

Algorithmic Painter: a NPR method to generate various styles of painting

Atsushi Kasao †
† Department of Design
Tokyo Polytechnic University

Kazunori Miyata ‡
‡ Center for Knowledge Science
Japan Advanced Institute of Science and Technology

1 Introduction

This paper proposes a non-photorealistic rendering (NPR) method named “Algorithmic Painter” (AP), which can replicate various styles of painting with a newly developed segment classification process.

“Synergistic Image Creator (SIC)” is a picture generation system that takes the painting process into consideration [Kasao & Nakajima 1998]. We have adopted SIC as the framework for Algorithmic Painter because SIC codes the whole source image into vector style data before creating the artwork. The coded image data are useful for a visual design analysis of the image structure.

Our final goal is to develop a system that “paints” an artwork from a captured image, the same way a picture might be painted from an image projected on the retina.

2 Algorithm

The proposed method automatically extracts three types of image segments from a source image: edge area, homogeneous areas, and highly contrastive areas. Next, each obtained image segment is converted into a brushstroke. Finally, a target picture is rendered by assigning a color to each pixel. This method can control the level of detail of individual brushstrokes, so that an obtained image can incorporate various artistic touches.

AP processes images in $L^*a^*b^*$ color space, and consists of six steps shown in Figure 1.

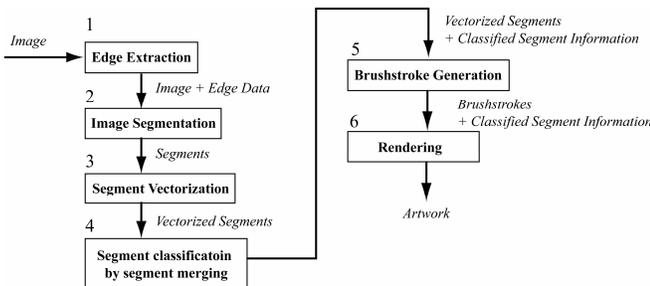
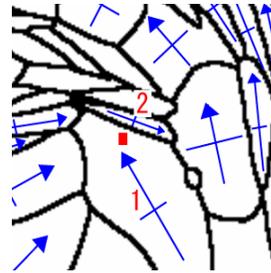


Figure 1. Process Overview:
The italic text shows the flow of data.

3 Remarkable Characteristics

In the rendering process, each pixel inherits its color attribute from the most attractive brushstroke vector. An attractive force is defined with a distance from a target pixel to the center of a brushstroke vector and the direction of the brushstroke vector. By using this attractive force, natural brushstrokes are obtained from simple vector data. In addition to this, each brushstroke is classified to create eloquent and natural painting regions.

In this method, various styles of paintings are defined by means of a chosen attractive force formula. Figure 2 shows an example of the way a brushstroke is created.



All attractive forces of each brushstroke vector are calculated for the red pixel. The nearest brushstroke to the red pixel is Brushstroke 2, but since the red pixel is located in the direction of Brushstroke 1, it belongs to Brushstroke 1.

Figure 2. The method of brushstroke creation

4 Results

Figure 3 shows how AP can be applied to create the various painting styles.

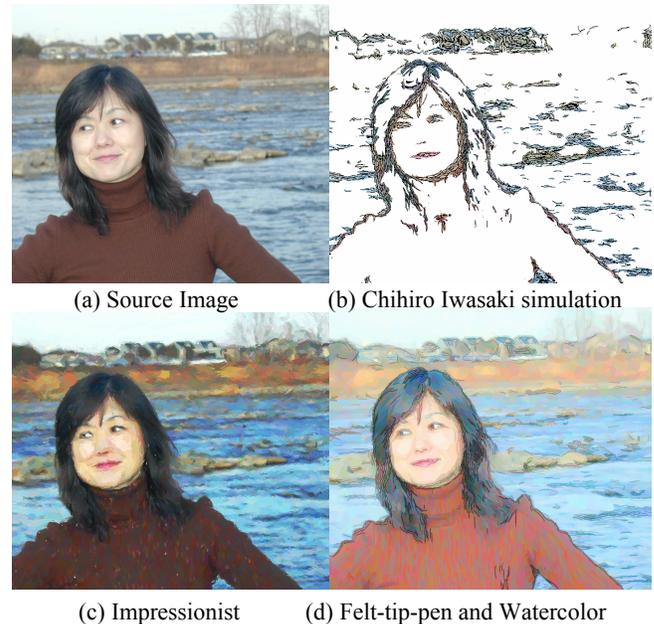


Figure 3. The various styles of painting

5 Conclusion

We have presented a method for creating an artistic painting from an image. The obtained painting holds the features of the original image, and can also be rendered in various styles. Within this framework a user can easily design a desired painting style by customizing an algorithm to define the shape of the brushstrokes.

Reference

KASAO, A., AND NAKAJIMA M., 1998. A Resolution Independent Nonrealistic Imaging System for Artistic Use. In *Proceedings of the International Conference on IEEE Multimedia Computing and Systems*, 358-367.

e-mail: † kasao@acm.org
‡ miyatak@acm.org