Art 101: Learning to Draw through Sketch Recognition

Conference Paper · June 2010

DOI: 10.1007/978-3-642-13544-6_30 · Source: DBLP

3 authors, including:

Tracy Anne Hammond
Texas A&M University
191 PUBLICATIONS **1,688** CITATIONS
SEE PROFILE

Manoj Prasad
Texas A&M University
12 PUBLICATIONS **109** CITATIONS
SEE PROFILE

Art 101: Learning to Draw through Sketch Recognition

Tracy Hammond, Manoj Prasad, and Daniel Dixon

Sketch Recognition Lab
Computer Science & Engineering Department
Texas A&M University
srl@tamu.edu

Abstract. *iCanDraw* is a drawing tool that can assist novice users to draw. The goal behind the system is to enable the users to perceive objects beyond what they know and improve their spatial cognitive skills. One of the early tasks in a beginner art class is to accurately reproduce an image, in an attempt to teach users to draw what they see, rather then what they know, improving spatial cognition skills. The *iCanDraw* system assists users to reproduce a human face, providing real-time drawing feedback enabled by face and sketch recognition technologies. We are presenting an art installation piece, where the conference participants using the *iCanDraw* 'smart graphics' system create the art in real-time at the conference.

Keywords: spatial cognition, sketch recognition, face recognition.

1 Introduction

iCanDraw is a system to assist users in drawing the human face. The system teaches a novice how to expand the realm of his knowledge in sketching. It enables the artist to draw what they see and focus their attention on the parts of an object, contours, proportions and spatial relationships between them. The art of drawing is commonly perceived as hard to learn, learning then mostly involves how one sees and processes the object being drawn. We present this system for the participants at the conference using our program. This allows them to create the art from the installation piece themselves. We use before and after photos to show examples of how an artist can grow.

2 Concept

The art of drawing involves a balance in creativity and the drawing skills. Empirically, people are quick to confess their inability to draw. This is due to the perceived difficulty in learning how to draw. *iCanDraw* is an intelligent tutoring system on drawing, built to stimulate creative thinking by helping overcome this perceived difficulty. The difference between an experienced artist and a novice is the ability to see beyond what one knows, the ability to perceive an object through the contours, spaces, and relationships of an object. One of the first tasks in teaching

R. Taylor et al. (Eds.): SG 2010, LNCS 6133, pp. 277–280, 2010.

novices how to draw is to reproduce an image. This task teaches how to visualize an object into its parts, their proportions and spatial relationships between them. Joshua Bienko, a professional artist and art professor states, "Beginning drawers draw what they KNOW. I go to great depths in my courses to erase what artists know so that we can develop what we see." Our application assists users to reproduce a human face. In the step-wise tutorial to draw, each step provides detailed instructions on how to draw specific, singular pieces, forcing the user to see the parts of face and their relation to the whole picture.

Our presentation includes a tour of the system, where we show the aspects of the drawing being taught, well defined steps involved in teaching a drawing, interpretations and feedback mechanism involved in the system illustrating the ability of the system to act as art tutor.

3 Technical Realization

We chose a photo of the human face because it is a stable idea for new artists to accept, unlike a cartoon figure. When a new artist sees a photo they can immediately see the inaccuracies in their own drawings; unlike a cartoon where there are more arbitrary choices based on perception. The drawing procedure is divided into well-defined steps. Figure 1 provides the screenshot of the program at one such step. Every step helps the artist to draw what they see, rather than what they perceive using written guidelines and corresponding adjustments to the reference image. Instructions provide a detailed explanation (including size and location) about a part of the face to be drawn, the parts of the face being the outline of face, eyes, ears, nose and mouth. This forces the user to concentrate on one part of the face, its size, symmetry and its relation to the face as a whole.

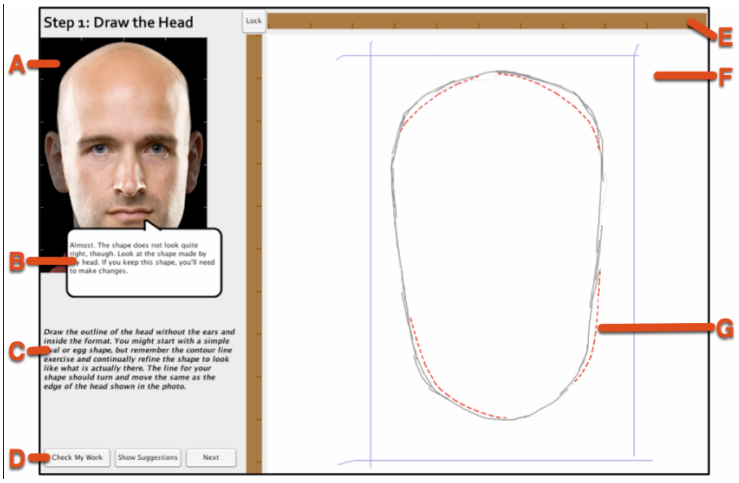

Fig. 1. Screenshot demonstrating many of the interaction techniques. (A) The reference image manipulated to show the head. (B) Text feedback. (C) Step instructions (D) Options available. (E) Straightedge tool. (F) Drawing area. (G) Visual feedback.

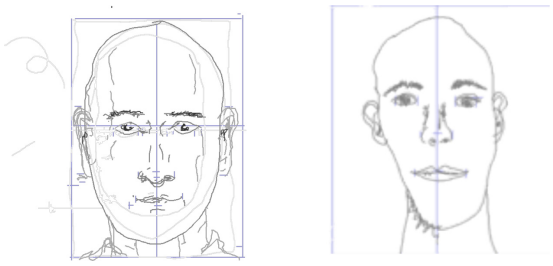

Fig. 2. Faces drawn by participants using the application at ArtReach

Table 1. Sample drawings from a user study

APPENDIX	**Exercise 1** Freehand	**Exercise 2** Corrective Feedback	**Exercise 3** Freehand (Repeated)	**Exercise 4** Corrective Feedback	**Exercise 5** Freehand
	(A)	(B)	(A)	(C)	(D)
Male #1	**T:** 0:22 **E:** 424	**T:** 1:08 **E:** 192	**T:** 0:34 **E:** 247	**T:** 1:16 **E:** 110	**T:** 0:34 **E:** 174
Male #2	**T:** 0:11 **E:** 572	**T:** 1:15 **E:** 206	**T:** 0:40 **E:** 293	**T:** 0:56 **E:** 101	**T:** 0:20 **E:** 160
Male #3	**T:** 0:23 **E:** 325	**T:** 1:07 **E:** 103	**T:** 0:15 **E:** 344	**T:** 0:44 **E:** 138	**T:** 0:12 **E:** 226
Male #4	**T:** 0:07 **E:** 609	**T:** 0:30 **E:** 187	**T:** 0:06 **E:** 371	**T:** 0:20 **E:** 134	**T:** 0:10 **E:** 379
Male #5	**T:** 0:11 **E:** 402	**T:** 0:45 **E:** 149	**T:** 0:11 **E:** 429	**T:** 0:31 **E:** 130	**T:** 0:10 **E:** 247
	A: 466 **SD:** 119	**A:** 167 **SD:** 41	**A:** 336 **SD:** 70	**A:** 122 **SD:** 16	**A:** 237 **SD:** 87

The photo image is first processed using face recognition software to obtain information about the location and size of the facial features. Throughout the drawing process, sketch recognition interprets the soon-to-be artist's freeform strokes, and

provides real-time constructive feedback to guides the user. Example feedback: “The eyes are a bit high on the face. Hint: Because few perceptually important features exist on the forehead, users tend to draw the eyes too high on the head. However, the eyes are usually approximately half way down on the face.” Or: “The eyes are a bit too close together. Hint: The space between the eyes is approximately equal the size of an eye itself.” Once the user is completely finished with the drawing, face recognition is performed on the final image, and the two facial templates are compared to provide a overall evaluation, which can be used to measure the progress that a user has made in learning how to draw. Figure 1 shows a screenshot of the system in progress. Figure 2 shows examples of face drawn by the users using the application. Table 1 illustrates the improvement in drawing after using the application across 5 users in terms of our evaluation metric.

This project is an interactive art piece where members of the conference use the *iCanDraw* system during the art exhibit and throughout the entire conference. The art produced becomes the art exhibit itself. Digital and paper copies of the images will be displayed, and participants will be able to take home a copy of their drawings.

Acknowledgements

This work is supported in part by NSF 0757557. The authors also thank Kerre Cole for her help in the completion of this document.

Reference

1. Dixon, D., Prasad, M., Hammond, T.: iCanDraw? Using Sketch Recognition and Corrective Feedback to Assist a User in Drawing Human Faces. In: Proceedings of Computer Human Interaction (CHI 2010), April 10-17. ACM Press, Atlanta (2010)