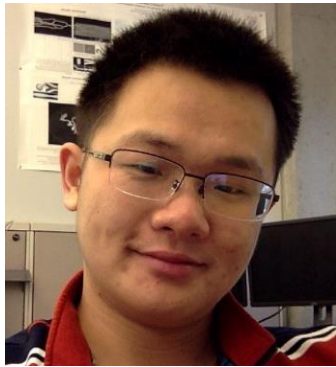
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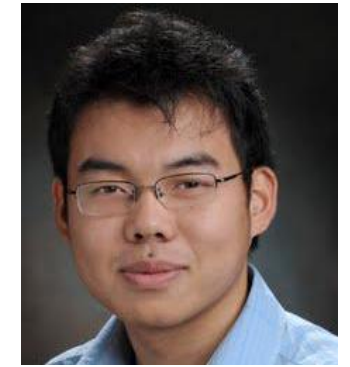
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