Innovative Deep Learning Strategies for Early Detection of Brain Tumours in MRI Scans with a Modified ResNet50V2 Approach

Rashadul Islam Sumon[1], Md Ariful Islam Mazumder[1], Salma Akter[1], Shah Muhammad Imtiyaj Uddin[1], Hee-Cheol Kim[1,2]*

1 Digital Anti-Aging Health Care, Inje University, Gimhae-si, Republic of Korea

2 Department of Computer Engineering, Inje University, Gimhae-si, Republic of Korea

sumon39.cst@gmail.com, arifulislamro@gmail.com, salma05.eu@gmail.com, imtiyaj.dream@gmail.com, heeki@inje.ac.kr

***Abstract*— Classifying brain tumors is a vital part of medical diagnosis, since early identification and distinction between benign and malignant tumors can greatly enhance patient outcomes. In this work, we use magnetic resonance imaging (MRI) scans to categorize brain cancers into four groups: pituitary, meningioma, glioma, and no tumor. Our model was trained and evaluated using a dataset of 18230 MRI pictures of the human brain. To optimize feature extraction and model performance, we suggest a modified ResNet50V2 architecture that is improved with numerous Squeeze-and-Excitation (SE) module. A stunning 99.97% training accuracy and 97.98% validation accuracy were attained by the model. These findings show how our method may help improve the precision and consistency of brain tumor diagnosis, which would be a significant advancement for neurology and medical research.**

***Keywords*— Brain Tumar, Squeeze-and-Excitation, ResNet50V2, Medical diagnosis, MRI**

	**Rashedul Islam Sumon** is pursuing his Ph.D. in the Institute of Digital Anti-Aging Healthcare at Inje University. His research interest aligns with Computer Vision, Medical Image Processing, Metaverse, Artificial Intelligence, and Bio Signal Processing.
	**Md Ariful Islam Mozumder** is pursuing his Ph.D. in the Institute of Digital Anti-Aging Healthcare & Computer Science at Inje University. His research interest aligns with Deep Learning, Computer Vision, Medical Image Processing, Digital Pathology Images, Sensor Data Analysis, Bio Signal Processing, NLP, and Blockchain.
	Salma Akter is pursuing his master's degree in the Institute of Digital Anti-Aging Healthcare at Inje University. Her research interests include Computer Vision.
	**Shah Muhammad Imtiyaj Uddin** is pursuing his Ph.D. in the Institute of Digital Anti-Aging Healthcare at Inje University, he received his BSc in Computer Science and engineering from the World University of Bangladesh in 2017. His research interests include Computer Vision, Machine Learning, and Deep Learning.
	**Hee-Cheol Kim** Ph.D. at Numerical Analysis and Computing Science, at Stockholm University in Sweden. He is a professor an d Head of Institute of the Digital Anti-aging Healthcare, Inje University, South Korea. His research interests include Machine le arning, Computer Vision, Text mining, Bioinformatics, Blockchain, Metaverse, and XAI.