

Leveraging Deep Learning for Automated Analysis of Colorectal Cancer Histology Images to Elevate Diagnosis Precision

Shah Muhammad Imtiyaj Uddin*, Md Ariful Islam Mojumder*, Rashedul Islam Sumon*, Joo Mon-il*, Hee-Cheol Kim*

Institute of Digital Anti-Aging Healthcare/u-HARC, Inje University, South Korea

imtiyaj.dream@gmail.com, arifulislamro@gmail.com, sumon39.cst@gmail.com, joomi@inje.ac.kr, heeki@inje.ac.kr

Abstract— Histopathology plays a vital role in the microscopic examination of colorectal cancer tissues, with a historical focus on the tumor-stroma ratio using texture analysis. However, due to the time-consuming and labor-intensive nature of this approach, there's a need for innovative solutions. This study introduces a groundbreaking shift by employing deep transfer learning to automate tissue classification within colorectal cancer histology samples. Through a comprehensive evaluation of various pre-trained models, including ResNet50V2, VGG19, Xception, InceptionV3, and MobileNet, we have achieved remarkable results. Notably, the ResNet50V2 model stands out with an impressive accuracy of 95%. Beyond its potential to significantly enhance operational responses, this research underscores the effectiveness and consistency of transfer learning as a rapid and efficient tool for colorectal cancer detection and classification.

Keywords— Histology, colorectal cancer, CNN, transfer learning, texture classification



Shah Muhammad Imtiyaj Uddin is pursuing his Master's in the Institute of Digital Anti-Aging Healthcare from Inje University. He has previously worked on multiple real-life projects related to mobile applications, computer vision, data sciences, and user interface systems. His research interest aligns with Computer Vision, Artificial Intelligence, and mobile applications.



Md Ariful Islam Mojumder was born in Bangladesh 1992, received his BSc in Computer Science & Engineering from the World University of Bangladesh, and an MS degree in Artificial Intelligence from the Inje University South Korea in 2022. Currently, he is pursuing his Ph.D. in the Institute of Digital Anti-Aging Healthcare from Inje University. He has previously worked on multiple real-life projects related to computer vision and data sciences. His research interest aligns with Computer Vision, Artificial Intelligence, Metaverse, Signal Processing, Algorithms, Blockchain, and Medical Image Processing.



Rashedul Islam Sumon is pursuing his Master's in the Institute of Digital Anti-Aging Healthcare from Inje University. He has previously worked on multiple real-life projects related to computer vision, data sciences, Smart IoT systems, and text mining. His research interest aligns with Computer Vision, Artificial Intelligence, Medical Image Processing, Algorithms, and Natural Language Processing.



Moon-II Joo received a PhD degree in computer engineering from Inje University in 2018. He is currently working as a research professor at the Institute of digital anti-aging Healthcare, Inje University, Korea. His research interests are in software engineering, human-computer-computer interaction, smartphone programming, and component-based development.



Hee-Cheol Kim BSc at the Department of Mathematics, MSc at the Department of Computer Science at SoGang University in Korea, and Ph.D. in Numerical Analysis and Computing Science, at Stockholm University in Sweden. He is a professor and Head of the Department of the Institute. Digital Anti-aging Healthcare, Inje University, S: Korea. His research interests include Machine learning, Text mining, and Bio Informatics.