

Clustered red blood cells splitting via boundary analysis in microscopic thin blood smear digital images

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Abstrak

Clustered Red Blood Cells are observed very frequently in the thin blood smear digital images. Separating clustered Red Blood Cells from the single Red Blood Cells and splitting of clustered Red Blood Cells into single Red Blood Cells is a challenging job in the computer-assisted diagnosis of blood for any disorder in many diseases like Complete Blood Count Test, Anemia, Leukemia and Malaria etc. The mentioned problems are highly laborious in manual microscopy for the hematologists. Many techniques currently existing for the solution suffer from both under- and over- splitting problems when highly complex clusters of Red Blood Cells occur. In addition, the existing techniques are not computationally efficient. In this paper, we address the aforementioned problems, firstly by considering the boundaries of the convex hulls of clustered Red Blood Cells and secondly, by splitting the boundaries according to the number of Red Blood Cells in relation to distance measures. Furthermore, we draw circles using a mid-point circle algorithm at each boundary cleavage to give an illusion of the Red Blood Cells. The test results of the proposed technique on a standard online dataset are presented in two ways. Statistically first of all by achieving an average recall of 0.964 and precision of 0.970 while their F-measure achieved is 0.962 as well as secondly through ground truth data with visual inspections.