

Related Work

In semantic segmentation tasks, boundary-aware methods often integrate features that help the model better understand and predict object boundaries, thereby enhancing segmentation quality. Additionally, edge-attention models [1] refine boundary representations by weighting the importance of edges, resulting in more precise boundary integration in semantic segmentation tasks. Deeply supervised edge detection techniques, which directly incorporate multi-scale edge information into the segmentation process, have demonstrated improved segmentation performance, such as HED [2] and RCF [3]. Similarly, methods like CASENet [4] integrate category-related edge features into the segmentation model, enhancing both boundary detail representation and category discrimination capabilities.

In 3D instance segmentation tasks, the novel EASE framework [5] employs an edge prediction module that guides the network in utilizing edge-aware features to reduce misclassification near boundaries. In medical imaging, many methods have been developed to address weak boundary issues in image segmentation, most of which rely on boundary information. SFA [6] introduces an additional decoder for boundary prediction and uses a boundary-sensitive loss function to fully exploit the relationship between regions and boundaries. PraNet [7] combines parallel partial decoders with reverse attention mechanisms to gradually expand object regions and integrate edge features. NB-AC [8] proposes a narrow-band active contour attention mechanism that focuses on more complex cases when dealing with weak boundaries. MEGANet [9] introduces high-frequency edge information through traditional image processing techniques, utilizing the Laplacian operator to extract and retain high-frequency features, particularly edge details in images.

In weakly supervised action segmentation tasks, the recently proposed Action Transition Boundary Alignment (ATBA) framework [10] effectively determines the boundaries corresponding to each transition, addressing the issue of noisy boundaries.

References

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