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Licensing Opportunity

TTO – Technology Transfer Office

Scale-adaptive media item segmentation technique

Ref. Nr

6.1581

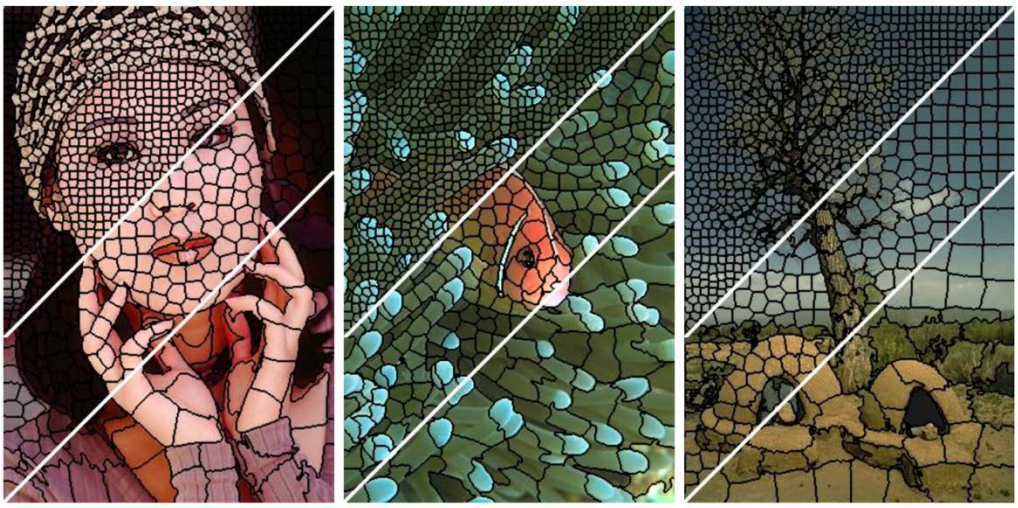

Figure 1. Image segmented using our SLIC into superpixels of size 64, 256, and 1024 pixels. The superpixels are compact, uniform in size, and adhere well to region boundaries.

Keywords

Image segmentation, superpixel, computer vision, media image, local clustering, 5-D CIELAB space, color similarity, proximity, under-segmentation error, boundary recall.

Intellectual Property

Achanta et al., US10229337B2

Publications

"SLIC Superpixels*" published in IEEE Transactions on Pattern Analysis and Machine Intelligence (Volume: 34, Issue: 11, Nov. 2012)

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Description

Image segmentation continues to be a central topic of many computer vision applications with the aim to extract useful information from the available images. There are plenty of domain specific segmentation algorithms in the research area. The current invention segments the images after simplifying them into small clusters of pixels where each cluster is called superpixel. The method of taking the local representation of the image instead of processing the whole image itself simplifies the computational cost of algorithms by reducing the size of the image into smaller amount of color clusters, and importantly keeping the main content of the image.

The suggested invention is called Simple Linear Iterative Clustering (SLIC) algorithm which generates superpixels by clustering pixels based on their color similarity and proximity in the image. The similarity between pixels is calculated with a new defined distance metric for 5D space features which encapsulates pixel color vector and pixel position in the image.

SLIC begins sampling the K regularly spaced cluster centers and move them to seed locations based on the lowest gradient position in small neighborhood of the image. The performance of the invention is measured through under-segmentation error which measures the segmentation error of the algorithm compared to manually(human) segmented image and boundary recall which measures the fraction of human segmented edges falling within one pixel of a least one superpixel boundary.

Advantages

- Low under-segmentation error
- High boundary recall
- Equally sized compact superpixels
- Linearly convergence in computational cost and memory usage
- Few input parameters.

Applications

- Object class recognition
- Medical image segmentation