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G-Band Chromosome Segmentation, Overlapped Chromosome Separation and Visible Band Calculation

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ABSTRACT Chromosome segmentation and overlap removal plays a vital role in chromosome analysis. Genetic disorders are detected through chromosome analysis. Many methods for chromosome analysis were proposed and most of them require human intervention at some point. In this paper, a novel idea to extract the visible bands in human chromosomes are explained, chromosome contour is obtained using Multi-object Geodesic Active contour (MOGAC). Hypothesis based chromosome segmentation for overlap separation is performed. The initial step is to segment and separate the non-overlapped chromosomes from metaphase spread chromosome image using MOGAC. This algorithm improves the segmentation accuracy for multiple object segmentation. For overlapped chromosomes, an automatic geometry separation algorithm is developed. This helps in separating the overlapped chromosome images. The main step is to identify the cut points on the image. With the obtained cut points, hypothesis lines are drawn over the overlapped region. This line shows the separation region. Hypothesis verification is done for obtaining the proper disentangled chromosome images. Vector quantization is used for band calculation in L^*a^*b colour space. The accuracy of the algorithm is about 96%. Centromere identification is performed by distance transformation. Based on band measurement and centromere position, homologous chromosomes are obtained.