

Hematology and Digital Image Processing: Watershed Transform-Based Methodology for Blood Cell Counting Using the WT-MO Algorithm

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Abstract:

Background: Most diseases can be detected by routine examination, even if they are in the initial phase. Currently, one of the most requested medical laboratory tests is that which allows detecting from bacterial infections until leukemias. However, for less favored populations, this examination can be seen as having a high cost.

Methods: Thus, this study introduces an algorithm of segmentation of images capable of detecting and counting red blood cells and leukocytes present in digital images of blood smear. The methodology was named by WT-MO, once it relies on the concepts of Watershed Transform and Morphological Operations. The experiments were conducted in the MATLAB software simulation environment, where 25 images were used in order to evaluate the accuracy, processing time, and execution time of the WT-MO algorithm.

Results: The results show that the WT-MO methodology presents high accuracy, reaching 96% and 92% in the red blood cell and leukocyte counts, respectively; reliability and low processing time, reaching an average processing time and execution time, achieving from 0.74 to 2.17 seconds. Therefore, the WT-MO algorithm can be seen as the first step in making laboratory tests more accessible to populations in underdeveloped and developing countries.

Conclusion: The WT-MO methodology helps not only disadvantaged populations gain access to low-cost, high-reliability tests but also has excellent potential for use in laboratories in developed countries.

Keywords: eHealth, Blood Cell Counts, Leukocytes, Erythrocytes, Image Processing.

1. Conflict of interest statement

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2. Authors' biography

No Biography.

3. References

No references