Abstract

Staining preparations of pulmonary tuberculosis (TB) sputum using the Ziehl-Nielsen (ZN) method performed by medical personnel can cause sputum images to have various qualities. Diagnosis of tuberculosis is done by manually analyzing the number of bacteria on a sputum slide using a microscope. Doctors often find it challenging to examine the image directly. It is considered ineffective because it takes time and produces different diagnostics. To help doctors, this study proposes using the K-means clustering algorithm and Markov Random Field (MRF) to segment the Mycobacterium tuberculosis image from its background image and calculate the number of Mycobacterium tuberculosis image. This method was chosen because it has a fast computation time and can handle a limited number of image datasets. The data used is an image of sputum preparations taken using a digital camera integrated with an ocular lens. The results are stored as JPEG images with a 24-bit RGB color scheme. The microscope's total magnification is 1000 times in oil immersion with an image size of 640x360 pixels. The results of tests carried out on 5 data, generated models showed that the accuracy, sensitivity, precision, and specificity of the method for calculating Mycobacterium tuberculosis were 96.99%, 98.68%, 93.17%, and 96.07%.

Keywords: K-means clustering, Markov Random Field (MRF), Tuberculosis (TB)