Similarity Memory Prior is All You Need for Medical Image Segmentation

Supplementary Material

A. Setting about K in W-LD Update Strategy

To accurately locate the category features of the input image, we propose the W-LD update strategy to dynamically update the prototype memory bank. The following is an introduction to the K parameter in the W-LD update strategy. In W-LD update strategy, K represents the update range

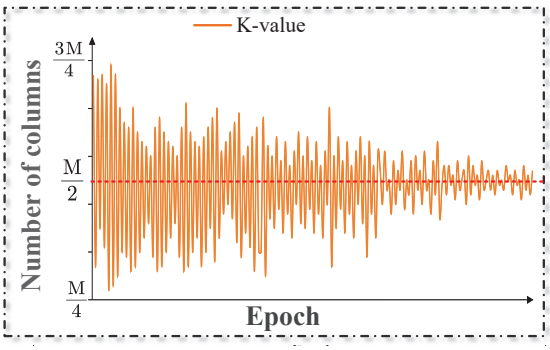

Figure 1. **Variation curve of** K on the Synapse dataset. M is the feature dimension of similarity memory prior.

of prototype memory bank. To prevent model training collapse, we add a restriction to K ($\frac{M}{4} \leq K \leq \frac{3M}{4}$) to ensure effective updates to the prototype memory bank. It has been proven that our measure is effective, and there is no training collapse in all comparative experiments and ablation experiments. Figure 1 show the curve of K in the training process. It can be seen that with the increase of epoch, the model gradually converges, and K is stable around $\frac{M}{2}$. In the initial stage of training, K fluctuates violently, indicating that the model is learning useful patterns in data, and both large and small initial K may have negative effects. Thus, we set the initial value of K to $\frac{M}{2}$ in all experiments to cooperate with model training.

B. Additional Visualization Results

In the process of medical image segmentation, we assign a semantic cluster (similarity memory prior) to the segmentation target in each image to extract key categorical features. Figure 2 shows the semantic cluster receptive field of DMW-LA on three datasets. We can observe that different clusters encode different semantic concepts. In the Synapse dataset, Cluster 2, Cluster 4 and Cluster 6 tend to focus on the region where the organs are located. In the ACDC dataset, Cluster 1 tends to focus on the left ventricle, while Cluster 2 focuses more on the right ventricle. In the SegPC-2021 dataset, Cluster 1 tends to focus on cytoplasm,

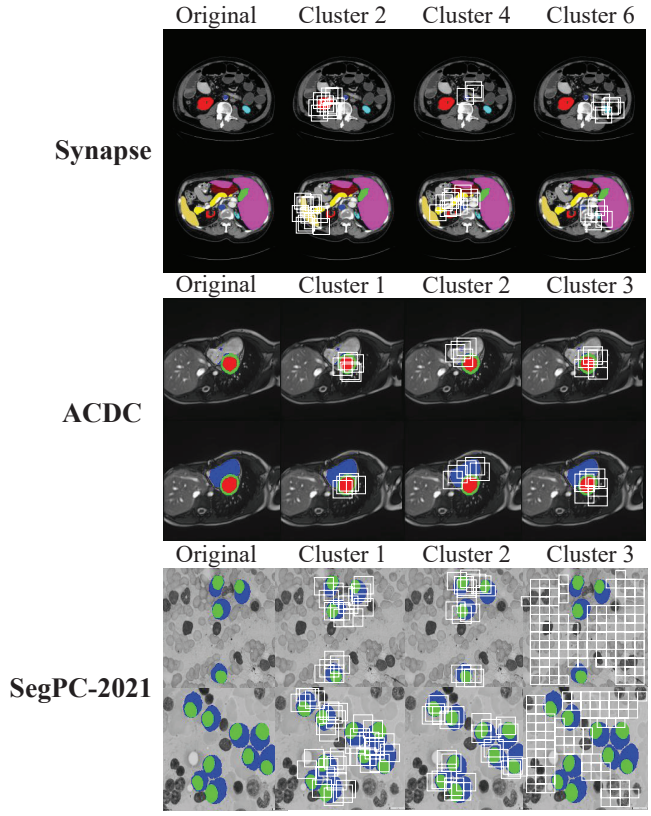

Figure 2. **Visualization of semantic clusters** (similarity memory priors) using DMW-LA on Synapse, ACDC, and SegPC-2021. We calculate the distribution of similarity memory prior in the prototype memory bank, and highlight their receptive fields with white boxes.

while Cluster 3 focuses more on tissue fluid and other cells in the background. This distribution indicates that when processing images, each semantic cluster focuses on specific category features, thereby helping the model identify key structures in medical images.

C. Evaluation Metrics

To better evaluate the performance of the network, we choose Dice score (DSC) and 95% Hausdorff distance (HD95) as evaluation metrics, as shown in Equation (1) and Equation (2).

$$DSC = \frac{(2 * TP)}{(2 * TP + FP + FN)} \tag{1}$$

$$HD(A,B) = \max\{ \max_{a \in A}\{\min_{b \in B}\{d(a,b)\}\}, \max_{b \in B}\{\min_{a \in A}\{d(b,a)\}\}\} \tag{2}$$

In the above formula, TP represents foreground information is predicted as foreground, FP represents background information is predicted as foreground, and FN represents foreground information is predicted as background. The HD95 represents the 95^{th} percentile of distances between the boundaries of A and B. DSC is used to evaluate the degree of overlap, while HD95 is used to evaluate distance. The combination of them can comprehensively evaluate the performance of the model.