

Image Quilting *

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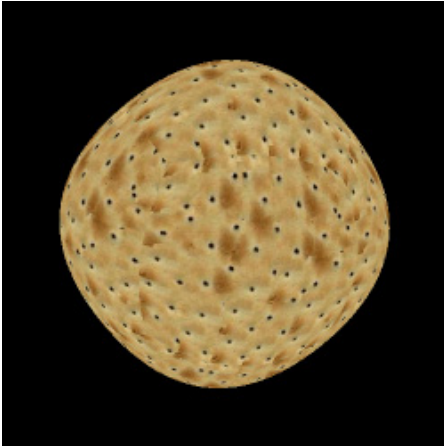


Figure 1: A hexoid mapped with a generated texture

1. INTRODUCTION

This report describes my implementation of an Image Quilting application as described in “Image Quilting for Texture Synthesis and Transfer,” by Efros and Freeman, with samples of generated textures.

2. ALGORITHM DESCRIPTION

The algorithm of Efros and Freeman generates larger textures from sample textures by the following method. It starts with a randomly chosen block, then builds a larger image one block at a time. Each successive block is chosen agree best (or be among the best) on a given overlap region. Finally, the minimum error path on this overlap region is computed, and the block is laid in the larger image with overlap boundaries on this minimum error path.

3. DESIGN DETAILS

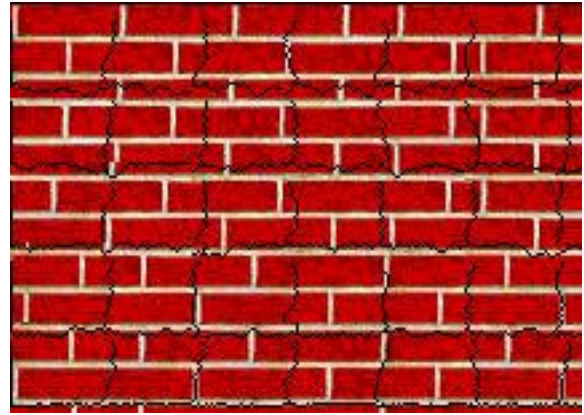


Figure 2: A generated texture with stitch marks highlighted

There are several variable parameters in the algorithm described in the source paper. Among these are the block size, the size of the overlap region, and the error threshold each overlap must satisfy before being admitted to the random pool of candidate samples. Since the optimal value of these parameters is not known, and likely varies depending on the source image, my image synthesizer allows the user to input his own values for the block size and overlap region. Further, since the block size often depends on the size of the features in the image, the user can select the size of the block by dragging the mouse over the source image. It is expected that the user will select some feature in the image this way, ensuring that the block size is large enough to encompass the feature. The primary advantage of this design is the amount of experimentation and feedback it gives the user during the texture generation process. The error threshold is set to 10% above the best possible overlap difference, the same value as in Efros and Freeman.

4. 3D TEXTURE MAPPING

This image was produced with OpenGL. The 3D object is a hexoid, a continuously differentiable object formed by rounding the faces of a cube. Each “face” of the hexoid has one texture applied to it. Figure 1 is one such example. The texture used in Figure 3 highlights the seams between faces of the hexoid.

5. SAMPLE IMAGES

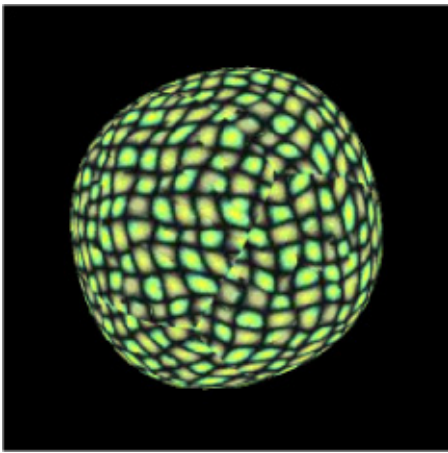


Figure 3: Hexoid with texture seams between faces

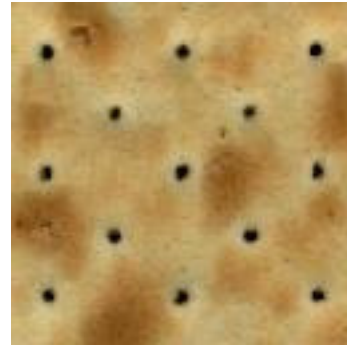


Figure 6: Source texture



Figure 4: Source texture



Figure 5: Generated texture

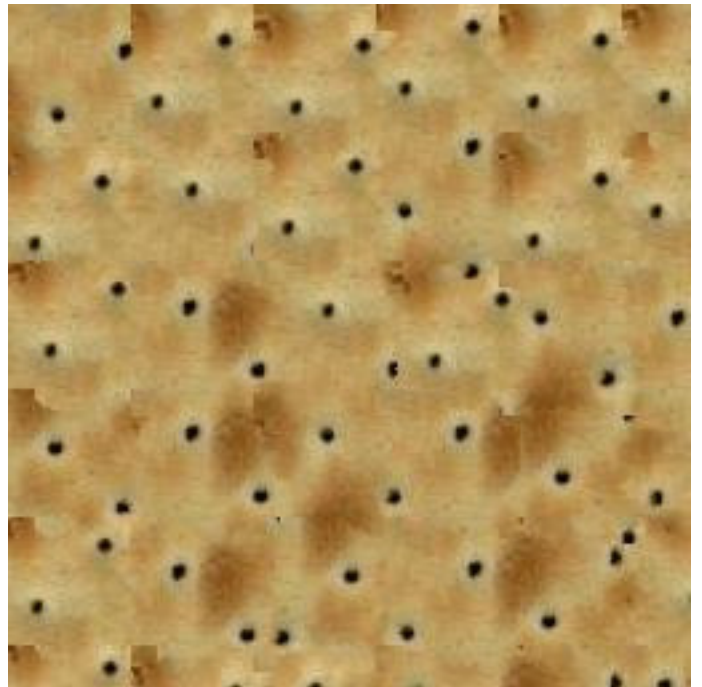


Figure 7: Generated texture



Figure 8: Source texture

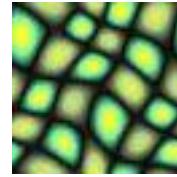


Figure 12: Source texture



Figure 9: Generated texture

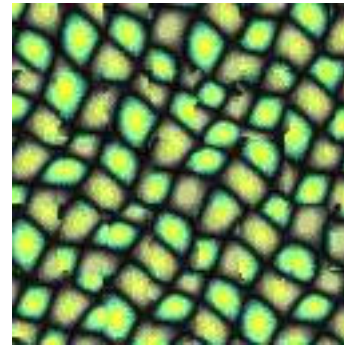


Figure 13: Generated texture



Figure 10: Source texture

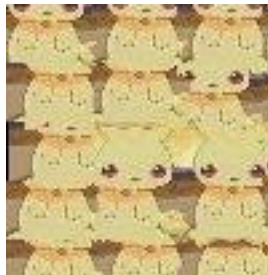


Figure 11: Generated texture

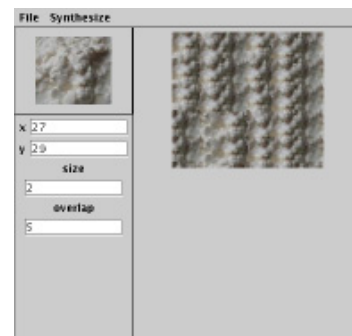


Figure 14: Screenshot of image generation application