Ultrasound imaging is one of the fundamental examinations of thyroid nodules, determining whether a patient undergoes a cytological examination, which is essential for the decision on a possible thyroid surgery. Unfortunately, the cytological examination has limited specificity and potential surgery carries risks. Therefore, other diagnostic methods are being sought with hope that they will be able to bring more certainty into diagnostics. One of the new methods is computer-aided diagnosis (CAD), which exhibits promising results using image analysis and machine learning. In this study, we present two somewhat similar, yet different, CAD approaches. The first approach is based on analysing entire nodules using a Segmentation Based Fractal Texture Analysis (SFTA) algorithm that splits the image into individual grayscale bands. Using this approach, we have achieved an accuracy of 92.4% using random forests (RF) and 95% using support vector machines (SVM) on a data set of 40 images evaluated by the cross-validation method. The second CAD approach is also based on the method of multiple image thresholding, but the difference is, that a larger number of predictors describing the binary texture are extracted from the individual grayscale bands. Furthermore, the analysis did not take place on whole nodules, but on patches of a size $17 \times 17$ px. Using this approach, we have achieved an accuracy of 74.4% when classifying individual patches. After averaging the results of classification of all patches in each nodule, an accuracy of 91.6% was achieved using an SVM classifier and 95.0% using an RF classifier on a dataset of 60 images. Since the patch-based approach does not deal primarily with the nodule as a whole, but focuses on the fine texture analysis in small patches, it brings new, clinically relevant information into clinical practice, which may contribute to increase an accuracy of thyroid ultrasound, and thus can partly reduce false positive findings indicated for cytology or surgery.