Chinese Ink and Brush Painting with Reflections

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(A) A 3D Scene with reflections in a Chinese Painting style

(B) The same scene with cinematic lighting

(C) A Chinese Painted Bunny

(D) A Chinese Painted Teapot

Figure 1: *Examples of reflections in Chinese painting. (A) shows a Chinese Painted 3D Scene with reflections on a river and (B) shows inclusion of cinematic lighting principles for enhancing mood and storytelling. (C) and (D) provides examples of Chinese painted computer graphics objects: Bunny and Teapot.*

In this work, we have developed an approach to include global illumination effects into Chinese Paintings (see Figure 1). Our method provides a robust approach to represent tone and value in a way similar to how Chinese Ink-and-Brush is painted. The method, especially, supports reflection, shadow, atmospheric, depth and weathering effects. Using the method, we can recapture the aesthetic of irregularity in shapes and forms commonly seen in Chinese Painting. We also arrange composition in 3D to obtain multi-camera imagee that matches the compositions in Chinese painting. We also included cinematic lighting aesthetic in 3D Chinese painting to enhance mood and storytelling.

During the last decade many methods are developed to simulate variety of aspects of Chinese painting. However, there has been no work to attempt global illumination effects such as reflection into Chinese painting. This is mainly because most of classical Chinese paintings do not demonstrate such effects. On the other hand, some contemporary Chinese landscapes painters, such as Yang Ming-Yi, started to incorporate some qualities that are traditionally Western into their paintings while retaining the distinct Chinese painting identity in their paintings. These painters use three-quarter views for buildings and bridges to imply a recession to a common vanishing point in Western painting.

These landscape paintings include foregrounds, middle and far distances that are unified by a continuous spatial field such as a reflected water surface. The integration of these Eastern and Western elements in their paintings, these artists provides a useful guideline for us to create Chinese paintings in 3D computer graphics. We, therefore, study Yang Ming-Yi's paintings as primary visual reference to include new elements while retaining overall style.

By studying his paintings, we have identified four elements that are crucial for simulating these paintings: (1) Value and Tone, (2) Shape and Form, (3) Water Reflection and (4) Layout and Composition. For value and tone, we have developed an NPR shader similar to [Chan et al. 2002]. This value and tone shader supports shades of ink in Chinese painting along with weathering effects controlled by a direction vector. Our value and tone shader also provides atmospheric effects based on depth. We have also developed a shape and form shader, that simply provides silhouette irregularities commonly seen in Chinese paintings controlling silhouette opacity along with a displacement shader.

Our main contribution is the inclusion of NPR water reflection shader. Resulting reflections are a weighted combination of a light and dark tone reflection images using a reflection mask and fade-out parameter. In particular, fade out parameter is key to obtain results resembling Classical Chinese painting by smoothly connecting the objects with their reflections as shown in Figure 1(C) and (D). As seen in these examples, our approach guarantees to create Chinese painting version of any object. To control layout and composition, image is rendered in several layers with slightly different camera positions and the result or composited together to obtain a free form layout structure as shown in Figure 1(A) and (D). To obtain cinematic lighting and control viewers eyes, we used slightly different parameters for each layer.

References

CHAN, C., AKLEMAN, E., AND CHEN, J. 2002. Two methods for creating chinese painting. In *Computer Graphics and Applications, 2002. Proceedings. 10th Pacific Conference on*, IEEE, 403–412.