

Effects of Different Superpixel Algorithms on Interactive Segmentations

ABSTRACT

Semi-automated segmentation or more commonly known as interactive image segmentation is an algorithm that extracts a region of interest (ROI) from an image based on the input information from the user. The said algorithm will be repetitively fed with such input information until required region of interest is successfully segmented. To accelerate this segmentation procedure as well as enhancing the result, pre-processing steps can be applied. The application of superpixel is an example of such pre-processing step. Superpixel can be defined as a collection of pixels that share common features such as texture and colours. Though employed as pre-processing step in many interactive segmentation algorithms, to date, no study has been conducted to assess the effects of such incorporations on the segmentation algorithms. Thus, this study aims to address this issue. In this study, five different types of superpixels ranging from watershed, density, graph, clustering and energy optimization categories are evaluated. The superpixels generated by these five algorithms will be used on two interactive image segmentation algorithms: i) Maximal Similarity based Region Merging (MSRM) and ii) Graph-Based Manifold Ranking (GBMR) with single and multiple strokes on various images from the Berkeley image dataset. The result of testing had shown that MSRM achieved better result compared to GBMR in both single and multiple input strokes using SEEDS superpixel algorithm. This study summary concluded that at different superpixel algorithms produced different results and that it is not possible to single out one particular superpixel algorithm that can work well for all the interactive segmentation algorithms. As such, the key to achieving a decent segmentation result lies in choosing the right superpixel algorithms for a given interactive segmentation algorithm.