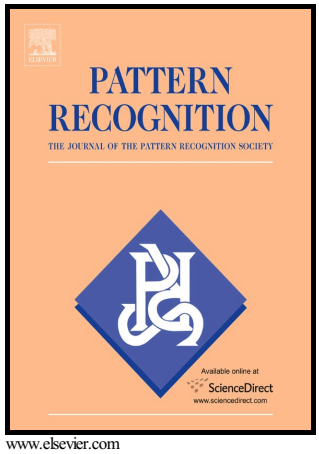

Salient object detection via spectral matting

Syed S. Naqvi, Will N. Browne, Christopher Hollitt

PII: S0031-3203(15)00357-X
DOI: http://dx.doi.org/10.1016/j.patcog.2015.09.026
Reference: PR5530

To appear in: *Pattern Recognition*

Received date: 15 February 2015
Revised date: 19 September 2015
Accepted date: 24 September 2015

Cite this article as: Syed S. Naqvi, Will N. Browne and Christopher Hollitt Salient object detection via spectral matting, *Pattern Recognition* http://dx.doi.org/10.1016/j.patcog.2015.09.026

Salient Object Detection via Spectral Matting

Syed S. Naqvi[a,*], Will N. Browne[a], Christopher Hollitt[a]

[a]*School of Engineering and Computer Science*
Victoria University of Wellington PO Box 600 Wellington 6140 New Zealand

Abstract

A number of pro-superpixel based saliency models have recently been proposed, which segment the image into small perceptually homogeneous regions before saliency computation. Such approaches ignore important object properties, resulting in inappropriate object annotations and considerably different saliency assignment to the various regions of an object. Although previous techniques employ multi-scale saliency maps in an attempt to rectify this problem, it becomes difficult to retain the characteristics of proto-objects after the first stage of processing. We introduce *matting components* based saliency to address the problems of inappropriate object annotations and inappropriate saliency assignment to object regions. The matting components account for proto-object properties by employing object aware spectral segmentation. To complement the matting component based saliency, we also employ the smallest eigenvectors of a matting Laplacian matrix. Color spatial distribution features are employed to capture global relationships at the pixel-level and assist the process of matting components based saliency computation. A novel joint optimization framework is introduced to fuse the features and learn important associated parameters. The contributions of the proposed approach are two-fold. The first contribution is the introduction of proto-objects aware spectral segmentation to obtain an accurate foreground saliency. The second contribution is the joint optimization of important parameters in conjunction with learning feature importance. In contrast to superpixel based approaches, the proposed model is able to completely annotate salient objects and assign similar saliency

*Corresponding Author: Syed S. Naqvi, School of Engineering and Computer Science Victoria University of Wellington PO Box 600 Wellington 6140 New Zealand; Email, syed.saud.naqvi@ecs.vuw.ac.nz; Phone, +64 4 463 5233 x7548

Email addresses: syed.saud.naqvi@ecs.vuw.ac.nz (Syed S. Naqvi), will.browne@ecs.vuw.ac.nz (Will N. Browne), christopher.hollitt@ecs.vuw.ac.nz (Christopher Hollitt)