

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

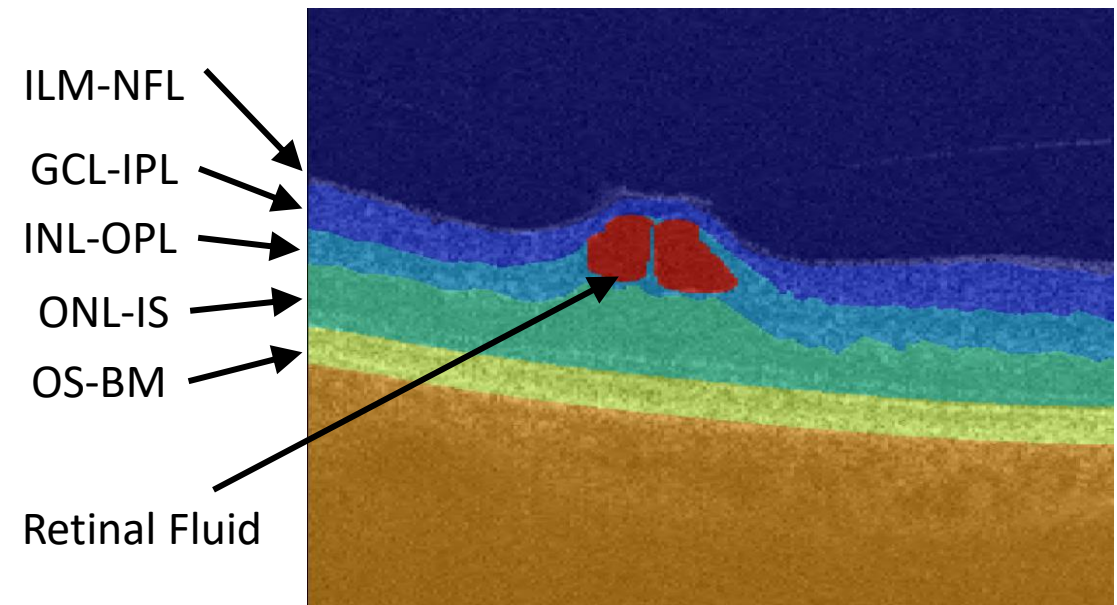
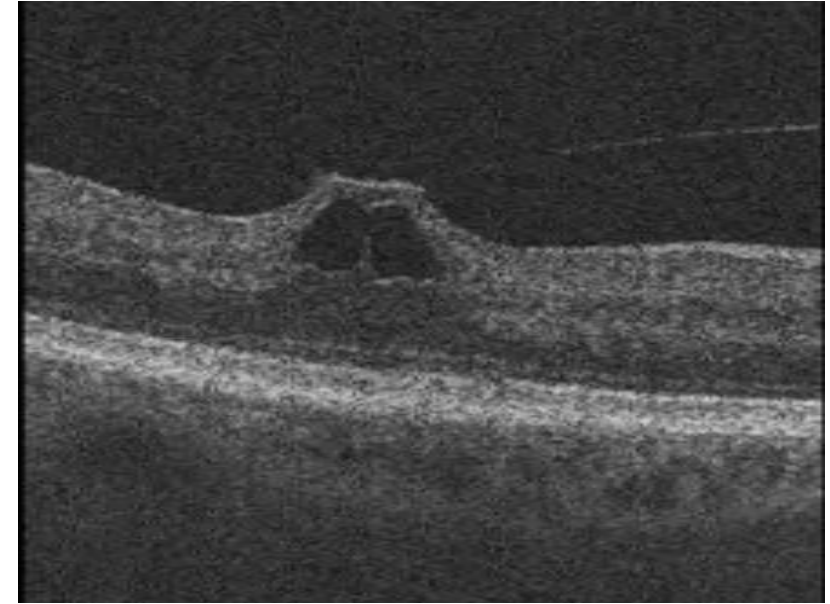
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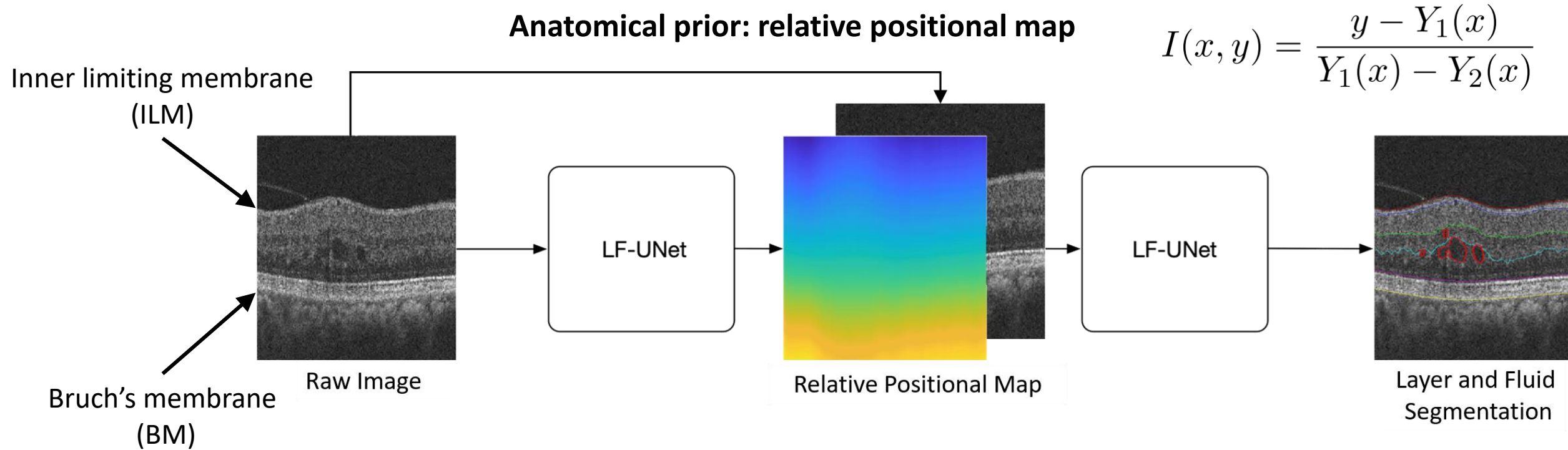
# Background

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



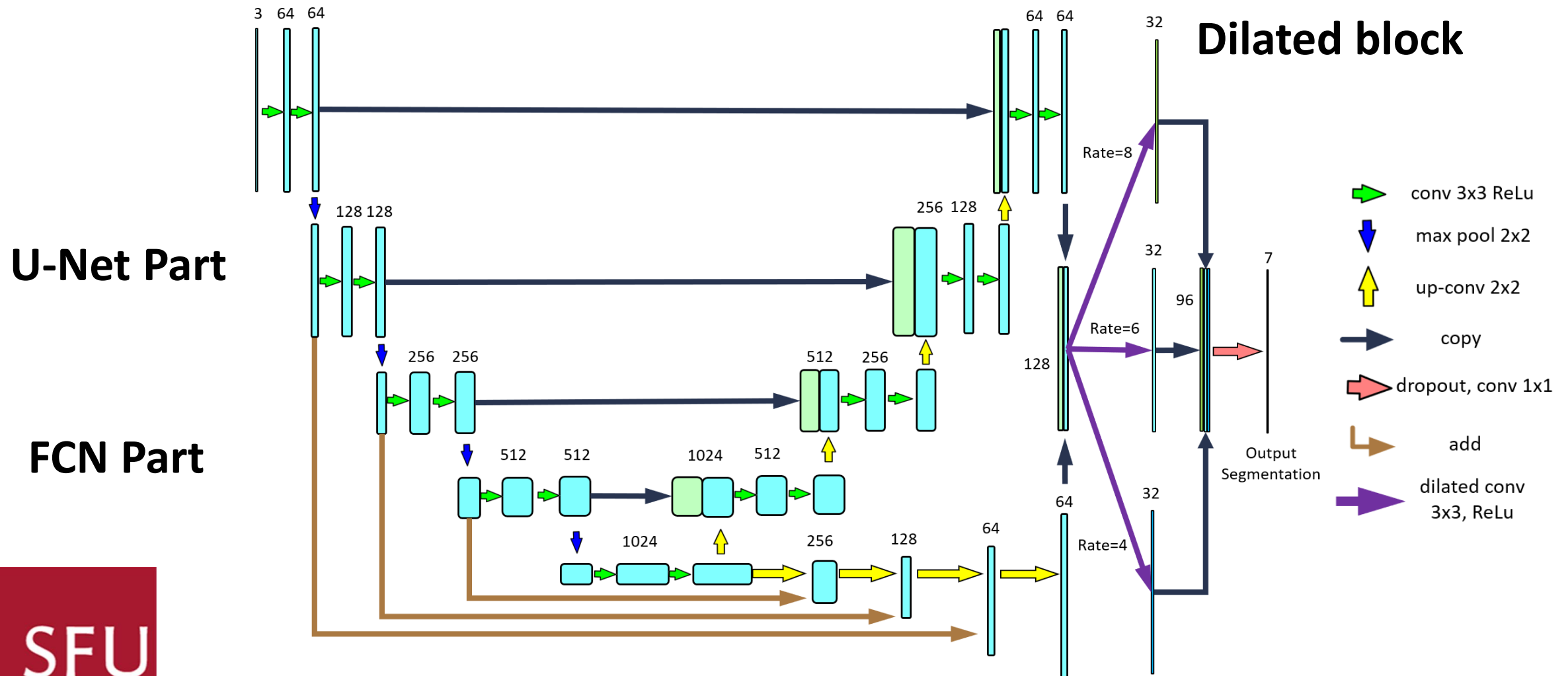
# Methods

## 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

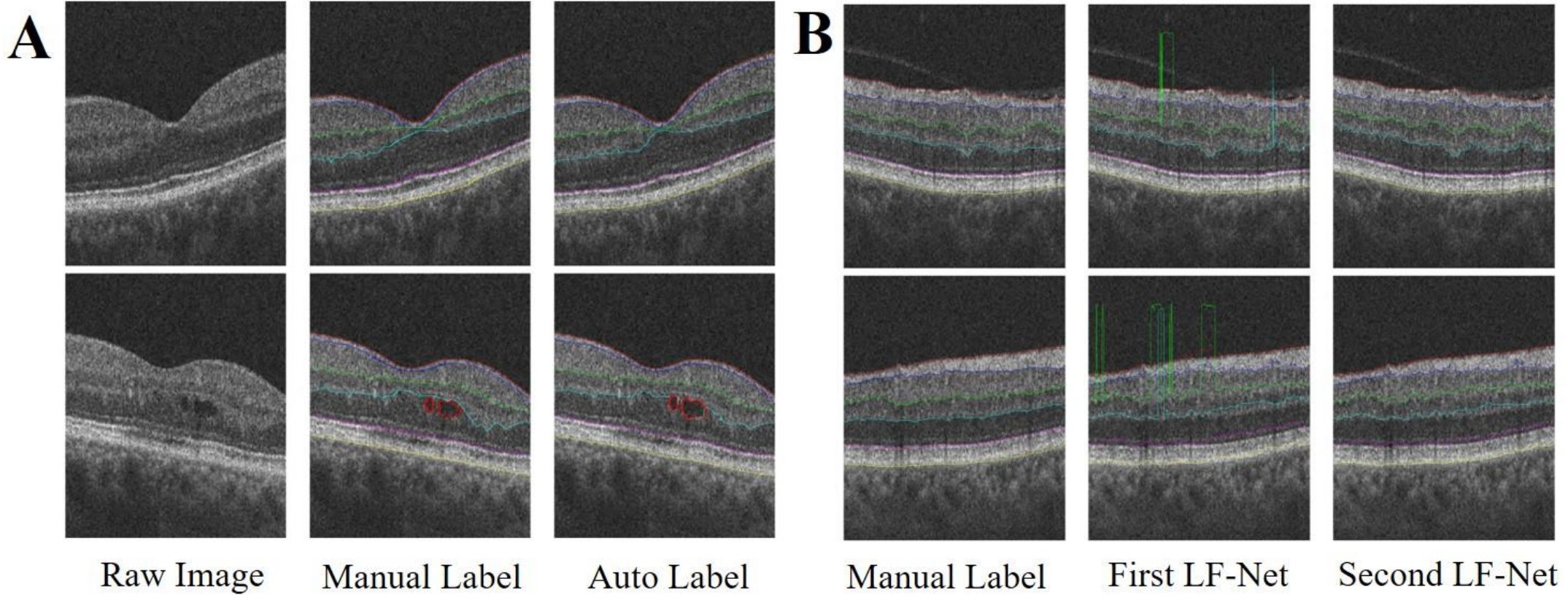
$$Loss_{log} = \lambda_1 Loss_{Dice} + \lambda_2 Loss_{log}$$

- Optimization: Adaptive Moment Estimation (Adam) + Early stopping
- Experiment data: 58 OCT volumes<sup>1</sup> (25 from Diabetic patients)
- Evaluation: 10-fold volume-stratified cross-validation



# Results

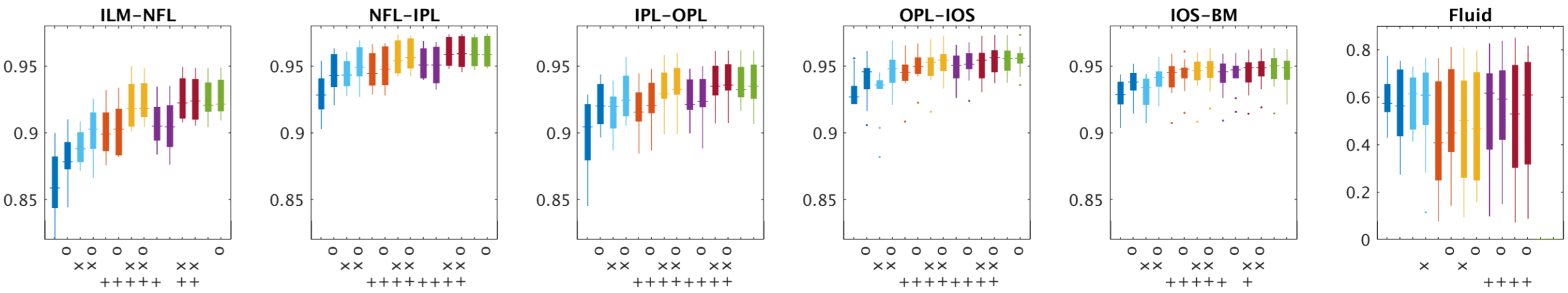
## Sample segmentation outputs



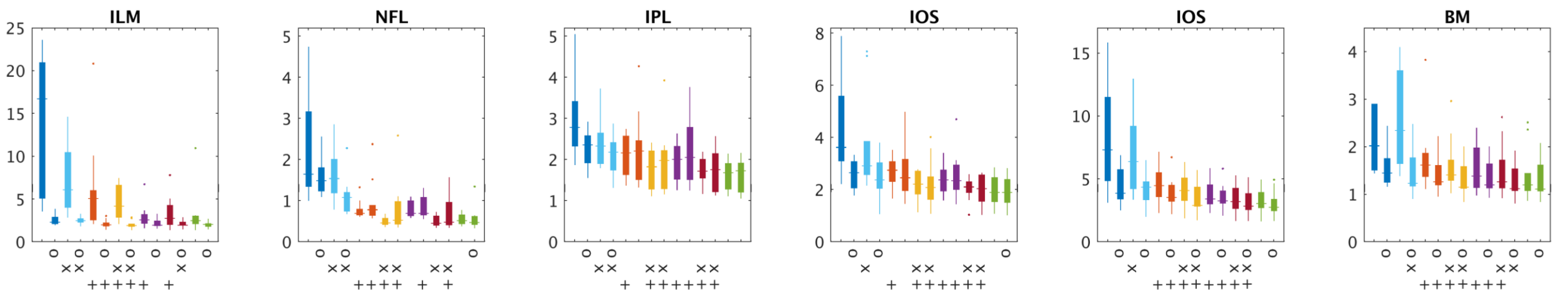
# Results - performance evaluation

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



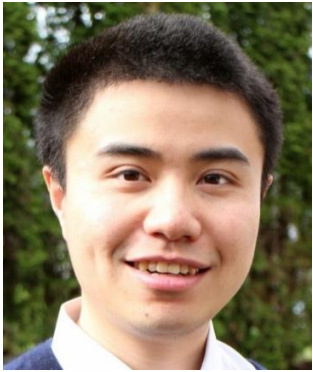
# Thank You !



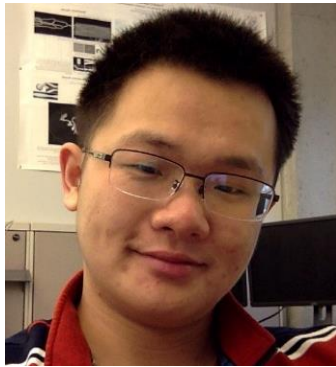
**Prof. Mirza Faisal Beg**



**Prof. Marinko Sarunic**



**Da Ma**



**Donghuan Lu**



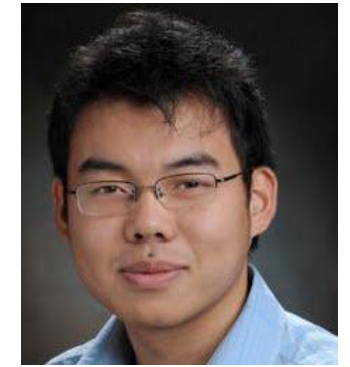
**Morgan Heisler**



**Setareh Dabiri**



**Sieun Lee**



**Gavin Weiguang Ding**