Conference Proceedings Volume 2562, Issue 1 AIP Conference Proceedings

An acute leukemia subtype classification procedure based on blood sample images

Abstract

It is known to be a very challenging task for hematologist to perform Wright-Giemsa stain blood slides analysis especially with the high demand for an accurate and precise analysis. An inaccurate diagnosis might affect the treatment decisions for the patient. Therefore, this study aims to develop an intelligent classification for acute leukemia based on Wright-Giemsa stain blood slides that can be used as the classification of Acute Lymphoblastic Leukemia (ALL) blood subtypes. The procedure consists of three stages namely image pre-processing, image segmentation, and classification of white blood cells. Initially, the image quality was enhanced by using contrast stretching and histogram equalization. Then, the HSV color thresholding, Otsu's thresholding, Watershed segmentation, and morphological operation techniques were used to segment the leukemia cells. Next, zero paddings and data augmentation were used to resize the input image dataset and synthesize more images for image classification. In the classification stage, two different deep learning classifiers architecture, namely AlexNet and GoogLeNet of convolution neural networks were used to differentiate between the artifact, normal, B-lymphocyte and T-lymphocyte. From 265 samples images, both classifiers yielded promising results, with a testing accuracy of 98.0% for AlexNet and 98.80% for GoogLeNet.