# **CLASSIFICATION OF BREAST CANCER ULTRASOUND IMAGES USING RADIOMIC FEATURES**

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| **ABSTRACT**  Breast cancer is one of the most common types of cancer among women, and its early diagnosis is vital due to the deadly risks. Detecting breast cancer at early stages helps extend the patient's lifespan and facilitates the treatment process. There are various methods available to diagnose breast cancer, such as ultrasound (US), mammogram, magnetic resonance imaging, and biopsy [1]. US imaging is more sensitive than mammography in terms of detection of breast lesions [2]. Therefore, this study focuses on the identification of breast tumors as benign or malignant from US images. In this study, an open dataset containing 647 breast US images was used. There are five main steps for this task: image preprocessing, segmentation, feature extraction, feature selection and classification. In the image preprocessing step, resizing, sharpening, Gaussian filtering and adaptive histogram equalization methods were applied to the images. Then, region of interests were detected in the segmentation step. In the feature extraction step, radiomic features such as first-order statistical features, shape-based features and texture features were extracted. Correlation-based feature selection was applied after the feature extraction step. In the classification part, four different machine learning algorithms were used to classify benign and malignant tumors according to selected radiomic features. These algorithms are J48, Logistic Model Trees, Random Tree, and Random Forest. The Random Forest method achieved a superior accuracy rate of over 91% on this dataset.  **References:**  [1] Puglisi, F., Zuiani, C., Bazzocchi, M., Valent, F., Aprile, G., Pertoldi, B., Minisini, A. M., Cedolini, C., Londero, V., Piga, A., & Di Loreto, C. (2003). Role of Mammography, Ultrasound and Large Core Biopsy in the Diagnostic Evaluation of Papillary Breast Lesions. *Oncology*, 65(4), 311–315. https://doi.org/10.1159/000074643  [2] Ali, E. A., Ahmed, A. M., & Elsaid, N. A. (2020). The added advantage of automated breast ultrasound to mammographically detected different breast lesions in patients with dense breasts. *Egyptian Journal of Radiology and Nuclear Medicine*, 51(1). https://doi.org/10.1186/s43055-020-00171-9 |

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