ABSTRACT

Deep Learning for Image Segmentation

Deep learning has emerged as a powerful approach for image segmentation, enabling pixel-level classification with high accuracy. Unlike traditional segmentation methods that rely on handcrafted features, deep learning techniques especially convolutional neural networks (CNNs) learn features automatically from large datasets. Image segmentation plays a critical role in applications like medical diagnostics, autonomous vehicles, satellite imagery, and scene understanding.

By leveraging hierarchical feature learning, deep models can capture both spatial and contextual information. Semantic segmentation (assigning class labels to each pixel) and instance segmentation (differentiating individual objects) are two primary types handled effectively using deep learning. The introduction of encoder-decoder architectures and modern enhancements like attention mechanisms and transformers has significantly boosted segmentation performance.

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