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Utilizing Deep Learning for the Real-Time Detection of Breast Cancer through Thermography
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Abstract
The prevention of breast cancer at an early stage is crucial for saving lives and reducing costs. Breast thermography, a complementary diagnostic technique, has shown promise in detecting breast tumors early. This research proposes a framework that leverages real-time thermography video streaming and deep learning models for the early detection of breast cancer. The framework, implemented in MATLAB 2019 on a standard Desktop with a thermal camera, captures high-quality real-time video streams, which are then used as input for classifying normal and abnormal breasts using deep convolutional neural network models, specifically Inception v3, Inception v4, and a modified Inception Mv4. The results demonstrate that the Inception Mv4 model, combined with real-time video streaming, effectively detects even the slightest temperature contrasts in breast tissue by generating a sequence of thermal images from different angles. The contrast is further improved by applying cooling gel to the breast area, resulting in an efficient image acquisition process and accurate detection. Additionally, the study reveals that a mere 0.1% increase in the temperature of the tumor surface area leads to an average improvement of 7% in detection and classification accuracy. © 2023 IEEE.

Author Keywords
Breast cancer; cooling jell; inception mv4; video thermography

Index Keywords
Convolutional neural networks, Deep neural networks, Diagnosis, Diseases, Image enhancement, Infrared devices, Medical imaging, Signal detection, Thermography (imaging), Tumors; Breast Cancer, Breast tumour, Cooling gel, Diagnostics techniques, Inception mv4, Real- time, Real-time detection, Reducing costs, Video thermography, Video-streaming; Video streaming

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