A Study of Denoising Techniques for Improved NSCLC Classification Using WSI Histopathology Images

A PROJECT REPORT

Submitted by

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23010201010	**23012005125 of 2023-2024**	**BWU/MCA/23/011**	**Purajit Bera**

in partial fulfilment for the award of the degree

of

Master of Computer Applications

in

Department of Computational Sciences

BRAINWARE UNIVERSITY

398, Ramkrishnapur Road, Barasat, North 24 Parganas, Kolkata - 700125

May, 2025

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BONAFIDE CERTIFICATE

Certified that this project report "**A Study of Denoising Techniques for Improved NSCLC Classification Using WSI Histopathology Images**" is the bonafide work of "**Anwesha Pramanik, Avik Kumar Maiti, Subrata Dolui, Purajit Bera**" who carried out the project work under my supervision.

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ABSTRACT

Lung cancer, particularly Non-Small Cell Lung Cancer (NSCLC), remains one of the deadliest cancers worldwide due to late-stage diagnoses and complex histopathological features. The rise of Whole Slide Imaging (WSI) has revolutionized digital pathology, but the presence of image noise significantly impacts the accuracy of automated diagnostic models. This project investigates and compares four classical denoising techniques—Bilateral, Gaussian, Median, and Wiener filters—to enhance the quality of histopathological WSIs for improved lung cancer classification.

High-resolution WSI data, annotated by oncopathologists under an ICMR-funded initiative, were pre-processed, augmented, and subjected to the selected denoising methods. A custom Convolutional Neural Network (CNN) was trained on the filtered datasets to classify lung tissue samples into three categories: Adenocarcinoma, Squamous Cell Carcinoma, and Non-Malignant. The performance of each denoising technique was evaluated using key metrics such as accuracy, precision, recall, F1-score, and AUC.

The results demonstrate that Median and Gaussian filters offer superior noise suppression while preserving structural features critical for classification. These findings highlight the importance of tailored preprocessing strategies in medical image analysis and suggest that effective denoising can significantly enhance the performance and reliability of AI-driven diagnostic systems in digital pathology.

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