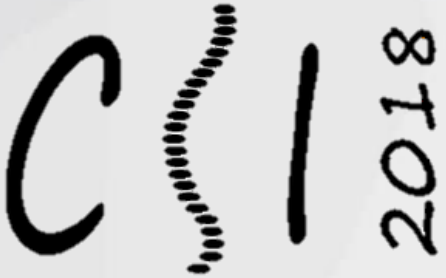

Intervertebral Disc Localization and Segmentation With a 2.5D Network

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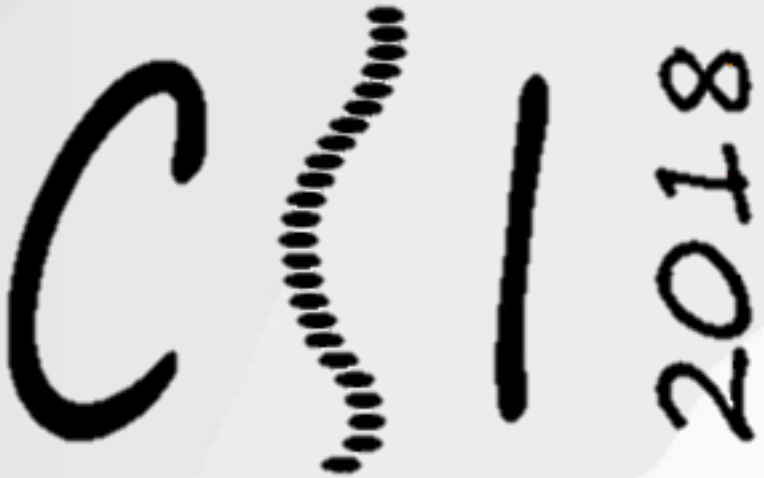
Content

PART 1



Background

The Challenge

Data

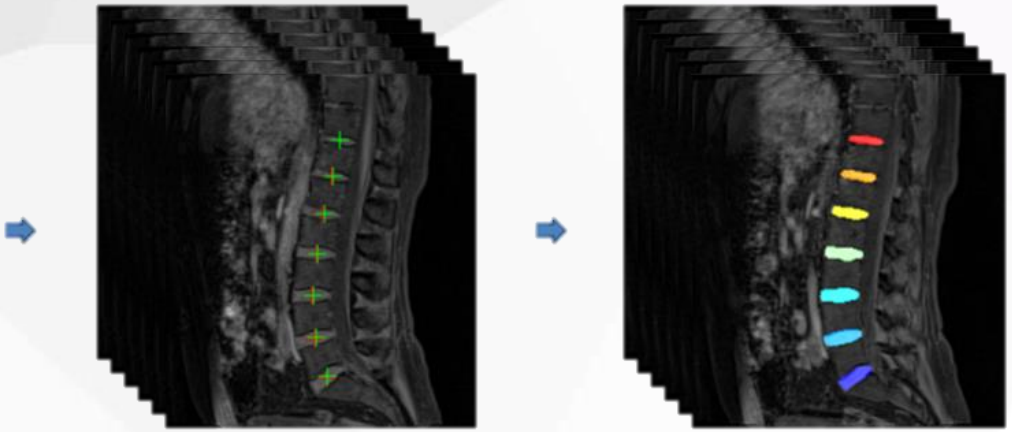
Four-modality Dixon series

Training set: 8 patients, 16 series

Testing set: onsite

Task

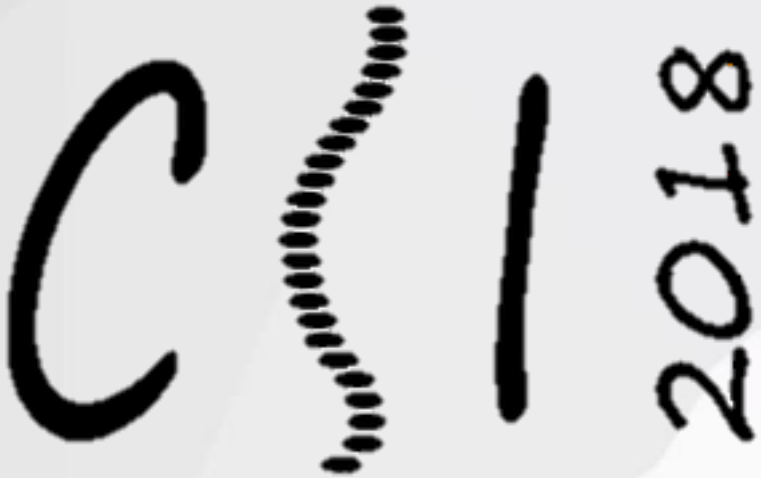
- Segmentation：Output the binary mask of each disc
- Localization：Locate the center of each disc



Localization

Segmentation

PART 2



Segmentation

Segmentation Framework

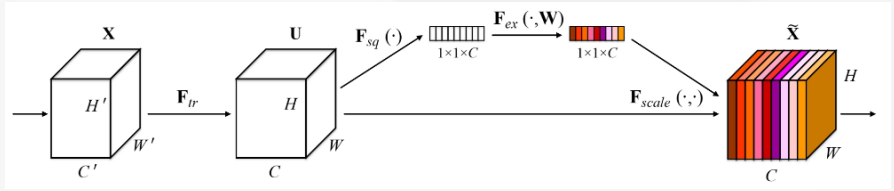
- A 2.5D CNN
- Why?
  - ✓ More context information than 2D networks.
  - ✓ More data diversity than 3D networks.
  - ✓ Good balance between performance and efficiency.
- How?
  - ➢ Crop: 256 * 256 * (36*4) -> 128 * 128 * (11*4)
  - ➢ Predict: 128 * 128 * (11*4) -> 128 * 128 * 1

    predict segmentation mask of ONE slice from multiple-slice input
  - ➢ Concat: multiple 128 * 128 * 1 -> 256 * 256 * 36

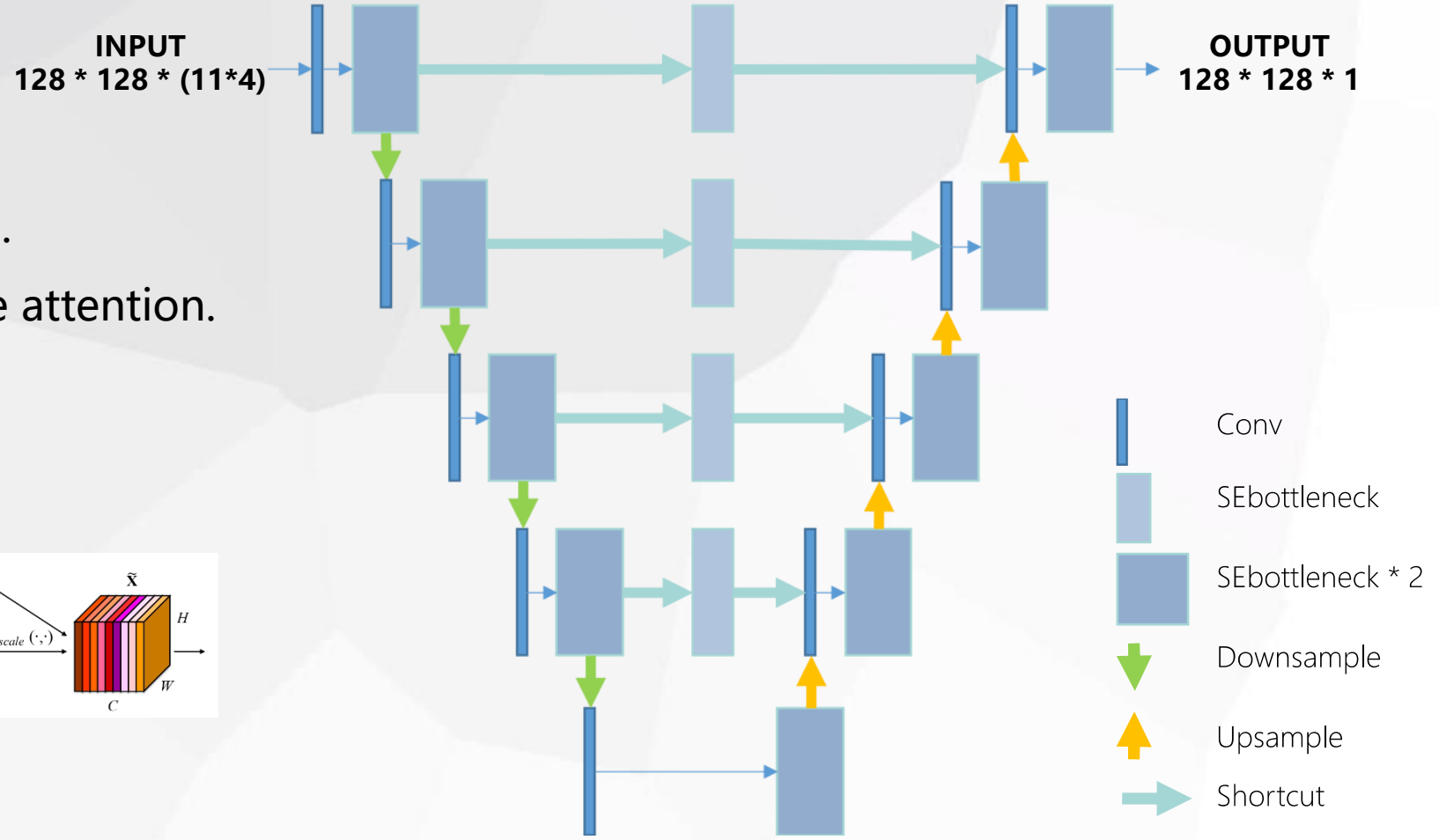
    traverse over slices to build overall segmentation mask
- Augmentation: 3D deformation, random scale, random noise, random crop

Segmentation Network Structure

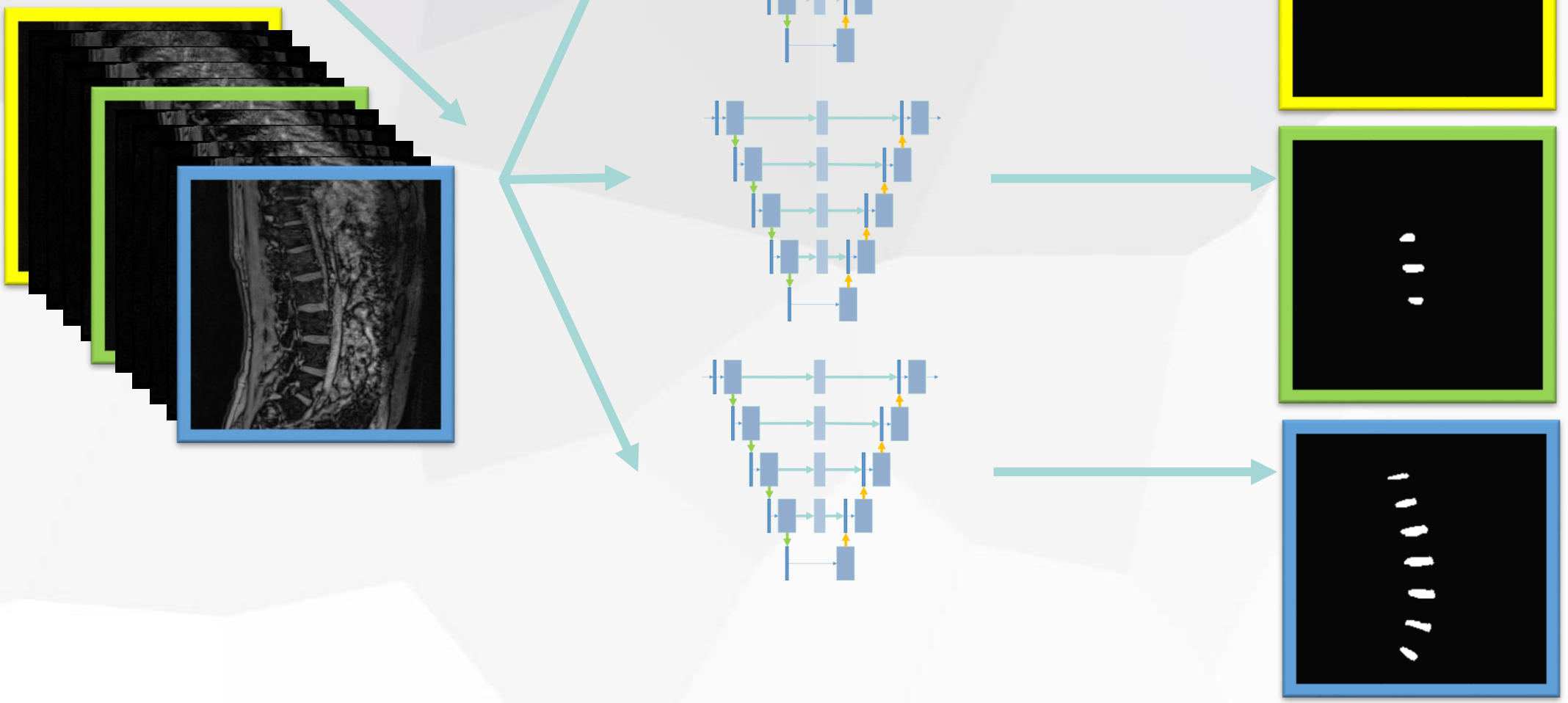
- A 2.5D CNN.
- Encoder-Decoder structure.
- SEBottleneck, channel-wise attention.
- Model fusion strategy.



SEbottleneck



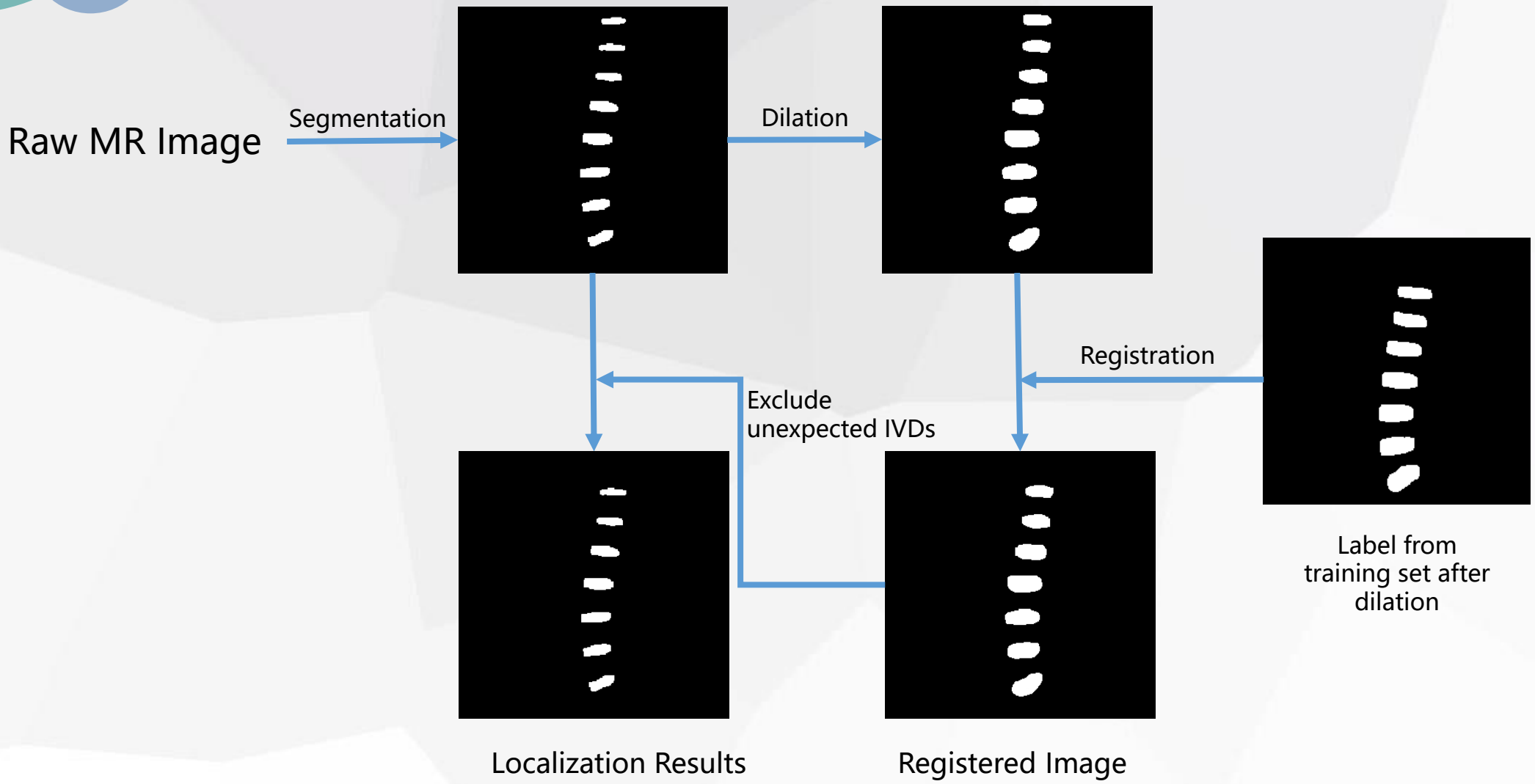
Segmentation Model Fusion



PART 3

Localization

Localization



Final Results

Ground Truth

Prediction

Intersection

Reference

- Hu, Jie, Li Shen, and Gang Sun. "Squeeze-and-excitation networks." *arXiv preprint arXiv:1709.015077* (2017).
- He, Kaiming, et al. "Deep residual learning for image recognition." *Proceedings of the IEEE conference on computer vision and pattern recognition*. 2016.
- Ronneberger, Olaf, Philipp Fischer, and Thomas Brox. "U-net: Convolutional networks for biomedical image segmentation." *International Conference on Medical image computing and computer-assisted intervention*. Springer, Cham, 2015.

END

THANK YOU