

Towards Development of an Intelligent System for Thyroid Cancer Detection

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Abstract—Thyroid cancer is the most common endocrine nodule that negatively affects the thyroid functions. Recently, the number of thyroid cases has increased dramatically during the past three decades and is mostly found in middle-aged women. To eliminate the increase in the number of thyroid cancer cases, one alternative is to develop an intelligent system for detecting thyroid cancer. This research aims to overcome some clinical problems in the manual thyroid examination, such as tedious, high dependency on medical personnel skills, and subjective results. An intelligent system was developed based on image processing, machine learning, and deep learning techniques performing in the ultrasound images. In general, the scheme was divided into three stages, which are pre-processing, segmentation, and classification. The pre-processing stage is used to enhance data quality since the dataset has a lot of noises and artifacts. In this case, we used several filtering methods to obtain a good quality of data. The segmentation stage is used to segment the nodule area. In this case, active contour followed with the morphological operation was performed. In the last stage, we performed machine learning and deep learning to classify the data. Our experiment successfully achieves good performance in all stages. In future work, automated detection of thyroid cancer severity becomes one of the challenging research works since it directly helps the medical personnel in diagnosing thyroid cancer.

Keywords—*deep learning, image processing, intelligent system, machine learning, thyroid cancer, ultrasound images.*