

# U-net : convolutional networks for biomedical image segmentation

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2021. 12. 21.



# To-Do list

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- dicom 파일과 엑셀 파일 대조해서 모든 dicom 파일을 JPG로 바꾸기
  - U-Net의 성능평가를 어떻게 하는지 알아보기
  - U-Net의 출력형태 알아보기
- \* 글보다는 수식과 도식화 위주로 발표 준비하기

# U-Net

## U-net의 평가지표 - Dice Loss function

Dice coefficient

$$\frac{2TP}{2TP + FP + FN} = \frac{2 \times |GT \cap Pred|}{|GT| + |Pred|} = \text{F1 score}$$

Dice Loss function

$$1 - \frac{2 \times |GT \cap Pred|}{|GT| + |Pred|}$$

\* Confusion Matrix

|               |              | PREDICTIVE VALUES |              |
|---------------|--------------|-------------------|--------------|
|               |              | POSITIVE (1)      | NEGATIVE (0) |
| ACTUAL VALUES | POSITIVE (1) | TP                | FN           |
|               | NEGATIVE (0) | FP                | TN           |

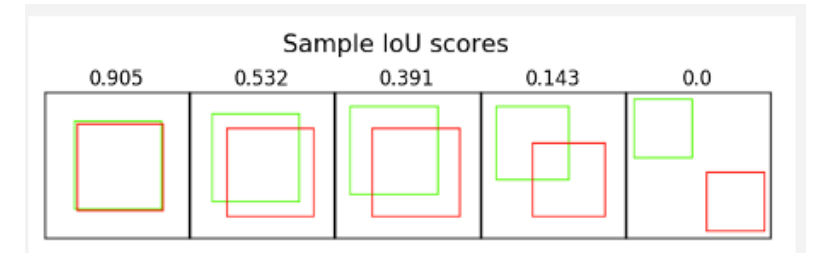
# U-Net

U-net의 평가지표

$$\text{IOU (Intersection over Union)} = \frac{\text{Overlapping Region}}{\text{Combined Region}}$$

IoU Loss function

$$\frac{TP}{TP + FP + FN} = \frac{|GT \cap Pred|}{|GT| + |Pred| - |GT \cap Pred|}$$



Jaccard Loss function

$$1 - \frac{|GT \cap Pred|}{|GT| + |Pred| - |GT \cap Pred|}$$

# U-Net

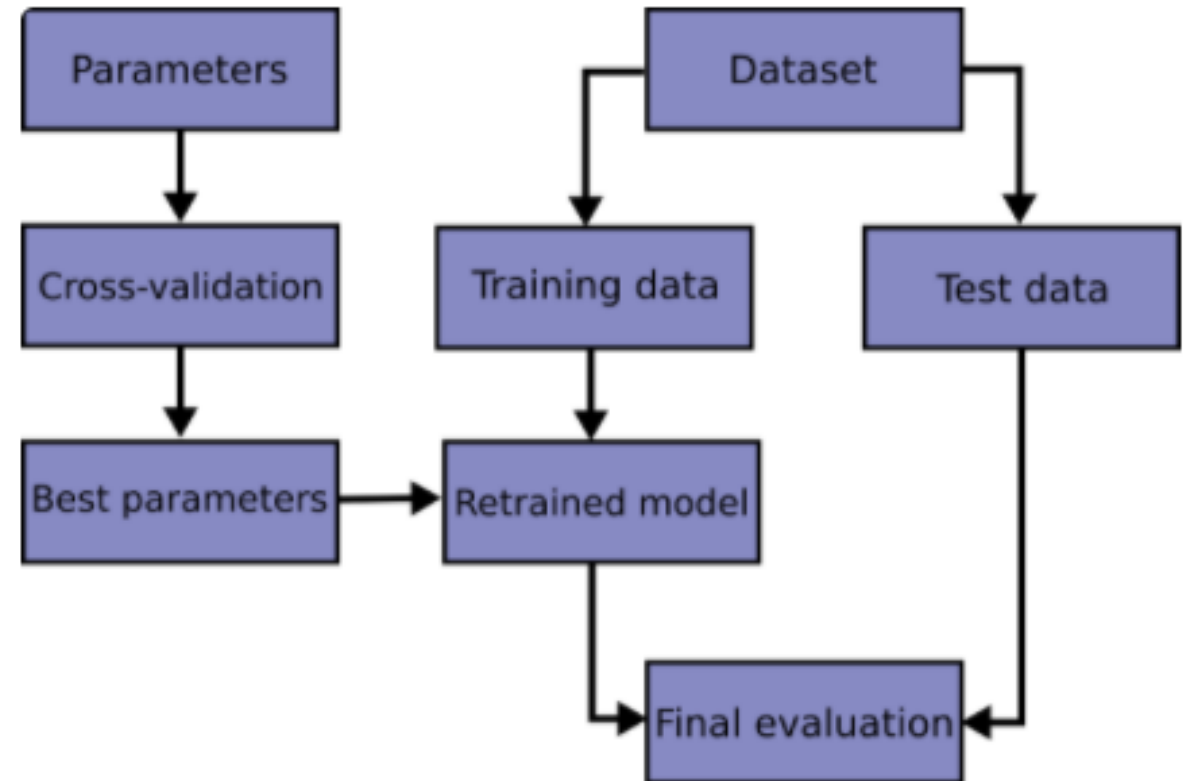
U-net의 평가지표 - warping error, pixel error, k-fold validation

$$D(T \parallel L^*) = \min_{L \triangleleft L^*} \|T - L\|^2$$

minimum mean square error between the pixels of the target segmentation and the pixels of a topology-preserving warped source segmentation.

Topological constraints

$$\|L - L^*\|^2$$



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Thank you