



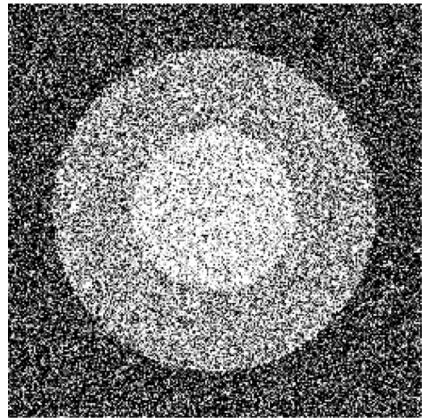
MICCAI 2019 SHENZHEN

Weakly Supervised CNN Segmentation:
models and Optimization

Hands-on
Jose Dolz

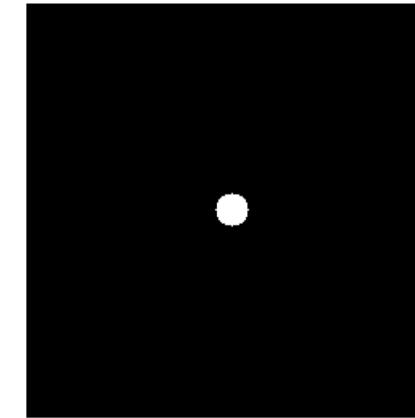
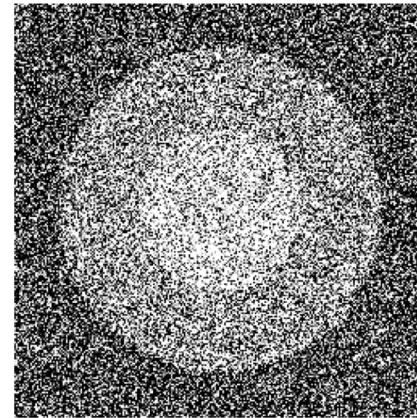


Weakly-supervised learning for segmentation



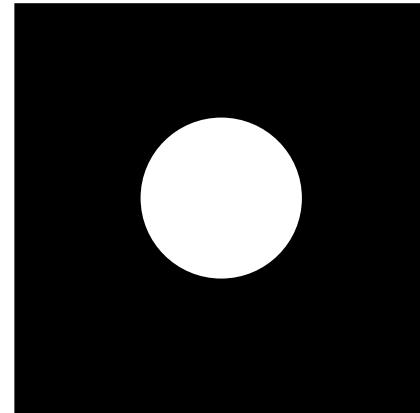
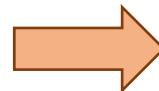
Images (n=10)

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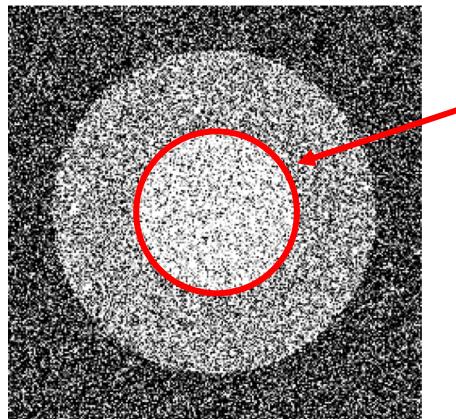


Weak annotation

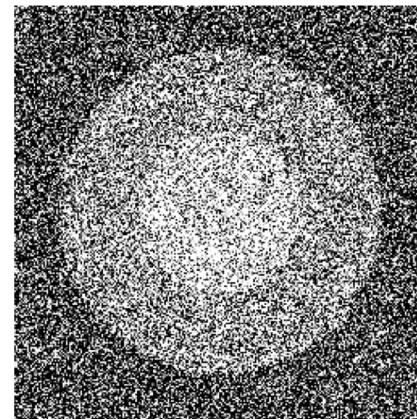
Goal



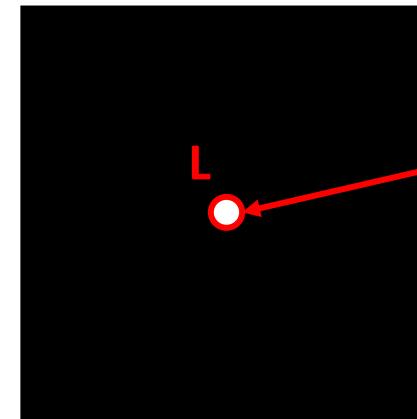
Weakly-supervised learning for segmentation



Images (n=10)



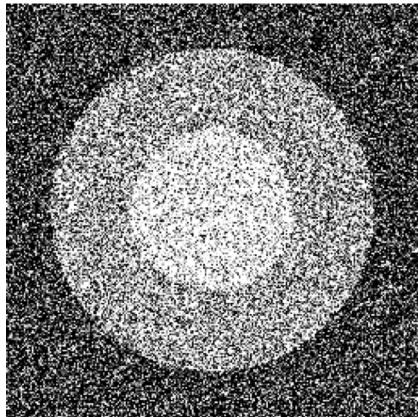
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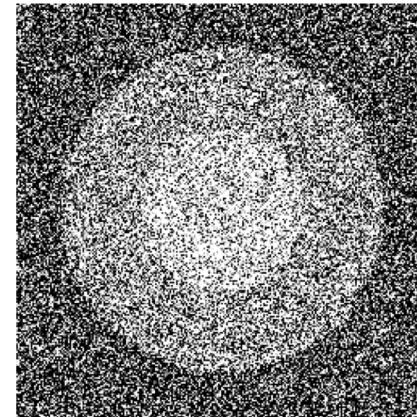
Weak annotation

$$- \sum_{p \in \Omega_L} Y_p \log(S_p)$$

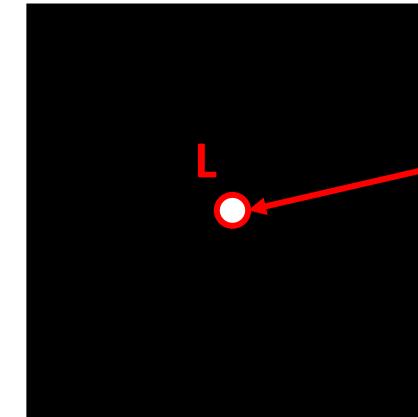
Weakly-supervised learning for segmentation



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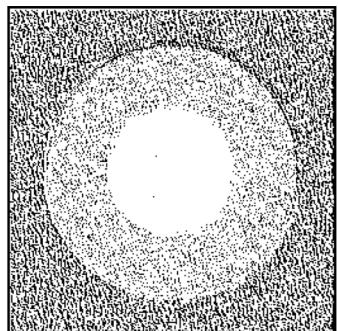
Images (n=10)



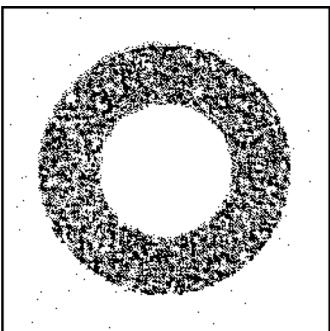
Weak annotation

$$- \sum_{p \in \Omega_L} Y_p \log(S_p)$$

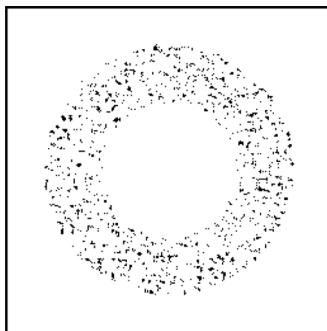
Predictions (Only Cross-Entropy)



Epoch 0

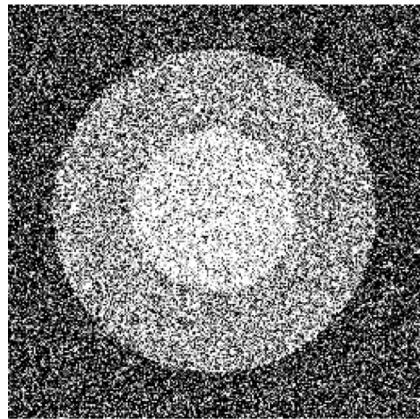


Epoch 200

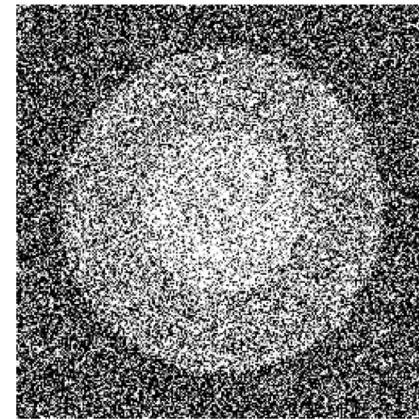


Epoch 400

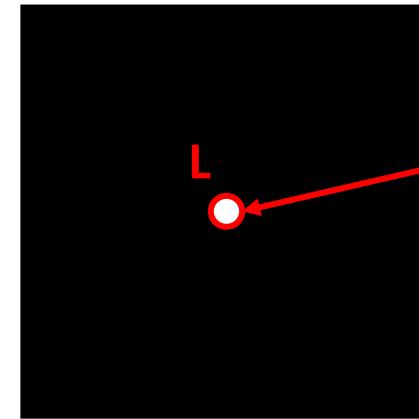
Weakly-supervised learning for segmentation



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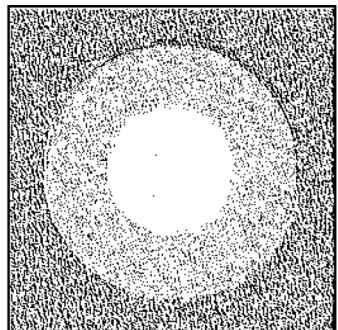
Images (n=10)



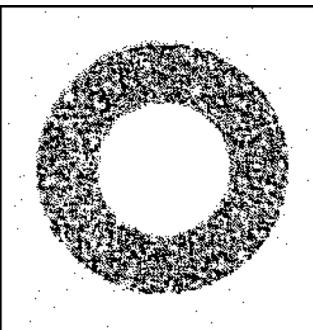
Weak annotation

$$-\sum_{p \in \Omega_L} Y_p \log(S_p) + (\sum_{p \in \Omega} S_p - 1^T y)^2$$

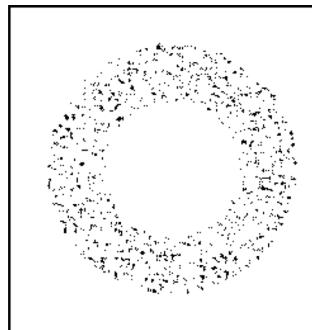
Predictions (Only Cross-Entropy)



Epoch 0

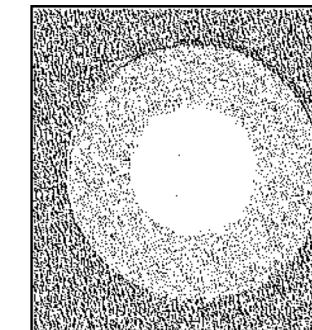


Epoch 200

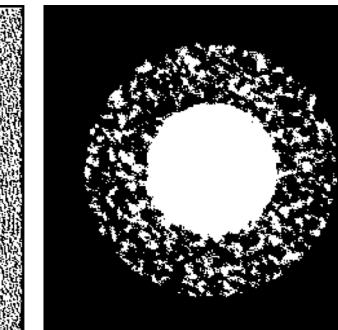


Epoch 400

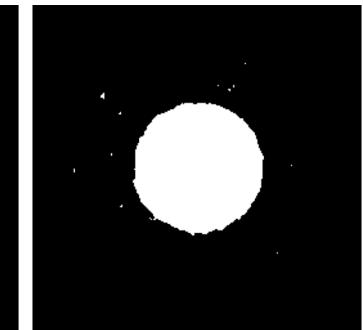
Predictions (Cross-Entropy + Size Loss)



Epoch 0

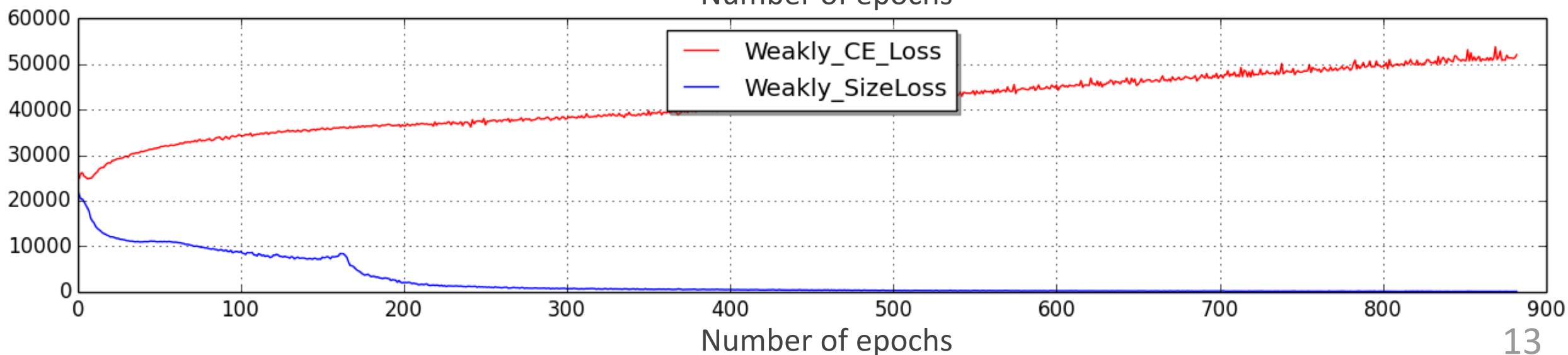
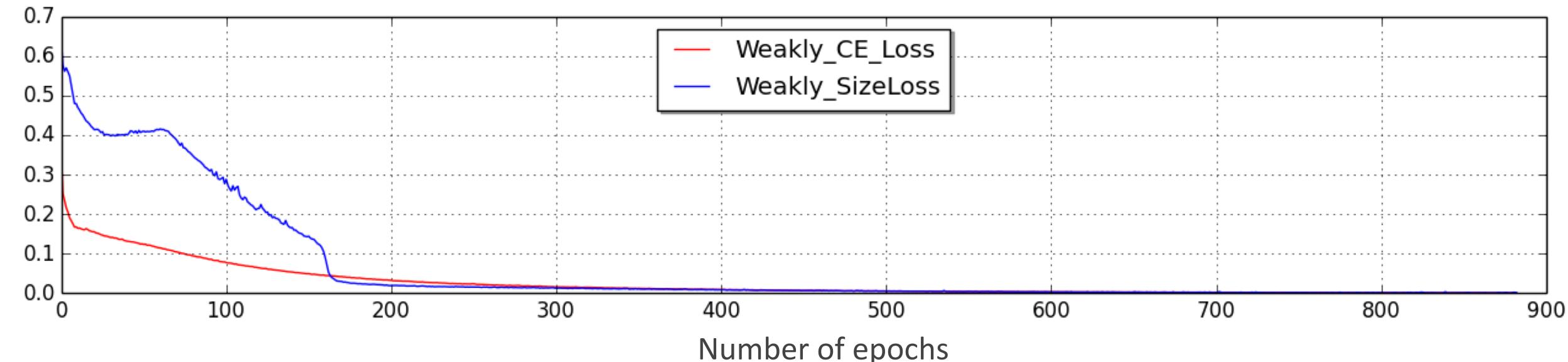


Epoch 200



Epoch 400

Weakly-supervised learning for segmentation



The code (and other material) is made publicly available in:

https://github.com/LIVIAETS/miccai_weakly_supervised_tutorial

Reference:

- [1] Kervadec H, Dolz J, Tang M, Granger E, Boykov Y, Ben Ayed I. Constrained-CNN losses for weakly supervised segmentation. Medical image analysis. 2019 May 1;54:88-99.