Image classification using deep learning algorithm for Thyroid imaging

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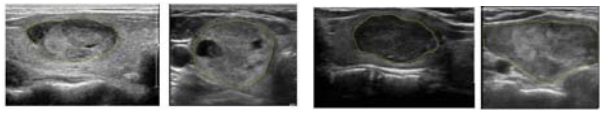
***Abstract*—We conduct image differentiation between benignancy and malignancy for ultrasonography image of thyroid, and also classification of false positive reduction from true positive mass of mammogram images, via convolutional neural networks. For thyroid images we have differentiation accuracy over 76%. For mammogram image classification, we obtained over 80% of accuracy for test datasets. We present the numerical result and corresponding convolutional neural network(CNN) architectures.**

Keywords—Thyroid imaging; Deep Learning; CNN; Ultrasonography; computer aided diagnosis

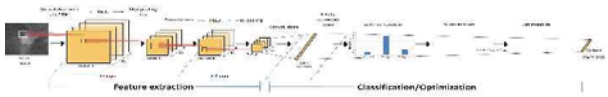
I. INTRODUCTION

Recently the rapidly progressed industries in artificial intelligence technologies reach lots of markets and countries in various fields of our life, and in the area of medical sciences. For the area of technology in computer-aided-diagnosis system (CAD), lots of researchers develop CAD systems to give diagnosis supports, since the human diagnosis suffers from the increasing ratio of cancer patients, which signifies the risk of human mistakes in diagnosis. In this study, we develop and demonstrate techniques to draw a reasonable and effective method to differentiate malignant from benign thyroid nodules on ultrasonography, and the image classification of mass from false positive ones in mammogram, in view of artificial neural network(ANN), especially in CNN.

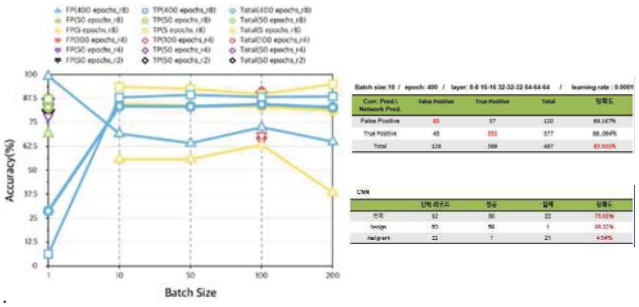
II. METHODS



(a) Benign cases (b) Malignant cases



(a) Two-layered CNN architecture for differentiating breast masses



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