Scalable Impressionist Rendering

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Abstract

The painted impressionist technique produces scale based effects: the far range vision is almost realistic while the close vision is blurred. In NPR, Impressionist Renderers are mainly based on a medium range vision. A very accurate scalable impressionist effect has been implemented and improves both close and far range vision.

Introduction

This short paper presents a new method to improve Impressionist Rendering in NPR.

The Impressionist art of painting came after the achievement of photorealistic painting (see Vermeer or Corot) as well as after the invention of photography. It is therefore a superseding of photorealism. Impressionism is mainly a scale based effect technique: the far range vision of the picture is photorealistic (left part of figure 1 from Pissaro[6]) while at close range, vision is blurred (right part of figure 2). This is also summarized by D. Laidlaw [4]: "From a few inches away, you can see shapes from the bristles of the brush as well as colors mixed within a stroke." Impressionist technique did improve through the end of the nineteenth century to reach a paramount with Monet. Monet has been described as pacing to and fro the canvas when he was painting. This way he had the impression of the whole while working on the details. Therefore the prospect of getting a medium range vision of Impressionist effects is almost inconsistent.

Impressionist effect has been a goal of many works from the beginning of NPR[1]. The main method consists in recoloring the picture through brush strokes. The attributes of each brush strokes are its location, color, size, direction and shape. This gives an accurate medium range Impressionist effect, the image is blurred but the general shapes or figures are still recognizable. Many related works have extended the method. Some have been focused on the direction of the brush strokes[5] to improve the impression of hand-painted picture and fast rendering to obtain a real-time video treatment[2]. Hertzmann[3] added multiple sizes brushes. The smallest ones being used to enhance details. A collection of successive images is obtained, the first ones are painted with large brushes and the next ones with smaller brushes. The first image is as blurred as a detail in an Impressionist painting and the last images are more detailed.

Figure 1: *Peasants*

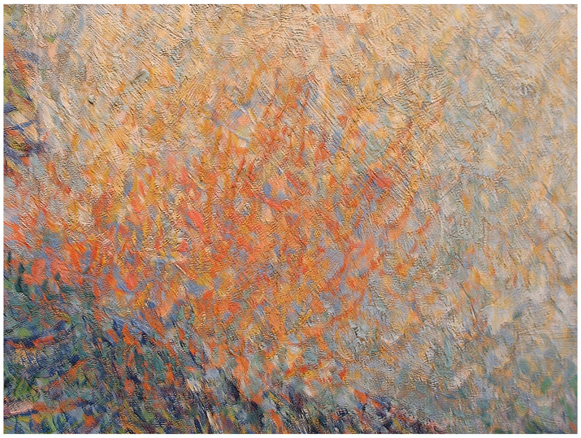

Figure 2: *Peasants (detail)*

The new Impressionist model

Through previous achievements and initial remarks it seems easy to develop an accurate Impressionist renderer. To do so one has to implement a technique similar to Litwninowicz[5] to a fine detail level. This means also that the modifications of the image will hardly be visible on a CRT device due to the low definition of this hardware. The Impressionist effect would rather consists in sub-pixel modifications of the image: the blurred effect is to appear mainly at bristle and not at brush level. A real difference would only appear while focusing on a small part of the image as one would do while pacing to the picture in a museum. Two problems remain: if the effect is to be computed at a sub-pixel level, which scale is suitable? Will the computation not be too slow?

Figure 3: *Twisted Tree, photography*

Figure 4: *Twisted Tree, Impressionist View*

The suitable scale might be proportional to the bristle size on the painting, therefore if the canvas is 400x600 millimeters wide and a single bristle radius smaller than 0.1 millimeters the effect must be computed for a 4000x6000 array of sub-pixels or 24 sub-pixels for each pixel. This will slow down the computation by a ratio of 24. Moreover any single pixel may appear unchanged after the computation.

Our answer is a vectorization of the effect. The image on the CRT device is very slightly blurred (see the tree in figure 4) while any magnifying view is retreated to increase the brush stroke effect (see a branch in figure 6 and compare it to figure 5). Furthermore the image might be saved as a postscript file to be stored or printed. As most printers print at 600 dpi at least the postscript file has to be the maximal retreated view. It is then possible to look at the image at a normal distance and get an almost realistic impression or through magnifying lenses to see the blurred local effects. It is also possible to show any part of it as a magnifying effect.

Conclusion

In the next future our work will consist in improving detail treatment to include better bristle strokes and if possible the volume impression of paint in real painting: bristles let paint on the canvas, some strokes are stronger and the bristles let higher marks of paint that are visible, with a shaded and bright side. This volume effect has to be implemented also.

Another part of our future works will consist in the integration of this method into a paintbox. It will then be possible to use it throughout the painting process.

References

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Figure 5: *Twisted Tree (detail)*

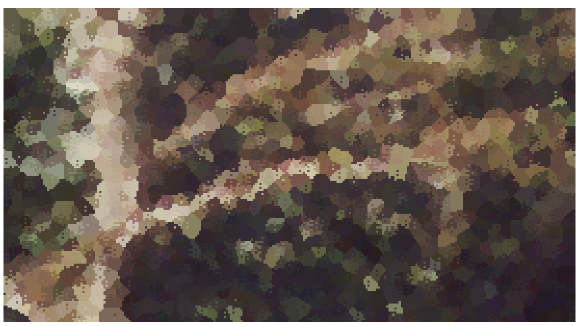

Figure 6: *Twisted Tree, Impressionist View (detail)*