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Contribution - Unsupervised Domain Adaptation for Colorectal Cancer Tissue Classification Using Self-supervised Deep Learning Methods and Sparsely-labeled Data

DS applications and challenges in Medicine, Natural Sciences, and Engineering

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Abstract

In digital pathology, big cohorts of digitized tissue slides are available, however annotations are scarce as they are very time consuming to create. Classifying different tissue types on a slide is a very important step in order to extract useful information for prognostic factors and other downstream tasks like patient stratification. However, supervised deep learning tasks like classification rely on large amounts of labeled data. In order to overcome this issue, we propose Self-Rule to Adapt (SRA), an unsupervised domain adaptation method which makes use of publicly available datasets. SRA uses self-supervised methods and unlike other domain adaptation methods does not rely on a fully labeled source dataset. Thus, the method allows for an effective transfer of knowledge from a weakly labeled source dataset to an unlabeled target domain. The self-supervision is created by capturing the visual similarity of images within and between the two domains. We show that our proposed method outperforms previous unsupervised domain adaptation approaches on public datasets and shows promising results on our in-house colorectal cancer cohort.