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Cell Segmentation by FeedbackFormer

FeedbackFormerを用いた細胞のセグメンテーション

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Cell segmentation by deep learning plays a crucial role in advancing cell biology researches. We considered that Transformers, which have recently outperformed CNNs in image recognition, could also be improved and developed for cell segmentation. Transformers tend to focus more on contextual information than on detailed information. This tendency results in a lack of detailed information necessary for accurate segmentation. Therefore, to supplement the missing information, we hypothesized that feedback processing in the visual cortex of the human brain could be highly effective. Our proposed Feedback Former is a novel architecture for semantic segmentation, inspired by the structure of the human brain. It utilizes Transformers as an encoder and incorporates feedback processing. Feature maps with detailed information are fed back to the lower layers from near the output of the model to compensate for the lack of detailed information which is the weakness of Transformers. Experiments on three different cell image datasets confirmed that our method surpasses the methods without feedback processing, demonstrating its superior accuracy in cell image segmentation. Our method achieved higher segmentation accuracy while consuming less computational cost than conventional feedback approaches.

Pre-registration