Poster No.

Eigenvalue-Based Preprocessing for Tissue Extraction from Pathology Image Slides

임도현

Department of Computer Science,

Hanyang University, Seoul, Republic of Korea

The objective of this study is to effectively extract patches containing only tissue from pathology image slides. Pathology image slides include not only tissue but also unwanted elements such as background and markings, necessitating precise preprocessing for accurate tissue extraction. To address this, we devised a preprocessing method utilizing the eigenvalues and eigenvectors derived from the covariance matrix calculated from the image’s RGB values.

We hypothesized that the brightness difference between tissue and background induces the greatest variability. Consequently, the direction with the largest variance corresponds to the first principal eigenvector, and its magnitude corresponds to the first eigenvalue. Visualization of the RGB pixel data in a 3D scatter plot confirmed a trend where brightness increases in the direction of the first eigenvector.

Notably, tissue patches exhibited significantly larger first eigenvalues compared to background patches, demonstrating effective separation between tissue and background. Additionally, we observed clustering of regions representing key features within the tissue in the 3D scatter plot, indicating successful extraction of data that reflects important tissue characteristics. This preprocessing method enabled accurate extraction of tissue patches.

This study validates the efficacy of the eigenvalue-based method in the preprocessing stage of pathology image analysis and is expected to lay the foundation for the development of a Foundation Model optimized for pathology in the future.