Deep learning‑based histopathological segmentation for whole slide images of colorectal cancer in a compressed domain

Deep learning methods for automatic pattern recognition have gained importance.

However, due to a lack of system memory, common pre-processing techniques for high-resolution photographs in the spatial domain tend to lose crucial data, such as high-frequency information and the region of interest. We provide a compressed picture segmentation method based on principal component analysis (PCA) and discrete wavelet transform to get around these restrictions (DWT). Following neural network inference for each tile, a wavelet weighted ensemble (WWE) based on the inverse discrete wavelet transform was used to recreate the entire prediction image (IDWT). Using 351 colorectal biopsy samples that had been pathologically confirmed by two pathologists, the training and validation were carried out. The average Jaccard score, pixel accuracy, and Dice score for 39 test datasets.

The possibility of misdiagnosis exists because pathologists do such a huge number of checks. This causes a sharp rise in medical costs, a rise in the rate of incorrect diagnoses, a drop in medical output, and the cancer diagnostic risk. Automated pathological imaging analysis can reduce human effort, save time, and offer a reliable basis for surgery and treatment. In pathology, convolutional neural networks (CNNs) are particularly well-liked for automatically diagnosing a variety of diseases1–19. Large image sizes, however, continue to impede technological advancements in pathological image analysis despite the speed and memory capacity of central processing units (CPUs) and graphics processing units (GPUs) continuing to rise20.

dispersion of data. 390 WSIs of colorectal biopsy samples were used. The typical WSI measured 43,443 by 28,645 pixels. Using 351 train and validation data and 39 test data, we divided the dataset into two groups (Supplementary Table 1). In order to perform binary segmentation of normal and aberrant areas in colorectal cancer (CRC) tissue pictures, we implemented a pipeline using this dataset.