A Method to Zoom of Infrared Images

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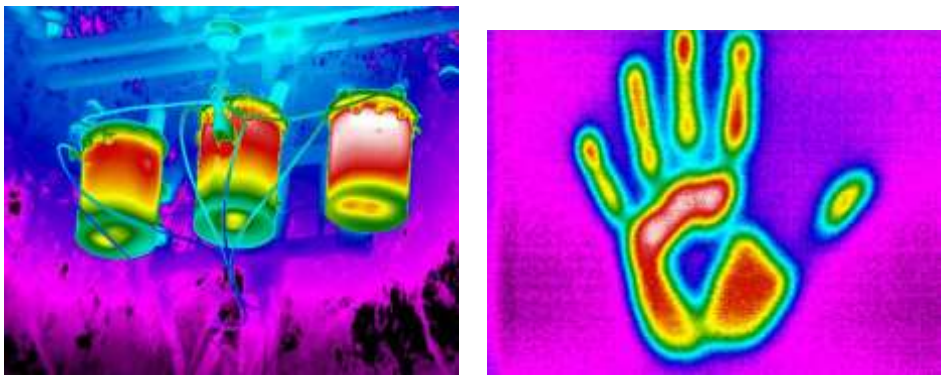
Abstract. In this paper, we propose a new zooming method for infrared thermal images. Generally thermal images are low-resolution images and requested to be up-sampled. This proposed technique can be used in the fields of biology and medicine. We compared three well-known interpolation approaches, near neighbor, bilinear and bicubic methods. Experimental results show that all results are satisfactory. In particular, bilinear and bicubic methods provide almost the same performance.

Keywords: interpolation, thermal image, image zooming.

1 Introduction

The thermal image cameras discern radiation energy in the infrared range of the electromagnetic spectrum and provide images of that radiation energy [1]. This process is called thermograms, and the range is approximately 9,000-14,000 nanometers. A thermal image/video may have low temperature deviation, and low visual contrast variation (or low thermal contrast variation) in biology or medicine applications cause the strongly require of high preciseness in image processing [2]. Figure 1 shows the thermal images from thermographic camera.



(a) (b)

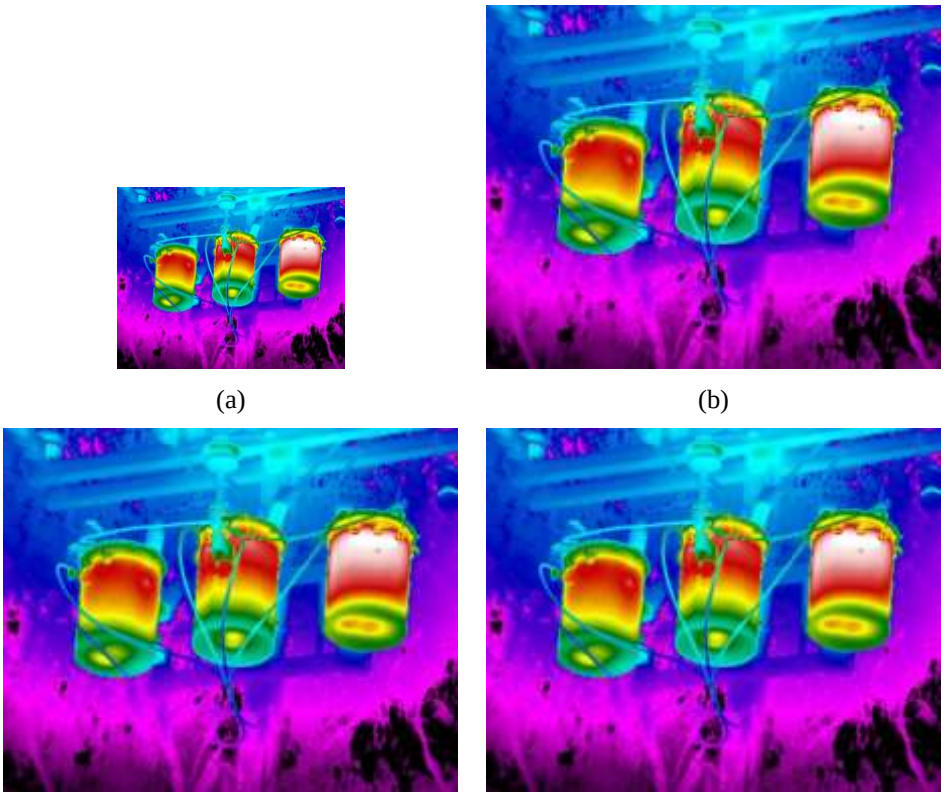
Fig. 1. Two examples of distance map.

2 Image Zooming Approach and Its Results

There are three well-known image interpolation methods: nearest neighbor method, bilinear method, and bicubic method. Images shown Fig. 1 is firstly down-sampled by factor of 2 as shown in Fig. 2(a). Let us consider doubling the size of above images with three approaches.

Figure 2(b) is the result of nearest neighbor method. Figures 2(c) and (d) show the result images of bilinear and bicubic methods. The resulting image from nearest neighbor method has undesirable cragginess.

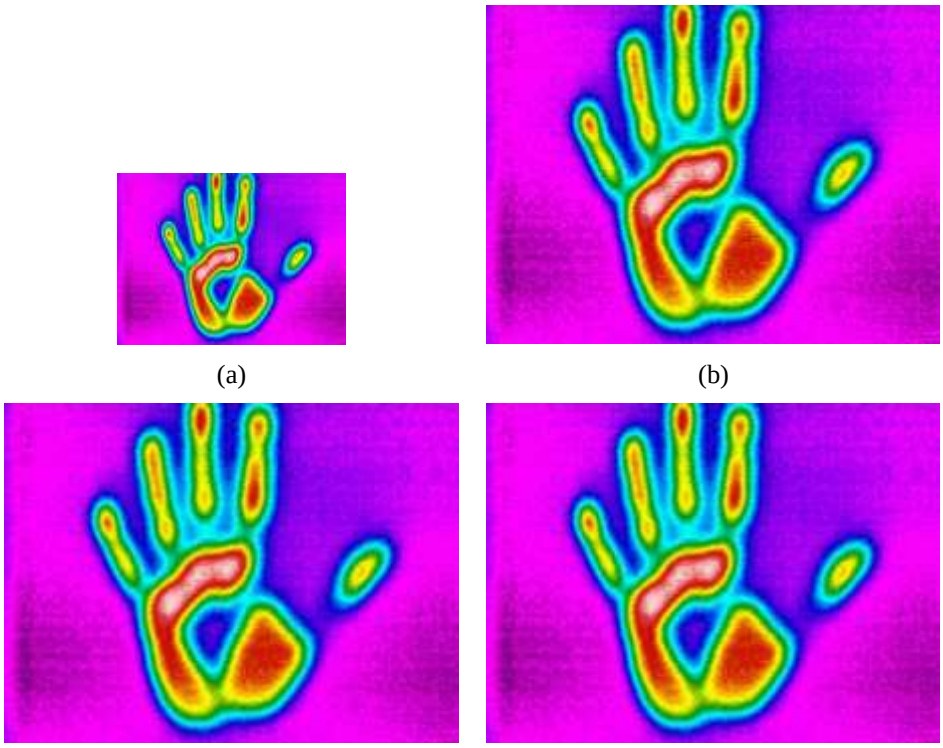
The bilinear and bicubic methods are normally better than the nearest neighbor method. However, sometimes they cause undesirable softening of details and can still be somewhat sharply notched. In the same manner, we conducted experiments with other thermal image as shown in Fig. 3. The softened area can be enhanced by edge detection approach [3] as shown in Fig. 4.



(a) (b)

(c) (d)

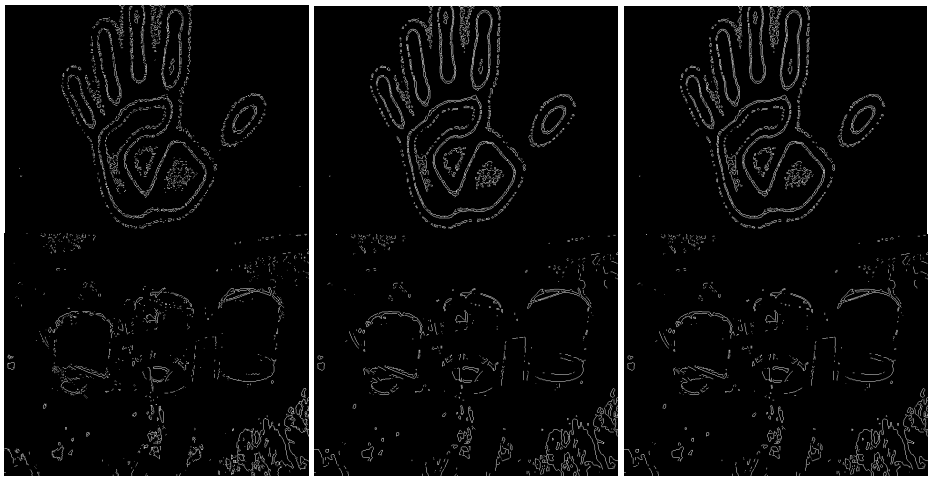
Fig. 2. (a) Original down-sampled image, (b) nearest neighbor method, (c) bilinear method, and (d) bicubic method.



(a) (b)

(c) (d)

Fig. 3. (a) Original down-sampled image, (b) nearest neighbor method, (c) bilinear method, and (d) bicubic method.



(a) (b) (c)

Fig. 4. Detected edges from (a) nearest neighbor method, (b) bilinear method, and (c) bicubic method.

3 Conclusions

In this paper, a new zooming approach was introduced. The thermal images are generally low-resolution images and are requested to be up-sampled. This proposed zooming approach can be applied in the fields of biology and medicine.

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