Reaction Report 2: Seam Carving for Content-Aware Image Resizing

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Date: September 28th, 2012

1 Major Contribution

In my opinion, the major contribution of this paper is to propose a quite simple but powerful algorithm to carve images as well as to retarget images, and effectively reduce the processing complexity and memory cost. Both the calculation of the minimal seams' cost and the function to find the optimal orders of carving an image to a given order were defined and derived in a way that can be implemented by dynamic programming, which stored the results of the sub-problems in the early calculation and used the previous results to compute the larger problem. Oppositely the type of recursive algorithm, the procedures of calling a function within a function and getting the results from the internal functions to continue the following conduction really waste a lot of time, especially in Matlab. Also this top-to-bottom structure in dynamic programming is much easier to understand each step in the computation from the beginning to the end. Besides, in the section of retargeting with optimal seams-order, instead of storing the intermediate image the author employed a n*m 1-bit map to store the path of choosing which direction of seam carving in each step, and used this map to conduct corresponding direction of seam carving operations in order to get the specified size of image. In this way, the memory cost is definitely reduced.

2 An Interesting Extension

From the output images in both directions of seam carving, sometimes we can apparently find out several distortion of lines, object contours and color dismatch. For example, after conducting the vertical seam carving, sometimes the lines or apparent contours in horizontal or in similarly horizontal directions will show some kind of shift and distortion. Or the left and right pixels color in the seam path will show some dismatch. I think this situation might due to that the whole algorithm aims to find the seams with the low energy in the input images without considering the energy of the output images. Probably we can find an energy relationship between the input and output images as a way to create more nature and coherent images. Perhaps the simplest way to balance the lost seams and the generated images is to coordinate the color or gradient in the seam crossing path, which are the positions that have been removed low energy pixels and filled with the next pixels. For instance, we can employ the algorithm mentioned in the seams insertion section that average the filled pixel value with the top, left, bottom, and right neighborhood pixel values. In this way, the previous distinct seam crossing will be blurred and normalized, and it will be not quite easy to figure out in the generated images. Also I think in this algorithm the work of carving several seams in one direction was done by computing specific number of seams in the original images and cut them together to get the target images. However, I think this task should be done by removing one seam from the original image then calculating the next seam in the resized image. In this way, we can reduce the error of looking for the smallest seam path cased by the changes in energy map of removing several pixels and refilling them.