Texture Synthesis: Image Quilting

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Introduction

My project will explore a method of texture synthesis, image quilting. For context, texture synthesis algorithms seek to generate a large-scale texture image from inputted sample image(s) that is a believable extension of the sample. Texture synthesis is used in a variety of applications including digital image editing and 3D texture mapping.

I will be implementing the image quilting algorithm created by Efros and Freeman 2001[1] to accomplish texture synthesis, where a texture is created from stitching patches from the given sample image(s). In addition to this, I

Implementation

I will program following the algorithmic steps in the Efros and Freeman 2001 paper. I will randomly sample a patch from the sample image that overlaps the previously selected patches that is within an error tolerance, which I've chosen to be the minimal sum of squared differences error between the patches from the sample image and previous patches in the overlapping area. To further reduce edge artifacts, I find the minimum cost path of the error surface using dynamic programming to find the optimal seam. My sample images will include regular and more stochastic images

I plan on demonstrating how the method works by presenting sample textures with the generated texture of the algorithm, and by showing an animation of the placement of the patches that create the output texture.

[1] A. A. Efros and W. T. Freeman, "Image Quilting for Texture Synthesis and Transfer", SIGGRAPH 01