Abstract
We present a method for producing painting-like images composed of predefined brush strokes. Our proposed method is based on image retrieval method and uses a stroke database. The stroke database consists of transformed copies of the several brush stroke profiles which are obtained from an actual brush stroke. An input image can be reordered in a painterly manner by combination of brush strokes retrieved from the database.

Our method is able to produce a painting with diverse media by changing the type of database, such as oil and pastel. In this process, we present a search algorithm to select an appropriate brush stroke from database and an assessment algorithm to judge whether to draw the retrieved brush stroke on the canvas or not. We also introduce a efficient brush stroke model and way of achieving the appearance of thick paint without physical simulation.

Categories and Subject Descriptors (according to ACM CCS): Computer Graphics [I.3.8]: Application—Graphics Utilities [I.3.4]: Paint systems—Computer Applications [J.5]: Arts and Humanities - Fine Arts—

1. Introduction
NPR (Non-Photorealistic Rendering) is an area of computer graphics concerned with the generation of diagrammatic and artistic images. Various traditional media can be mimicked, such as oils [Her98] [HP00], pen-and-ink illustration [SWHS97] [JNLM05], watercolor [CAS97], cartoon [KKY01], pencil [LKL06], mosaic [Hau01] and charcoal [MG02].

In particular, image-based painterly rendering algorithms analyze input image using image process and vision technique, and create diverse brush strokes with different attributes, such as orientation, position, color, and length. They have focused on how correctly it can draw or generate attributes of brush stroke automatically in order to depict the features in the source image. Meanwhile, this paper introduces a method different from the paradigm pursued in the existing image-based painterly rendering method.

Our painting model is based on the idea that a painter makes each brush stroke to represent part of the subject as clearly as possible. The painting is built up by repeating this process with increasingly fine sketch with smaller and smaller brushes. In the painting process, a painter has a "slip" as a necessity. A slip is an error in carrying out the intention [Nor83]. The painter’s unavoidable slip is one of the important factors that artistic works give inspiration to the humans and occur necessarily during the drawing. Figure 1 illustrates the general painting process.

Although the process may inevitably bring about some slip being against a painter’s original intention, it is rather a distinguishing factor between painting and photograph, and is the essence of the beauty of painting. The mechanism under which a human is unable to make a painting just like a photograph as he pleases, this limitation is the staring point to make a creative work. The inevitable slips can be implied by using the several random or restricted factors on the algorithm. By using the random factor in the determination