Improved Esophageal Varices Assessment from Non-Contrast CT Scans

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Algorithm 1 Canonical Correlation Analysis Loss

Input: Two relevant logits of $H_1, H_2 \in \mathbb{R}^{n,h}$, $\epsilon = 10^{-12}$.
Output: CCA loss $\mathcal{L}_{CCA}(H1, H_2)$ optimizing correlation between H_1 and H_2.

$H_1, H_2 \leftarrow \frac{H_1 - \text{mean}(H_1)}{\text{std}(H_1)+\epsilon}, \frac{H_2 - \text{mean}(H_2)}{\text{std}(H_2)+\epsilon}$
$C_1, C_2 \leftarrow \frac{H_1^T H_1}{n-1}, \frac{H_2^T H_2}{n-1}$ ▷ Compute covariance
$\lambda_1, V_1 \leftarrow \text{eig}(C_1); \lambda_2, V_2 \leftarrow \text{eig}(C_2)$ ▷ Eigen-decomposition
$H_1, H_2 \leftarrow H_1 V_1[:, \text{top } h], H_2 V_2[:, \text{top } h]$ ▷ Project to top eigenvectors
$C \leftarrow \frac{1}{n-1} H_1^T H_2$ ▷ Compute cross-covariance
$\mathcal{L}_{CCA}(H_1, H_2) \leftarrow -\frac{\text{Tr}(C)}{\|H_1\|_F \cdot \|H_2\|_F + \epsilon}$ ▷ Calculate canonical correlation
return $\mathcal{L}_{CCA}(H_1, H_2)$

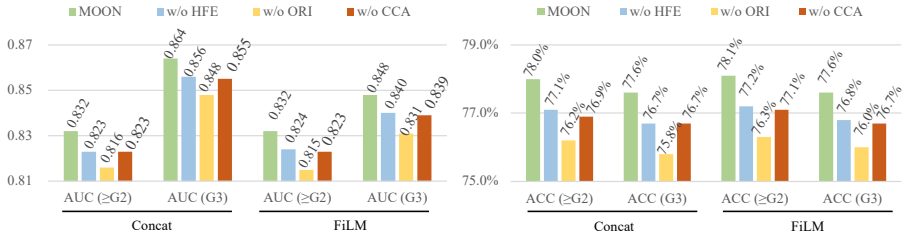

Fig. 1: Ablation experiments on different strategies on independent test dataset.