Object Detection in Digital Images under Non-Standardized Conditions Using Illumination and Shadow Filtering

Authors : Waqqas-ur-Rehman Butt, Martin Servin, Marion Pause

Abstract : In recent years, object detection has gained much attention and very encouraging research area in the field of computer vision. The robust object boundaries detection in an image is demanded in numerous applications of human computer interaction and automated surveillance systems. Many methods and approaches have been developed for automatic object detection in various fields, such as automotive, quality control management and environmental services. Inappropriately, to the best of our knowledge, object detection under illumination with shadow consideration has not been well solved yet. Furthermore, this problem is also one of the major hurdles to keeping an object detection method from the practical applications. This paper presents an approach to automatic object detection in images under non-standardized environmental conditions. A key challenge is how to detect the object, particularly under uneven illumination conditions. Image capturing conditions the algorithms need to consider a variety of possible environmental factors as the colour information, lightening and shadows varies from image to image. Existing methods mostly failed to produce the appropriate result due to variation in colour information, lightening effects, threshold specifications, histogram dependencies and colour ranges. To overcome these limitations we propose an object detection algorithm, with pre-processing methods, to reduce the interference caused by shadow and illumination effects without fixed parameters. We use the Y CrCb colour model without any specific colour ranges and predefined threshold values. The segmented object regions are further classified using morphological operations (Erosion and Dilation) and contours. Proposed approach applied on a large image data set acquired under various environmental conditions for wood stack detection. Experiments show the promising result of the proposed approach in comparison with existing methods.