Comparative Study of Image Resolution Techniques in the Detection of Cancer Using Neural Networks

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Abstract. The quality and accuracy of deep learning models for image classification have historically relied on the resolution and quality of the images. Super-resolution has improved the resolution and detail of low-resolution lossy images. This study investigates the efficacy of image resolution techniques in enhancing the binary classification efficacy of cancers from histopathologic images using a deep-learning model. A comparative analysis was conducted across five cancer datasets, using ten image upscaling and downscaling resolutions, and utilising six performance metrics beyond accuracy to evaluate the model performance. The extensive dataset collection in cancer-based medical imaging, image upscaling and downscaling permutations, testing, and experimental pipeline results gave the study a cutting-edge understanding of image resolution in cancer-based histopathological image classification. Low-quality or super-resolved medical images do not improve the accuracy of the binary classification of good cancer-based histopathological images. The comprehensive image resolution permutations and their applicability across multiple cancer datasets have yielded state-of-the-art results that can help advance the thinking around super-resolution and image resolution considerations for binary classification of cancer-based histopathological medical images.

Keywords: Deep Learning, Image Classification, Convolutional Neural Networks (CNNs), Generative Adversarial Network (GAN), Data Augmentation.