Saliency detection method fused depth information based on Bayesian framework

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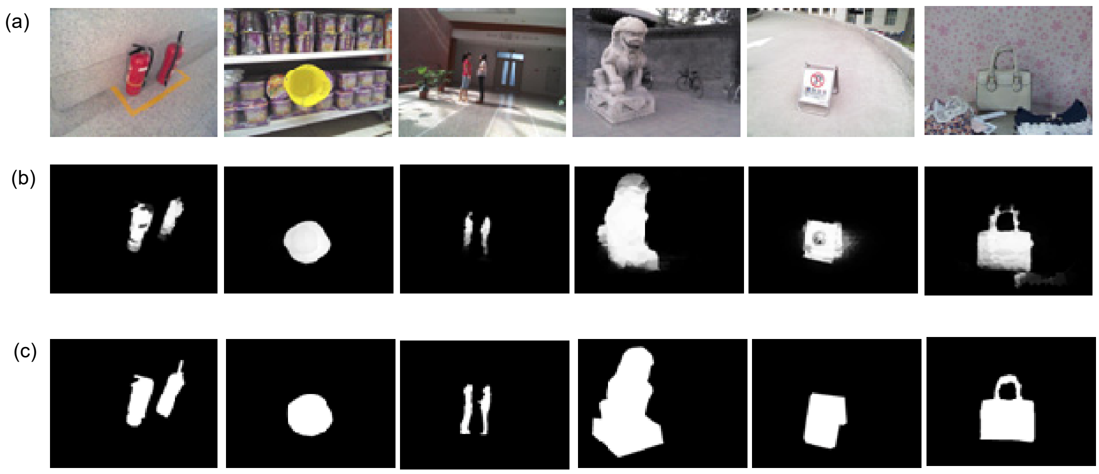

Saliency maps on the NPLR-RGBD dataset. (a) Color Image; (b) Our results; (c) GroundTruth

Overview: Saliency detection aims to detect salient objects in an image and filter out background noise by simulating human visual attention mechanism. Most current methods for saliency detection rely on the color-difference between salient object and background while ignoring depth information, which has been proven to be important in the human cognitive system. This leads to not good enough saliency detection results especially when the salient object presents in a low-contrast background with confusing visual appearance. To address this problem, we present a saliency detection method fused depth information based on the Bayesian framework. Firstly, in order to reduce the computational complexity, we use SLIC algorithm on the RGB images and depth image. Secondly, we extract the tinctorial information and spatial information of the superpixel from the input RGB picture, and obtain the color-based saliency map using a variety of contrast methods which includes global contrast, local contrast and foreground-background contrast method. Meanwhile, extracting the depth information of the superpixel from the input depth picture, and obtaining the depth-based saliency map based on anisotropic center-surround difference. Third, an object-biased Gaussian model acts on color-based saliency map and depth-based saliency map for the purpose of filtering out background noise further. Finally, we fuse the color-based saliency map and the depth-based saliency map based on the Bayesian framework. Specifically, depth-based saliency map is used as the prior probability, and calculate the likelihood probability using color-based saliency map, then obtain a posterior probability based on the Bayesian formula. Exchanging the role of depth-based saliency map and color-based saliency map in the Bayesian framework could obtain another posterior probability. The finally saliency map is defined as the product of two posterior probability in this paper. Our approach is evaluated on the published NLPR-RGBD dataset and the NJU-DS400 dataset, and experimental results show that our approach can effectively detect the salient object in a low-contrast background with a confusing visual appearance by filtering tinctorial information and deep information. Furthermore, compared with other four prevailing methods by precision score and the F-measure score, our approach is superior to the other four prevailing methods.

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