Joint Event

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Developing an artificial intelligence model to eliminate unwanted pectoral muscle regions in mammography images used for breast cancer diagnosis

Abstract:

The presence of pectoral muscle regions in certain breast images can lead to inaccurate results when artificial intelligence (AI) models are used for tasks such as cancerous mass detection and breast density classification. The aim of this study is to develop an AI application that can automatically clean pectoral muscle regions in mammography images. We proposed using a machine learning approach to train an AI model to accurately segment the pectoral muscle regions in mammography images. We utilized a dataset of 400 mediolateral oblique (MLO) images from the CBIS-DDSM dataset, which were manually segmented and labeled using segmentation software. These images were used for training a U-Net network, a popular architecture for image segmentation, using Python. The trained AI model was then applied to 1000 MLO images and the predicted pectoral muscle regions were removed. Manual checks and corrections were performed on these images to obtain a large training dataset for further training. With the augmented training dataset, the final AI model was trained using the U-Net network. Evaluation using the intersection over union (IoU) ratio showed over 80% overlap between predicted and manually segmented regions, indicating successful pectoral muscle removal. The model's performance suggested its potential for automatic pectoral muscle eliminate in breast imaging. In conclusion, our study demonstrated that it is possible to effectively eliminate unwanted pectoral muscle regions in mammography images using the developed AI model based on the U-Net network.

Biography

Yakup Arslan is a researcher in the Department of Physics at Duzce University, Türkiye. His research areas include the characterization of living tissues, monitoring changes in various biological tissues and designing autonomous systems in these areas by using Electrical Impedance Spectroscopy, Fourier Transform Infrared Spectroscopy and artificial intelligence (AI) techniques. Recently, he has focused on artificial intelligence applications in health. In this context, he is studying to develop an AI model for the purpose of mass and calcification detection and mass classification in mammography images obtained from the Turkish population.