# **Inverse Texture Synthesis**

**1. Brief Summary**

I have implemented the [Kwatra et al.2005] for forward texture synthesis, and [Wei et al. 2008] for inverse texture synthesis.

Kwatra presents a texture energy metric to measure similarity of the synthesized texture to the input texture. Based on this energy, the algorithm could iteratively optimize the output texture globally. Moreover, the controllable information could be directly added to the algorithm framework, thus synthesizing dynamic texture.

However, the inverse texture synthesis runs in the opposite direction with respect to traditional example-based texture synthesis. Given a large texture, this algorithm automatically compute a texture compaction that best summarizes the original. This algorithm could be regarded as the extension of Kwatra’s. The energy function consists of two terms. The first term measures the local similarity for a set of samples in the input texture with respect to the texture compaction, and the second term measures the local similarity for a set of samples in the texture compaction with respect to the input texture. And the optimization algorithm needs more elaborate design.

**2. Result**

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| --- | --- |
| C:\Users\v-pewan\AppData\Local\Microsoft\Windows\INetCache\Content.Word\Texture-01.png | D:\Projects\GitHub\TextureSynthesis\Image\InvTexture-03.jpg |
| (a) | (b) |
| Figure 1: Texture optimization for example-based Synthesis. The texture sample (a) is on the left side, and the output texture is on the right side. | |

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| D:\Projects\GitHub\TextureSynthesis\Image\InvTexture-02.png | D:\Projects\GitHub\TextureSynthesis\rst\InvTexture-02_rst.jpg | D:\Projects\GitHub\TextureSynthesis\rst\200_200_2_10.jpg |
| (a) | (b) | (c) |
| Figure 1: Inverse Texture Synthesis. Given the input sample texture (a), automatically compute a small texture compaction (b) that best summarizes the original. This small texture compaction can be used as the sample texture to synthesize another new texture. | | |

**References**

KWATRA, V., ESSA, I., BOBICK, A., AND KWATRA, N. 2005.Texture optimization for example-based Synthesis.

In SIGGRAPH papers, 795–802.

WEI, L.-Y., HAN, J., ZHOU, K., BAO, H., GUO, B., AND SHUM,H.-Y. 2008. Inverse texture synthesis. *ACM*

*Trans. Graph. 27*,3, 52.