Chapter 8

Correlation and Analysis of Overlapping Leukocytes in Blood Cell Images Using Intracellular Markers and Colocalization Operation

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ABSTRACT

This chapter contributes to the study of uncertainty of signal dimensions within a microscopic image of blood sample. Appropriate colocalization indicator classifies the leukocytes in the region of interest having ragged boundaries. Signal transduction has been interpreted using correlation function determined fluorescence intensity in proposed work using just another colocalization plugin (JaCoP). Dependence between

the channels in the colocalization region is being analysed in a linear fashion using Pearson correlation coefficient. Manders split, which gives intensity, is represented in a channel by co-localizing pixels. Overlap coefficients are also being analysed to analyse coefficient of each channel. Li's intensity correlation coefficient is being used in specific cases to interpret the impact of staining.

1. INTRODUCTION

Blood sample image usually contains the following: erythrocytes (RBC), leukocytes (WBC) and platelets. The major classification on "White blood cells" are denoted as follows, "Neutrophils", "Eosinophils", "Monocytes" and "Lymphocytes". Each of these subtype cells contributes to the usefulness in body defence. Hence each subtype of cells are taken and classified as imaging dimensions in accordance to its shape. The main limitation behind the four subtypes of leukocytes is that, if they are clumped together they may reduce the accuracy of classification. The purpose of this research is to interpret the biological relevance between specific classes of leukocytes using colocalization procedures. Spatial point characteristics are visually evaluated to provide protrusion of cells associated with the region of interest. The chapter is organised as follows section 2 deals with the previous research of processing blood samples using image processing. Section 3, discusses algorithm for segmenting the class of leukocytes with JaCoP. Section 4 discusses result of medical image segmentation using colocalization method. Section 5 concludes the overall work.

2. LITERATURE SURVEY

"Immunohistochemical" slide image registration accuracy depends on the field of view of few cells. Registration accuracy is achieved with biomarker colocalization using an elastix framework based on dynamic resolution levels (Moles Lopez et al., 2015). The classification of leukocytes based on their shape and lobes of nucleus is given as follows. It can be mononuclear which includes "Monocytes" and "Lymphocytes". The other contains granules named as granulocytes, which includes Neutrophils and Eosinophils. The extraction of WBC cells from blood samples is followed by separation of cytoplasm and nucleus thereby further enhanced classification has been done in (Putzu et al., 2014). Marker controlled watershed has been used for segmentation based on cell nucleus. Subsequently, classification has been done to separate WBC and RBC (Miao & Xiao, 2018). However, misclassification may result in improper movement of WBC leading to cell adhesion.

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