Machine Learning Applications in Cancer Detection

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Machine learning (ML) is widely applied in robotic technology. From facial recognition to nature language processing, it is becoming an integral part of life. Although ML was originally used in medicine over 50 years ago, only recently it has become highly popular thanks to the exponential advances in computational hardware witnessed in the past decade. An important application of ML in medicine is in the analysis of laboratory data for breast cancer diagnosis. Breast cancer is the most frequently diagnosed cancer among women. Currently, breast imaging for the detection and characterization of suspicious breast lesions relies on mammography and ultrasound. Mammography is the technique of choice for early detection of breast cancer. Although it is very sensitive at finding cancer, mammography results in many false positives. 20% of biopsied cases actually revealing cancer. The remainders turn out to be benign cases. The false diagnosis leads to potentially dangerous and unnecessary surgical procedure for otherwise healthy patients. Preventing benign biopsies is the most important way to improve the efficacy of mammography, especially as screening is becoming more and more widespread. ML methods for tumor classification have emerged as a proposed solution. In the medical industry, support vector machines (SVMs) and artificial neural networks (ANNs) are most common. In this work, SVMS and ANNs are critically analyzed. Each method is tasked with classifying various breast tumors as malignant or benign from a publicly available UCI Wisconsin Breast Cancer Dataset. After allowing the methods to train sufficiently, each of them undergoes an evaluation step towards establishing which of the methods is most suitable for breast cancer diagnosis.

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