Proceeding Book of the y-BIS Conference 2019:

Recent Advances in Data Science and Business Analytics

September 25 – 28, 2019
Mimar Sinan Fine Arts University / Fındıklı Campus

Edited by

Ozan Kocadagli
Ali Erkoc
Bilge Baser
Nihan Acar Denizli
Tahir Ekin
LOC of y-BIS 2019

Web design by
Ali Zafer Dalar

Cover photo by
Aylin Yaman Kocadagli

Cover design by
Ali Mertcan Kose

Damla Ilter

Published by

Mimar Sinan Fine Arts University Publications : 884

ISBN:

978-605-5005-95-5

Serial Number:

eMSGSÜ-FEF-İST-019/09-Kat1

Classification-based Approach for Validating Image Segmentation Algorithms

Luca Frigau*[1], Francesco Mola[1],Giulia Contu[1]

[1] Department of Economics and Business Sciences

In computer vision, image segmentation is a process that partitions an image into different objects of interest. Despite it is a trivial activity (almost always) to the human vision, in image processing, image understanding and artificial intelligence that is one of the most demanding problems [1]. In literature several image segmentation algorithms have been developed [2], which follow both global and local approach. Nonetheless, to assess and consequently to compare their outputs is still challenging.

Specifically, the image segmentation algorithms can be compared considering three factors: reliability, viability and validity [3]. Among these three factors, validity is the most challenging one, since validating the output of a segmentation algorithm is very important, both for users of algorithms and for algorithm developers.

We propose an approach for validating the image segmentation algorithms that ranks the performances of two or more outputs obtained from different image segmentation algorithms, consequently being able to define the best one.

This is a classification-based approach that ranks the outputs of different segmentation algorithms by performing machine learning classifiers. Furthermore, it takes into accounting for both the computational complexity of the validation experiment and for the robustness of its results: Fisher consistent estimates are obtained with sample of pixels of extremely-reduced size by using a subsampling approach.

This image validation approach has been tested on several real images differing each other in terms of shape, color and texture.

Keywords: Image Validation; Subsampling, Machine Learning

References

[1] David G. Lowe. Distinctive image features from scale-invariant key- points. International Journal of Computer Vision, 60(2):91–110, Nov 2004. ISSN 1573-1405. doi: 10.1023/B:VISI.0000029664.99615.94. URL https://doi.org/10.1023/B:VISI.0000029664.99615.94.

[2] HP Narkhede. Review of image segmentation techniques. International Jour- nal of Science and Modern Engineering, 1(8):54–61, 2013.

[3] Jayaram K Udupa, Vicki R Leblanc, Ying Zhuge, Celina Imielinska, Hilary Schmidt, Leanne M Currie, Bruce E Hirsch, and James Woodburn. A frame- work for evaluating image segmentation algorithms. Computerized Medical Imaging and Graphics, 30(2):75–87, 2006.

*Corresponding author: frigau@unica.it