

MitoVis: A Unified Visual Analytics System for End-to-End Neuronal Mitochondria Analysis

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Summary:

The conventional neuronal mitochondria analysis workflow mainly relies on manual annotations and generic image-processing software. Moreover, even though there have been recent developments in automatic mitochondria analysis using deep learning, the application of existing methods in a daily analysis remains challenging because the performance of a pretrained deep learning model can vary depending on the target data, and there are always errors in inference time, requiring human proofreading.

To address these issues, we introduce MitoVis, a novel visualization system for end-to-end data processing and an interactive analysis of the morphology of neuronal mitochondria. MitoVis introduces a novel active learning framework based on recent contrastive learning, which allows accurate fine-tuning of the neural network model. MitoVis also provides novel visual guides for interactive proofreading so that users can quickly identify and correct errors in the result with minimal effort.

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