Development of a Computer Aided System for the Classification of Breast Lesions from Mammogram Scans

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Over the past few decades, Computer Aided Diagnosis systems have grown in popularity to improve mammogram performance. Currently, most systems do not suggest diagnosis; rather, a majority of systems only highlight suspicious lesions. This project aims to take performance a step further, using a convolutional neural network trained on images from USF's Digital Database for Screening Mammography to classify breast lesions cropped from mammogram scans and a support vector machine trained off of written patient information to assess risk factor. The support vector machine (SVM) was created and optimized using a genetic algorithm with data gathered from UCI's Mammography Database. Next, the convolutional neural network (CNN) was constructed in use for the classification of breast masses gathered from the mammogram scans. To increase the dataset size, each image was rotated and noise filters were added. Further preprocessing involved resizing the scans. Images were then shuffled randomly and passed through the convolutional neural network for training. The weights from the CNN and SVM were then saved to allow the system to work inside of a web application. Thus, allowing radiologists to save patient information for the support vector machine to assess and upload patient scans for the convolutional neural network to classify. The web application was hosted on a Python Flask back end and all user data was saved to a SQL database. This research will hopefully support the application of machine learning in future practices. Following the submission of this abstract, further research is to come.

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