



Technology Commercialization Opportunity

Multi-resolution Adaptive and Progressive Gradient-based
Color Image SEGmentation (MAPSEG™)

Technology Description

The MAPSEG algorithm integrates color, texture, and gradient information in a multiresolution framework, and is based on the principle that the segmentation results of images at low-resolution can be used to efficiently segment their corresponding high-resolution counterparts.

The algorithm is initiated with a dyadic wavelet decomposition scheme of an input image accompanied by a vector gradient calculation of its color-converted counterpart in the 1976 Commission Internationale de l'Eclairage (CIE) L*a*b* color space. The resultant gradient map is used to generate thresholds to segregate regions of varying gradient densities at different resolution levels. At each level, the classification obtained by a growth procedure is integrated with a texture model by using a unique region-merging procedure to obtain an interim segmentation. A confidence map and nonlinear spatial filtering techniques are combined, and regions of high confidence are passed from one resolution level to another until the final segmentation at the highest (original) resolution is achieved.

A performance evaluation of several hundred images using a prominent segmentation evaluation metric called the Normalized Probabilistic Rand (NPR) index demonstrates that MAPSEG computationally outperforms published segmentation techniques with superior quality.

Keywords: Image segmentation, pre-process, progressive region growth, multivariate region merging imaging, image understanding and analysis.

Technology Readiness

MAPSEG is presently at this level of readiness: (Note: The alpha version is applicable only for color (RGB) imagery. We are currently in the process of extending this technology for handling high dimensional remotely sensed data)

Idea	Concept	Prototype	Alpha Version	Beta Version	Released
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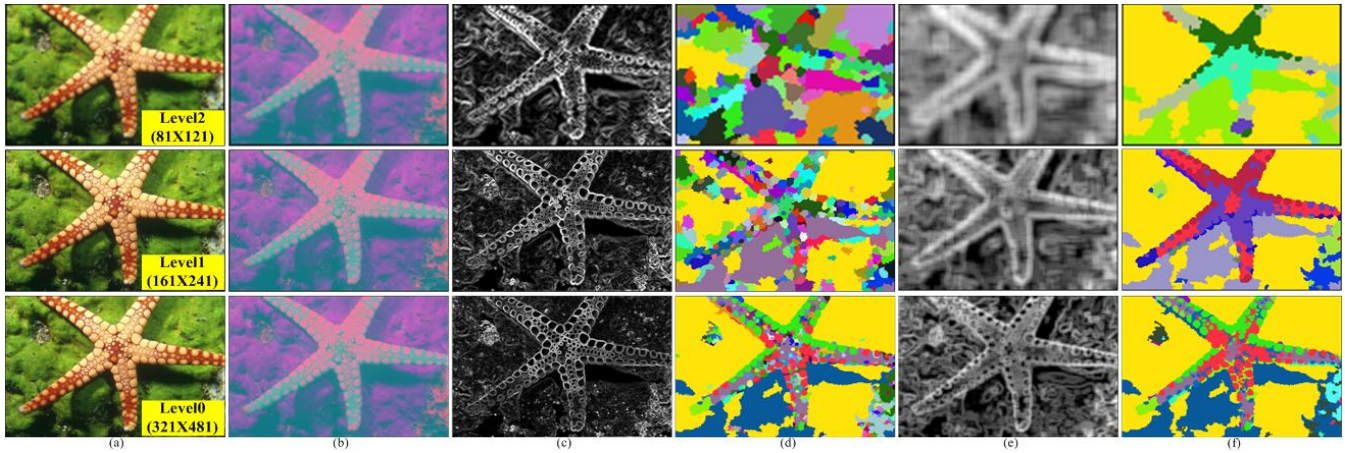
The developers of MAPSEG will work with licensees to finalize the development and move MAPSEG towards a “released version.”

Intellectual Property

MAPSEG was awarded US patent 8515171.

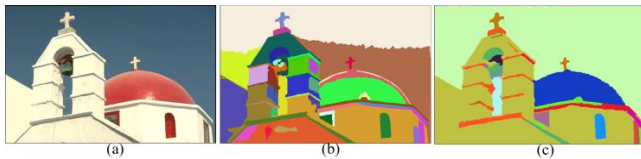
Applications

MAPSEG can be used as a pre-processing step in a variety of imaging applications including printing, biomedical, remote sensing, surveillance (involving recognition and tracking).



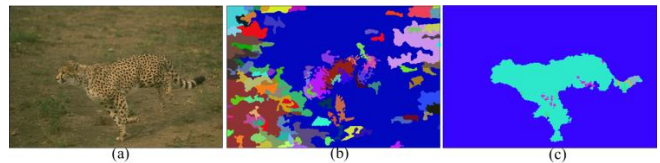
The Six Modules of MAPSEG

MAPSEG is comprised of six modules processed at different image resolutions: (a) Input RGB image (b) convert image into CIE L*a*b* color space (c) compute gradient/edge information (d) initial estimate of various regions (e) texture characterization (f) final segmentation output where every region has a distinct color.



Handling Structural Variations

Gradient variations in natural scene images, as seen in the image of a church, often cause images to be over-segmented. A previous method (b) over-segments the sky and structural details of the church due to differences in illumination. MAPSEG (c) efficiently handles the illumination issues resulting in an accurate segmentation.



Distinguishing Textures

The image of a cheetah demonstrates the challenge of distinguishing textures when the dissimilar textures have great color similarity. Previous methods (b) were unable to distinguish the cheetah camouflaged by the sandy background; the results shown in (c) demonstrate the significance of MAPSEG's texture characterization module.

Target Customers

- Printing and Imaging Industries
- Biomedical Imaging Device Manufacturers
- Defense and Remote Sensing Industries
- Graphics Processing System Manufacturers

Opportunity

RIT's Intellectual Property Management Office (IPMO) is interested in working with those parties who are qualified and interested in the commercialization of this MAPSEG intellectual property. Arrangement types include licensing the application to existing organizations or new organizations that have expertise in the field or related fields.

Contact

Those interested in learning more about this opportunity should contact:

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