Developing Tactile Diagrams with Electronic Drawing Programs Using a Validated Texture Palette

Description

This presentation introduces the basics of computer aided tactile graphics creation through Photoshop/GIMP while focusing on how to include a validated, usable set of textures in the final product. In an effort to standardize and streamline tactile graphics, many new resources have become available for computers. Such advancements have often helped teachers save time when producing tactile graphics but also tend to leave texture behind. This presentation will teach the creation of tactile graphics with basic, standardized textures using Photoshop/GIMP.

Learning Objectives

1. Learn how to produce a computer aided tactile textured graphic for swell paper.
   This includes:
   a. Learn the fundamentals of Photoshop/GIMP.
   b. Learn how to produce a line drawing by tracing an image.
   c. Learn about the distinguishable texture set created by the RNIB, which we have made available as electronic add-ons for Photoshop/GIMP.
   d. Learn how to scale an image in preparing to use the texture set.
   e. Learn how to fill regions of interest with one of the texture patterns.
2. Learn how to correct image perspective to provide a face on view.

Background

Tactile Graphics

Tactile graphics are images that are designed to be touched rather than looked at. When information in a print graphic is important to a tactual reader, a tactile graphic may be developed. The concept and content of the graphic are represented by a set of tactile symbols selected to be easily read and understood. A tactile graphic is not a straight reproduction of the print graphic, or a tactile "photocopy" of the original. A tactile graphic does not include the symbols expected by visual readers, such as color, embellishment, and artistic additions. [1]

Other descriptions of tactile graphics can be found in these references. [1][2][3][4]

Microcapsule, Swell Paper

Used by printing on to special paper that reacts to light and heat to raise areas. This method is capable of producing continuous lines, textures, or shapes. The user prints to the paper then passes it through a special fuser. Though only the black ink covered areas are intended to rise sometimes colors and grays have unexpected results.
Embosser

Used with special software, these printers can produce braille and densely packed embossed dots. Though these machines are limited in the number of textures they can produce, the density and height of the dots can be altered.

Image Manipulation Software

Photoshop created by Adobe Systems Incorporated is a well-known and versatile image manipulation suite [5]. GIMP (GNU Image Manipulation Program) is a free alternative to Photoshop that has many of the same features [6]. Both tools are perfect for generating tactile graphics from images. American Printing House for the Blind (APH) also uses Inkscape, a free vector image tool, in their tutorials [7].

Texture
To help users better understand the content of images, textures can be added to tactile graphics. These textures help the user distinguish regions of interest and help break the image into more understandable components. Research from the Royal National Institute of Blind People in the UK has determined the best textures for computer generated tactile graphics. These textures were found to be the most salient and distinguishable, which further improves user understanding. For the best user understanding a key is generally included to give meaning to the textures. [2][6][9][4]

**Line Styles**

Similar to textures, a standard set of line styles is included. Unfortunately at this time neither GIMP nor Photoshop implement line styles in a way that allows for the line to curve while drawing. This means that it is up to the illustrator to make the lines as needed. For the best user understanding a key is generally included to give meaning to the styles. [4]

**Perspective**

Most visual images created from photos, as well as many diagrams representing 3D item (orthographic drawing), include some form of perspective. Perspective is the inherent visual property of an object coming out of the page or disappearing into the background. If this is converted into a tactile diagram as is, the user will have a hard time differentiating between a perspective line and an odd shape or a repeated object changing size. In order to maximize user understanding, it is beneficial to remove perspective. Often the object of interest is best understood by having multiple sides viewable to the user; this is best handled by creating multiple images from different angles representing straight on viewpoints. This procedure is not without cost though. When one perspective is removed others may be altered or exaggerated. Generally these are ignored in the image outline. [4]

**Filters**

Image filters are a way of finding or hiding content in an image or to manipulate the image based on a predefined instruction set. For example high pass filters find areas of an image with rapid change in color. Quite often these rapid changes in color represent edges between 2 major parts of an image. Therefore this can be used to provide a head start at outlining the image. Other types of filters can also be used to determine edges, falling under the category of edge detection algorithms.
Creating Tactile Graphics

Preparing the Images

In order to match the scale of the generated textures the images need to be resized and scaled. This will ensure that the textures remain the same size when the images are printed. Some fine tuning of the texture scale can be done later if needed when working with the images but should remain close to the texture palate sizes to maintain the previously validated results.

Load Presets

In order to later use the textures they must be loaded into the software. In the case of GIMP, to add texture (pattern) scaling abilities, a script must be loaded.

Perspective

Perspective can be removed from the images using the skew functions. This allows the illustrator to warp and skew the image in different directions to remove most of the perspective in the image. In many cases this will still leave some visual oddities in the image, however, they are not likely to be later included in the outlines.

Filters and Edge Detection

Filters can help the illustrator immediately find some of the most important outlines. This can be done near the beginning but is completely optional. GIMP has the ability to directly find edges with an edge detection function in the filters menu. High pass filters can be used in Photoshop to simulate the same effect of edge detection.

Image Outline

Core information represented in the tactile diagram will come from outlining important regions of the image. Outline the image as if to highlight important features of the image or tracing the image onto another page.

Texture

Apply texture to regions to help make them distinguishable from other regions. This will help the user find areas of interest.
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Other Resources

http://www.tactilegraphics.org/ [1]

References