

“Multimodal Breast Cancer Classification with Medical Based Transfer Learning CNN Algorithms”

A Dissertation

Submitted in partial fulfillment of the requirements for the award of
the degree of

Post Graduate Diploma in Bioinformatics

Submitted by

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May, 2024

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I further declare that the results presented in this dissertation and the consideration made there in, is carried out by me in the School of Applied Science and Technology, Gujarat Technological University, Ahemadabad-382424.

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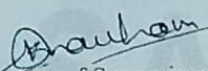
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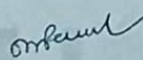
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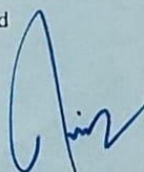
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Acknowledgments

I would like to thank my project advisor, **Dr. Kshipra Chauhan** for guiding and supporting me throughout this entire dissertation project. Her knowledge and experience was invaluable and helped make my project's direction more clear.

I also want to extend my gratitude toward my other project advisor, **Prof. Mahesh Panchal**, Assistant professor at the Graduate School of Engineering and Technology, GTU, for always being available to assist whenever I needed help of him.

I am humble and grateful to my family and friends for pushing me to be better and always supporting me.

Lastly, I would like to appreciate School of Applied Science and Technology, GTU for providing me with this opportunity to learn and grow.

Sanket Mansangbhai Chaudhary

Abstract

According to WHO, more than 2.3 million new cases of breast cancer occurs each year worldwide, which makes it the most common type of cancer among women. Breast cancer treatment can be highly effective at an early stage. But individual medical diagnostic methods have limitations to cover up whole spectrum of complexity to detect cancer in early phase, which motivates to consider multiple medical image modalities to make diagnosis. The first aim of the project was to apply medical based pre-trained CNN models on different medical image modalities separately, changing the parameters of settings for these models, and using data augmentations methods to the medical images to get better classification accuracy. In the next step, to create feature-level fusion based multimodal CNN classification model using most accurate pre-trained model found for each image modality. During this work, have used five different models on three specific breast image modalities datasets: Mammograms, Ultrasound and Thermal images, where each dataset divided into malignant, benign and normal classes and also implemented RadImagenet and chexnet weights on DenseNet121, Resnet50, Inception-v3, Inception-Resnet-v2 CNN architectures. Almost all models performed well after fine-tuning except chexnet, but Inception-Resnet-v2 showed the best result across all modalities with 66%, 81%, 99% accuracy for Mammograms, Ultrasound and Thermal dataset respectively. In addition, it performed better at accuracy as single model used in method1 than three distinct models to create multimodal CNN model mentioned in method 2.

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Acknowledgments

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