Sketch2Cartoon: Composing Cartoon Images by Sketching

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ABSTRACT

In this paper, we introduce the Sketch2Cartoon system, which is an automatic cartoon making system by leveraging a novel sketch-based clipart image search engine. Different from existing work, most of which either limited users to the pre-prepared characters or only used keyword queries to search materials, Sketch2Cartoon enables users to sketch major curves of characters and props in their mind, and real-time search results from millions of clipart images could be selected to compose the cartoon images. The selected components are vectorized and thus could be further edited. By enabling sketch-based input, the cartoon image making process becomes more natural, and even a child who is too young to read or write can draw whatever he/she imagines and get interesting cartoon images.

Categories and Subject Descriptors

H.3.3 [**Information Search and Retrieval**]: Query formulation, Search process

General Terms

Design, Experimentation

Keywords

Sketch2Cartoon, sketching, clipart, search

1. INTRODUCTION

Cartoon, which is famous for the ability of story telling and artistic expression, plays an important role in human's daily life, such as children education, comics in newspapers, and cartoon movies. However, to enrich artistic expression of cartoon images, it always needs artistic skills and the mastery of complicated softwares. This makes it too difficult to create beautiful cartoon images for common users, especially for children with unlimited imagination but limited software usage ability.

Most of existing cartoon making systems [3] limited users' imagination by only using pre-made clipart libraries. Al-

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*Jun Zhang performed this work while being an intern at Microsoft Research Asia.

Figure 1: Illustration of Sketch2Cartoon system. The upper image is the input sketch, and the lower one is the resulting cartoon image.

though by leveraging Internet images, iClipart[1] has potential to provide unlimited categories of cartoon objects, the keyword-based inputs are not very natural, especially for children who are too young to read or write.

As the popularity of devices with touch screens, input using a pen or a finger has become a very natural way to interact with computers. In [4], authors proposed to use Internet images to compose a realistic picture from a freehand sketch annotated with text labels. However, without an effective and efficient sketch-based image search technique, the text labels become a prerequisite in [4], and thus it costs minutes to compose one image, which makes the system far from practical. Moreover, the automatic montage technique for realistic images is still an open problem, which makes it more difficult.

Different from realistic images, characters and props from clipart images are much easier to extract, vectorize, and compose. Moreover, recently, we successfully built a sketch-based image search engine MindFinder [1, 2]. It supports real-time response on millions of images, and thus makes possible the sketch-based cartoon image composing system.

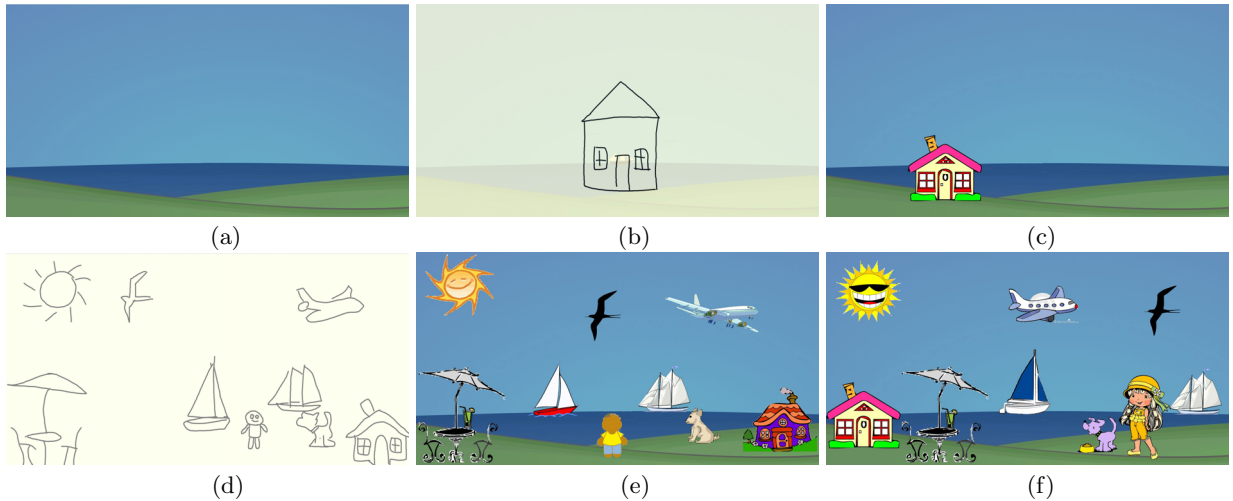[1]iClipart is a research prototype in Microsoft Research Asia, leaded by Jian Sun and Ying-Qing Xu.

Figure 2: Illustration of the Sketch2Clipart system. (a) Select a backgroud image. (b) Draw a house. (c) Get a house from top results of ClipartFinder. (d) All sketches drawn by the user. (e) Resulting cartoon image. (f) Another cartoon image queried by the same sketches as in (d) but with different objects, scales and positions.

In this work, we present the Sketch2Cartoon system, which is a real-time cartoon making system that enables sketch-based input. In order to provide unlimited cartoon contents, we crawled about 1 million clipart images from the Internet, and built a novel clipart image search engine ClipartFinder [1] to support real-time keyword- and sketch-based search, as shown in Fig. 2. Different from MindFinder [1, 2] which requires that the objects in the resulting images have similar position as the sketch query, ClipartFinder is translation and scale invariant. Sketch2Cartoon enables users to sketch major curves of characters and props in their mind, and search each desired component by ClipartFinder. Each retrieved component has been vertorized and supports further editing. Sketch2Cartoon supports multi-touch control, and also enables users to write keywords on any position of the touch-screen using a finger or a pen, to trigger keyword-based search. Fig. 1 illustrates the input and output of Sketch2Cartoon.

2. SYSTEM OVERVIEW

In this section, we briefly introduce the main functions of Sketch2Cartoon step by step.

1. The user selects one image from the repository as the background. See Fig. 3(a)

2. The user can sketch a character/object or write a keyword on the canvas. The system will analyze the strokes, and then automatically extract keywords and sketches for further search. See Fig. 3(b)

3. After drawing, the system will fetch images through the ClipartFinder engine. Then the user can selected the most appropriate clipart to his/her imagination. The clipart will be automated scaled and moved to match with the sketches. See Fig. 3(c)

4. If needed, the user can edit the character/object, such as moving, scaling, rotating, and re-coloring. Multi-touch gestures such as pan, zoom and rotate are also enabled. The user can also replace current character/object by another one in the top results queried by current or modified sketch.
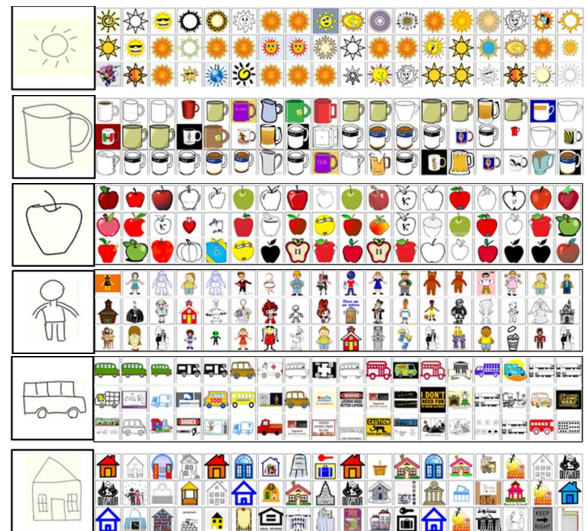

Figure 3: The queries and corresponding top results of ClipartFinder.

5. By repeating 2 to 4, the user can add more characters/objects. See Fig. 3(d-f)

6. If the user is satisfied with his/her work, he/she can save it to the gallery, or export to a SVG file, which is easy to share with others.

3. REFERENCES

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