Image segmentation is one of the crucial steps for image analysis, interpretation and recognition. This paper presents cross diagonal neighborhood approach based on local direction pattern (LDP) descriptor. Edge based segmentation divides images into regions based on local edge responses. The local attributes and edge responses are the crucial factors for edge based segmentation scheme. The LDP descriptor precisely measures the amount of each edge response in and around a centre pixel. The LDP overcomes the noise related problems of the local binary operator (LBP). On LDP images three categories of texture units are derived by partitioning the 3 x 3 neighborhood in to cross texture unit (CTU) and diagonal texture unit (DTU), to reduce the huge dimensionalities involved in the basic texture units and to characterize the local edge information precisely. The segmentation method is tested on five large databases namely Wang, Oxford flowers, Indian facial expressions, Brodatz textures and standard images from Google. The segmentation results demonstrate the efficacy of the proposed method.
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**Index Terms**

Computer Science  
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**Keywords**

LDP, Texture unit; cross and diagonal; edge responses;