ThinkingSketch

A reflection tool for drawing pictures on computer

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Abstract

Artists, such as Pablo Picasso, Piet Mondrian, etc. seem to understand that the activity on creating new style is more important than just creating objects with a certain established design taste. Such an attitude is meaningful, because both creator and people apt to get used to the trend of current taste and lose interest in it. On the other hand, it is difficult for us to educate students to be aware of the importance of keep finding new styles, because we need a lot of training time for difficult techniques for creating artworks.

We developed a drawing software “ThinkingSketch” to cover the weakness of beginners in techniques. This software enables user to create artworks with same design taste. Basic concept of the software is "trace and copy". Using this tool, user makes graphic templates by tracing scanned artworks. Then, combine and transform the design templates to make a new original artworks. After defining the basic primitives, layouting rules and color mapping parameters, this software will generate pictures with randomly generated parameters. Through the definition of the rules for picture generation, user will have experience of self-reflection. We found that this drawing method can be a good experience to understand what artistic taste is.

1. Introduction

Famous artists, such as Picasso, Mondrian, etc., seem to understand that the activity for creating artistic styles is more important than just creating objects with the same design taste. Such an attitude is very important for creators. On the other hand, it is difficult for us to educate students to be aware of the importance of keep finding new styles. Because, we need a lot of time in training such as drawing, painting, and so on.

One of the purpose of "ThinkingSketch" development is to provide a shorter and easier way to establish one's own style in design. It is not easy to establish ones own artistic style from scratch. It is almost same as the case of drawing picture. We sometimes find difficulty in starting up drawing. It takes time to start first stroke over a white paper. However, once we made first step of the drawing, it becomes easy to continue modification of the drawing. "ThinkingSketch" is an object based two dimensional graphic software and on top of the basic graphic engine, user can define object generation rules. The software helps users to start with the first step in drawing and establishing design taste for defining another style.

2. Reflection – Basic Concept of ThinkingSketch

The most basic idea of ThinkingSketch is to accelerate human reflection on creating artworks. In this section, we will explain the concept of reflection in art creation and how we can accelerate through reflection.

For most of artists, it is hard to create one's own best artwork output with only one trial. Based on observation, we are proposing a model of artwork creation. On this model, creative process is consists of two essential components. One component is a primitive and abstract image (or feeling) that artists want to express. At the early stage of creation, creator's image for the final output is still "obscure." At this stage, artist does not have any concrete expression. Another component is his (incomplete) artwork, such as drawing, painting, sculpture, and so on, in creating process. Artists needs to watch, gaze, and feel what the artwork is. Artists compare the artwork on creation with what is in artists mind. At the initial stage, artist starts with first artwork as very rough sketch. By repetitive reference of the artwork and initial image, artist gradually changes the image of ideal artwork or make the image clearer and more precise. Then, artist tries to update the artwork. By repeating artwork modification and improvement of target artwork object, artists tries to realize what the artists has in mind. At the final stage of this cyclic modification process, artist feels the artwork is close enough to what artist had in one's mind at the beginning with some obscure feeling. Then the final status of artwork becomes the completed one. We call such an interaction between artist and artwork as 'reflection.'

This is our model on making artworks. On top of this model, we will make a meta-structure for supporting artist work. That is about establishment and description of taste or style issue. Appreciator of artworks realize a certain identity is on the series of artworks (Figure 1), which is produced by an artist in a specific period. We feel those pictures have the same taste or style. This style is supposed to be established through the reflection in artwork creation. After creating a series of artworks, the artists idea for style can be concrete enough to express in some linguistic way. Our idea is to extract artists idea as a sharable concrete description with text or symbol.

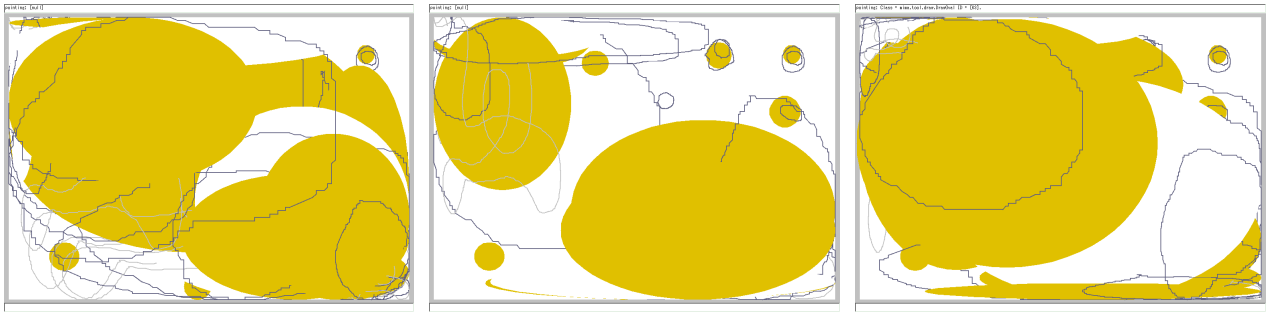

Figure 1: Series of Pictures generated by “ThinkingSketch”

3. Method for Extracting Sharable Description

In this section, we introduce how to create artworks and extract design tastes using “ThinkingSketch” through the reflective drawing process.

Drawing with "ThinkingSketch" is performed by generating objects using randomized parameters and applying them generation rules as filters to remove some non-preferable patterns. "ThinkingSketch" automatically generates series of drawings by tuning of generating and filtering rules. At the early stage of the tuning, user will not be satisfied with generated pictures. By tuning parameters, "ThinkingSketch" will create more preferable drawings.

3.1 Drawing Operations on "ThinkingSketch"

As a first prototype of drawing generator, "ThinkingSketch" designed to draw a picture by following three steps.

At the first step, creator choose or define a set of primitive pictures (Figure 2). In current system, we can read scanned image of existing artworks (or photo) and then trace the shape on the picture(Figure 3, 4). Then we will keep the traced or drawn data in the archives of this system. (Generation of primitive is not necessary required because user can choose simple geometrical

objects like lines, rectangles or circles.

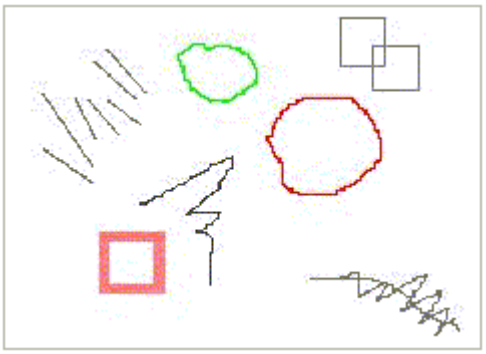

Figure 2: Primitive Objects

Figure 3: Trace of an Objects

Next step, creator defines a set of colors to be mapped to each primitives (Figure 5). Those color sets are defined in color palettes. Color pallets can be not only generated by randomization but also acquired by manually/automatically mapping from referred picture/photo.

As the last step in this simple drawing definition, creator defines how to place objects on canvas. As an example of automatic primitive placement, the position of target object is randomly generated. Then, if the position of the primitive fulfills some specified criteria, the target will be placed on the target position.

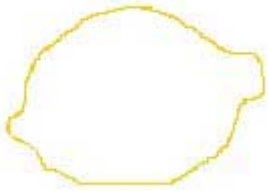

Figure 4: Traced Templeate Objects

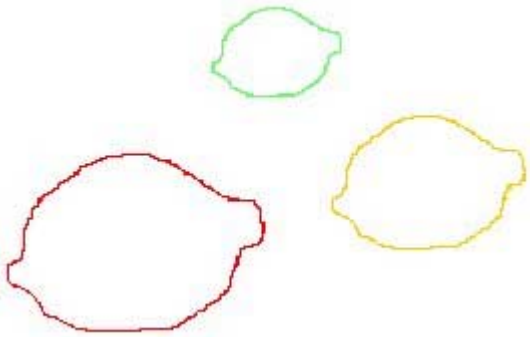

Figure 5: Mapped Objects

On both primitive selection and setting the end of drawing (it can be simply defining the number of the repetition), creator can also specify rules. After defining a series of creation setting, creator can let "ThinkingSketch" draw pictures, again and again. During this process, creator can perform tuning and make convergence of behavior of this drawing robot to be a better artist.

3.2 Methods For Extracting a Sharable Idea

One big difference from conventional drawing tool is that users are not expected directory draw pictures, but they just expected to specify generation rules (e.g. primitive data set selection) for drawing, rules for drawing, and start drawing. Hereafter let us call such users as style creator.

After defining parameters by style creator, different pictures can be repeatedly generated based on the same setting (= combination of basic patterns and rules). As "ThinkingSketch" creates parameters with randomly generated values with filtering, it does not create exactly the same picture on its canvas. However, observer will find that there exists a kind of common style/taste exists between the series of drawings. Style creators evaluate the result of their parameter setting and can repeatedly update its parameter until he will make satisfaction. These process are the style creation process.

On reaching this stage, style creator has two outputs. One is a set of concrete drawing artworks and the other is style definitions. On "ThinkingSketch", such a style definition set is handled to be a sharable idea.

Extraction of such "sharable code (= shareable idea)" is a unique concept and has important meaning to help creation, because in normal creation process, it is difficult to express creator's idea as a concrete description. We sometimes feel that the image (or concept) about out coming artwork is hard to define, because the idea looks dynamic existence and it is felt to be changing every seconds. The possible way of idea extraction by conventional methods are by doing observation of creator's activity or by self-reflection. Unfortunately, those methods are not enough, because it does not ensure the completeness of description.

Using this method for idea extraction, we can extract concrete information for artwork generation. This information definition process is two layered indirect specification aspects. While the information is being composed, style creator does not directory change the final artwork but parameter for artwork generation. This is one of the aspect of the indirect specification. Though tuning on generation setting is such an indirect operation, style creator will feel that the change of code is directly editing of concrete artwork as if retouching paint to style creators. The reason why we have such feeling that is close to the direct operation, seems to caused by the quickness of reflection from the update of setting and reflection on the display as the next picture generation. After the generation setting has completed, the setting can be referred as a description(or

specification) of series of artworks. The second aspect of setting is a resource for analyzing ones current style. Using this two aspects of generation setting to style creator, "ThinkingSketch" can be used as a tool for improving or re-generating another style of artworks. This structure resembles rehearsal based programming[1].

The uniqueness of "ThinkingSketch" as a style creation tool is that the artist can handle his style as a concretely defined set of information symbol.

4. Experimental Practice

We made the design feasibility study of "ThinkingSketch" at a course in a university before completing the detail software design of "ThinkingSketch".

"Trace & Trace" is a experimental practice in Future University - Hakodate. The purpose of this practice is enabling students to understand the taste of evaluating artworks through the experience of constructing ones own original artworks. On conventional learning methods, before creating original artworks, students are required to learn skills of sketch, coloring, composition, etc. Most of the students in our university did not take educational course of art in high school. In this practice, students are guided to reuse elements of existing pictures to cover the lack of drawing skills of students.

4.1 Background of the Practice

The target topics of this practice were Picasso, Matisse, and Mondrian. Their abstract artworks are different from realistic painting, which was popular until the end of 19 century. Their approach is to compose abstract objects on canvas. Their approach is recognized as one of the origin of current design stream. Their approach reflects the movements of post impressionism, collage (a method to combine characters, photographs, and object), and automatism (a method to generate a painting). Those ideas for visual expression influenced the activity at Bauhaus that is one of the origin of design education.

On this practice, we chose artworks in early stages of above artists. As they are not arranged with sophisticated way, we expected to find no rational nature of the design. Because, we need to let students find rational arrangement from the real world with various shapes and colors.

4.2 Trials in the Practice

In the "Trace & Trace" practice in year 2000, we made trails in three weeks.

At the first week, we gave students picture books of Picasso, Matisse, and Mondrian. Then students take the book to papers. Then, they made rearrangement the pages based on the historical order and made considerations on what kind of changes happened to them. After understanding the periods that those artists established their style, they guided to find visual objects that are defined as a strategic shape and extract the shape as a design template for composition. Then, they traced the templates on the picture to the tracing paper (Figure 6). From tracing paper, paper fragments whose shapes are the same as traced elements is made by cutting traced paper. Students tried to reconstruct his own composition using these elements. With this trial of reconstruction using real materials, students were deeply involved in this work. As the last phase of the first week practice, students draw a sketch of arranged shapes on B2 size paper with pencil.

Figure 6: Tracing Templates

Figure 7, 8: Composition on Computer

At the second week, students converted picture on B2 size paper. Then students made graphical data element as electronic data using Adobe Illustrator by tracing an image. Students tried composition again on the display (Figure 7, 8). On our observation, students tried a lot of variations of arrangement on the display. In spite that students tried a lot of variations, we requested them to find the best work from them.

After finishing component generation and composition on Adobe Illustrator,[1] the data was moved to Adobe Photoshop[2] for coloring. Several palettes including color palette made from original picture was used to assign colors to each element.

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[1] Illustrator is a trademark of Adobe System Inc.
[2] Photoshop is a trademark of Adobe System Inc.

The final output of student's works through these process was meaningful enough in spite of the shortness of their short learning period. From the comments of students, we can find that they are making critiques of the artwork with concrete and objective comments.

The result of this experimental practice, we confirmed that by "borrowing elements or know-how form existing works," those who are not necessary good at artistic practice could learn the meta-level concept of composition in artwork through practice.

4.3 Extraction of Expected Functions for “ThinkingSketch”

Through the "Trace & Trace" practice in year 2000, we find the following functions are recognized as an important elements to automatically construct new pictures.

1) A tool for tracing shapes and colors. These are realized as wall paper image loading, shape tracer as polyline, polygone, rectangle, oval, etc. and color palette that reflects reference image color usage.
2) A tool for managing shape and color templates.
3) Automatic replacement of templates with coloring.

5. Related work

Harold Cohen's AARON[2, 3] is a famous autonomous drawing system (Figure 9, 10, 11), which generates original artworks. Basically AARON is a rule based system, which has knowledge of objects such as stone, human, plant, etc. AARON draws objects one by one by checking the status of the pictures drawn on canvas image. It generates pictures swiftly and draws them on computer display or on a large paper using a drawing machine, which is designed and manufactured for painting with AARON. By using the printer, the quality of pictures drawn by AARON becomes the level of human painter.

Figure 9, 10, 11: Artworks generated by ARRON

AARON is a program that is tuned up well and realizing a style of a high level artist. "ThinkingSketch" is designed as a tool for finding new style/taste of artwork generation with frequent interaction between human and computer by checking artworks as its output.

6. Conclusion and Future work

As a picture generator: Using "ThinkingSketch", we have been generating abstract pictures. Generation of those pictures is easy and series of generated pictures from the same parameter settings have a large variation. Besides being the easiness and variation, we can feel that all of them are generated in a same taste.

"ThinkingSketch" is applicable not only for art and design education, but also professional use in design drawing. It can be used design drawing generator which has a set of drawing knowledge. Right now, we are planning to extend the capability of "ThinkingSketch" to fit the professional use for graphic designers. Once we can define a design style, we can easily create the series of output of design works. It is helpful to generate industrial product design such as wall paper, book cover, car sheet design, and so on.

The idea of random generation and control of generation rule can be applied to three-dimensional object generation. Such a direction can be another extension.

As "ThinkingSketch" implementation has almost completed, we are planning to use this in the class of "Trace & Trace" as educational tool.

7. Acknowledgements

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