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A STUDY ON THE AUTOMATIC ANALYSIS OF FLUORESCENT IN-SITU HYBRIDIZATION IMAGES IN THE DIAGNOSIS OF CHRONIC MYELOID LEUKAEMIA

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ABSTRACT

In this research report, algorithms for automatic real-time detection of FISH images of chronic myeloid leukaemia (CML) cases were explored. The use of a MATLAB environment was adopted for development. Two techniques, the first using watershed segmentation and the other using an existing colour filter, were implemented. Both aimed to segment the required CML colour image using different colour filtering techniques in order to analyse the images. The project was extended by combining the strengths of the two to develop an overall algorithm. This final designed prototype was tested on 100 images. For the purpose of this study, the problem was simplified by excluding superimposed chromosomes. The results were compared to the diagnosis made by a trained cytogeneticist operating a currently installed professional system, which was treated as the reference method. The results on this limited dataset showed a sensitivity of 0.86 and a specificity of 0.97. This study suggests that an image processing approach of the type developed in this project may be feasible. However this would need to be refined and developed further to allow, for example, its extension to include causes of false positives that were excluded for the purpose of this study. Suggestions for enhancements and future developments which could approach the performance of existing systems and achieve the required performance for diagnostic use, are discussed in light of these findings.