

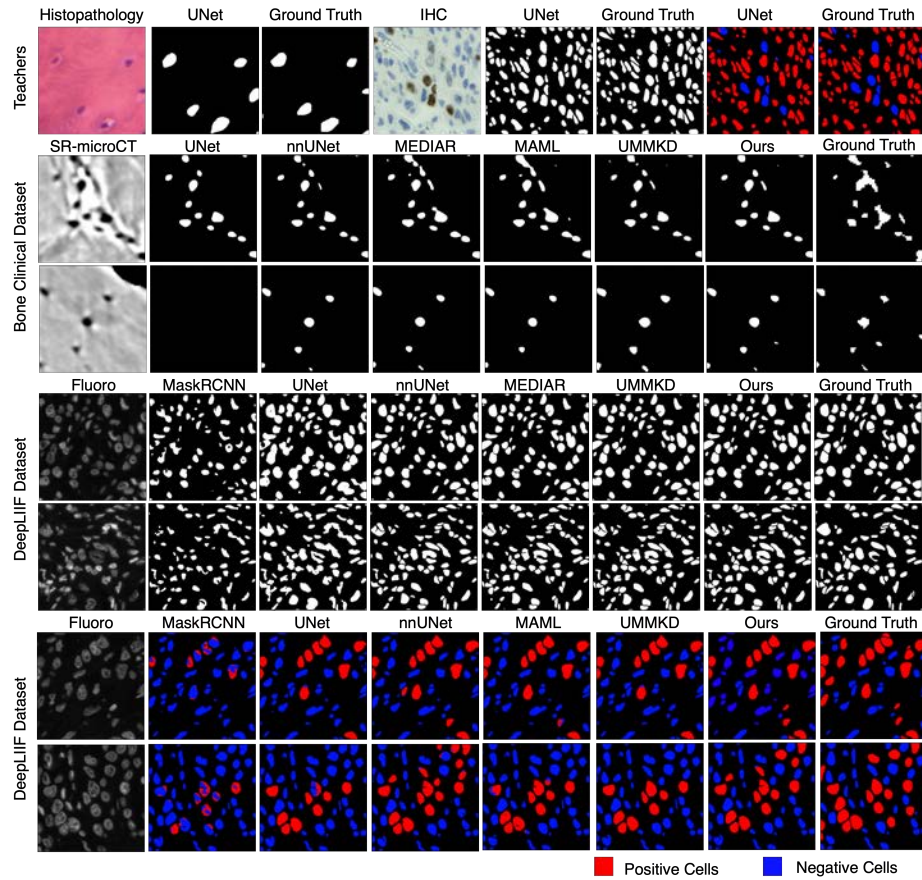
Letting Osteocytes Teach SR-microCT Bone Lacunae Segmentation: A Feature Variation Distillation Method via Diffusion Denoising

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1 Supplementary Visual Results



2 Evaluation Metrics Definition

Dice Similarity Coefficient (DSC): The DSC equation has the form:

$$DSC(y_{gt}, y_p) = 2 \cdot \frac{|y_{gt} \cap y_p|}{|y_{gt}| + |y_p|}, \quad (1)$$

where y_{gt} and y_p are the ground truth and predicted segmented images.

Haussdorf Distance (HD): The HD equation has the form:

$$HD = \frac{1}{2} \cdot \left(\frac{GtoP}{G} + \frac{PtoG}{P} \right), \quad (2)$$

where $GtoP$ is the directed average HD from ground truth to predicted segmentation, $PtoG$ is the directed average HD from predicted to ground truth segmentation, while G and P are the number of pixels points in the ground truth, and in the predicted segmentation, respectively. The directed average HD is computed as:

$$d_{HD}(p_{gt}, p_p) = \frac{1}{2} \cdot \frac{1}{p_{gt}} \sum_{p_{gt} \in y_{gt}} \min_{p_p \in y_p} d(p_{gt}, p_p) + \frac{1}{p_p} \sum_{p_p \in y_p} \min_{p_{gt} \in y_{gt}} d(p_{gt}, p_p), \quad (3)$$

given by the sum of all minimum distances from all ground truth p_{gt} and predicted pixels points p_p divided by the number of points in the ground truth y_{gt} and predicted segmentation y_p .

Aggregate Jaccard Index (AJI): The AJI equation has the form:

$$AJI = \frac{\sum_{i,j=0,0}^{N,M} p_{count}(y_{gt_i} \cap y_{p_j})}{\sum_{i,j=0,0}^{N,M} p_{count}(y_{gt_i} \cup y_{p_j})}, \quad (4)$$

where i and j are the N ground truth and M predicted objects in the y_{gt_i} and y_{p_j} segmentations. AJI is computed by adding the pixel count of $y_{gt_i} \cap y_{p_j}$ to AJI numerator, and that of $y_{gt_i} \cup y_{p_j}$ to the denominator. This naturally adds pixels of those ground truth objects that do not find an intersecting segmented object (false negatives detection) to the denominator. It also adds the pixel counts of all unclaimed segmented objects (false positives detection) to the denominator.

Panoptic Quality (PQ): The PQ equation has the form:

$$PQ = \frac{\sum_{y_{gt}, y_p \in TP} IoU(y_{gt}, y_p)}{|TP| + \frac{1}{2}|FP| + \frac{1}{2}|FN|}, \quad (5)$$

where y_{gt} and y_p are the ground truth and predicted segmented images, respectively, and IoU denotes Intersection over Union. True Positives (TP) denote available instances pairs correctly matched, False Negatives (FN) unmatched y_{gt} instances, and False Positives (FP) unmatched y_p predicted instances.