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Empowering Breast Cancer Prognosis: Leveraging Convolutional Neural Networks and Transfer Learning for Enhanced Predictive Models

Akansha Saini[1] and Rishabh Sahani[2]
School of Engineering, P P Savani University, Dhamdod, Gujarat, India[1]
Department of Mechanical and Materials Engineering,
Florida International University, Miami, United States of America[2]
akansha.saini@ppsu.ac.in and rsaha010@fiu.edu
Corresponding Author: Rishabh Sahani

Abstract: *Breast cancer poses a formidable global health challenge, demanding precise prediction models for early detection and treatment planning. This study pioneer's advancements in breast cancer prediction by harnessing 2D Convolutional Neural Networks (CNNs) and Transfer Learning (TL) in deep learning frameworks using histopathological data. Initially, a CNN base model achieves a 50% accuracy on the CBIS-DDSM dataset, which significantly improves to 55% through TL. Subsequently, we propose a refined approach, developing a comprehensive CNN architecture using TensorFlow's Keras API, specifically tailored for image classification. Meticulous experimentation and hyperparameter tuning propel model accuracy to an impressive 97%. Additionally, deep learning techniques are applied to the Invasive Ductal Carcinoma (IDC) Segmentation Use Case dataset, yielding a notable 94% accuracy in breast cancer detection. These results underscore the potential of CNNs and TL in breast cancer prediction and highlight the efficacy of tailored deep learning approaches. Achieving 97% and 94% accuracy on two datasets showcases the promising capabilities of advanced deep learning techniques, offering valuable insights for clinical applications and advancing healthcare outcomes*

Keywords: Deep Learning, Breast Cancer, Convolutional Neural Networks (CNN), Transfer learning (TL)