

E1-13: Comparison of methods for detection of edges in digital images

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The detection of edges plays a vital role in feature extraction in Computer Vision systems. In these systems the extracted features from a digital image are used with

the domain knowledge of that particular class of images to interpret the contents of the image. Edges and boundaries of objects in an image provide a vital clue about the shape of the objects which could be used in the subsequent interpretation stages. Several methods for edge detection are presented in the literature and the objective of this study was to compare some of these widely used methods and identify which methods are suitable for different types of images. The edge detection methods considered were the Sobel, Laplacian, Marr Hildreth and Canny.

These 4 methods were implemented on a PC and applied on different types of images. The results showed that the Marr/ Hildreth and the Canny methods detect the edges in a noisy image fairly accurately than the Sobel and the Laplacian methods. These 2 methods detect fine narrow edges which the other 2 methods fail to detect. Both the Marr Hildreth and the Canny methods have to be applied using different sizes of operators. The Marr/Hildreth method has the advantage of producing continuous contours as edges, therefore subsequent edge linking to form boundaries was not necessary. The small size operators in the Marr/Hildreth method detect finger edges while the large ones detect the major edges in the image. The Canny operator was a directional operator which provides accurate detection of fine edges when small size operators are used and major edges when large size operators are used. However, this method has the disadvantage of needing a non-maximum suppression and edge linking processes to extract boundaries of objects in the image.