Region of interest (ROI) selection using vision transformer for automatic analysis using whole slide images

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Extended Abstract:

Goal: The Study aims that the choice of regions of interest (ROI) is a routine step in medical image analysis for all images modalities. also enhancing diagnostic accuracy, compromising inter-observer variability.

Research Area: This research mainly focused by Deep leaning, medical AI and Computational digital image analysis. Here, A whole slide image (WSI) is a digital image of a pathological specimen generated by a WSI scanner and used.

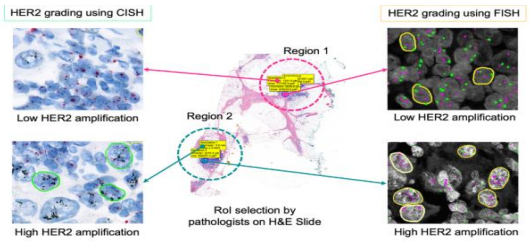

Figure 2. Human epidermal growth factor receptor 2 (*HER2*) status changes depending on the selection of region regardless the test methods.

Methodology: There are few methods on finding ROI from WSI mentioned in literature. The methods can broadly be classified in two categories: those that are based on image-features and those that are based on psycho-physical features of pathologists13,14 also WSI quality evaluation. Methods of image features make use of statistics or structures.

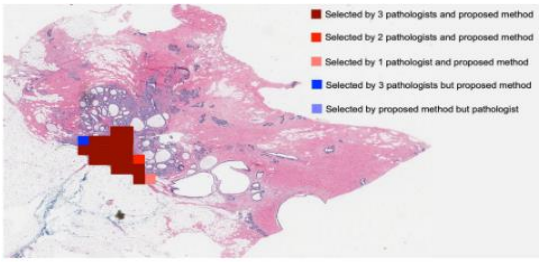

Figure 4. Overlap of ROIs for proposed method and pathologists.

Results and Analysis: The ViT-based method outperformed CNN models, showing higher accuracy (99% at 20×, 97% at 10×) and faster processing (less than 15 seconds per WSI). This study investigated the role of image magnification in ROI detection.

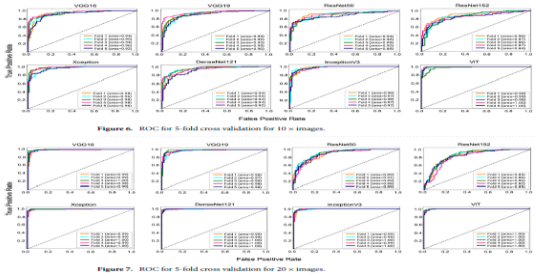

Figure 6. ROC for 5-fold cross validation for 10 × images.

Figure 7. ROC for 5-fold cross validation for 20 × images.

References:

[1] Hossain, M. S. et al. "Region of Interest Selection Using Vision Transformer for Automatic Analysis Using Whole Slide Images." *Scientific Reports* 13, 11314 (2023).

Keywords:
ROI detection, Vision Transformer, Whole Slide Image, Digital Patholoy.