Studien- / Diplom- / Masterarbeit, ET / MT / IST / Physik / Biomedizintechnik

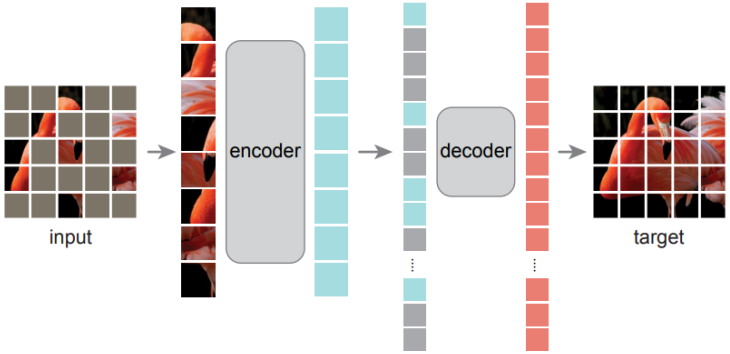
Unsupervised diagnosis through a multi-core fiber using masked autoencoder

Motivation

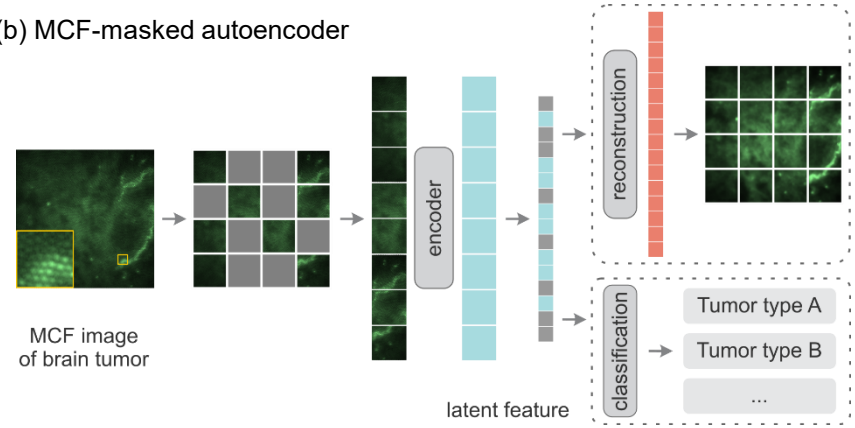
Multi-core fibers (MCF)-based endoscopy enable in vivo visualization of brain tumor with minimal invasiveness, which makes intraoperative tumor diagnosis possible. However, MCF image reconstruction is necessary, because honeycomb artifacts degrade spatial resolution and hinder its applications in clinics.

Recently, a novel approach, the unsupervised masked autoencoder (MAE) was proposed with significant improvement in image reconstruction and classification tasks. By random masking input patches, the autoencoder achieves state of the art accuracy, but much less data are required. Inspired by the MAE, MCF also plays a role of “masking”, and intentional deactivation of partial fiber cores is expected to enhance the reconstruction in fiber imaging.

(a) Masked autoencoder.
He, et al. CVPR2022



(b) MCF-masked autoencoder



Task

- Implementation of masked autoencoder model
- Model training and feature extraction using reconstruction decoder
- Object recognition using classification decoder based on extracted features
- Model optimization, result evaluation and documentation

Keywords

Deep learning, masked autoencoder, image reconstruction, image classification, python, pytorch

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