Systematic Web-based Assessment of Medical Records and Mammography Image for Breast Cancer Likelihood Prediction

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According to the Global Cancer Observatory, there were 65.858 breast cancer new cases in Indonesia (2020) with an estimated 22.430 deaths, mostly due to late treatment and false negative. We propose solutions that use a systematic web-based assessment based on image processing and artificial intelligence (AI) as a doctor's subsidiary information. Our proposed consist of a random forest (RF) and multivariate logistic regression (MVLR) based AI to evaluate a medical record a mammography image filtering, processing, and a pre-trained InceptionV3 based deep convolutional neural networks to evaluate a mammography image. Furthermore, we propose a novel training technique that uses gradual learning, consisting of two-step transfer learning to InceptionV3 model, using CBIS-DDSM datasets (first step) then pre-processed MIAS and DDSM datasets (second step). In the system’s design of first and last part, we use the expert judgment of the radiologist to evaluate the various combinations of image processing methods: normalization, limited adaptive histogram equalization contrast, and Gaussian filter. The results show that RF and MVLR did not give a significant performance difference with test accuracy of 79% and 80% respectively. Thus, both models are adopted to system. Our proposed method, the gradual learning of InceptionV3, achieves significant improvement of 94% compared to 79% without transfer learning, confirming the effectiveness of it method on this task. This research purpose to assist doctors to make better diagnosis, to reduce false negative. In addition, utilizing a web-based system can be implemented in rural areas, more accessible for the public, reducing cancer late stage diagnosis. Keywords: artificial intelligence, breast cancer, DDSM, deep CNN.

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