Texture Synthesis Using VAEs

CMSC 726 Final Project, UMD -- Fall’17
Texture Synthesis
Texture Types

- regular
- near-regular
- irregular
- near-stochastic
- stochastic

Figure from Wikipedia: Texture Synthesis
Texture Types

Figure from Wikipedia: Texture Synthesis
Model

Gregor et al., DRAW: A recurrent neural network for image generation. ICML’15
Approach

- Use the DRAW model to generate texture.
  - Generated images are small (28x28 only).
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- Loss function:
  - Cross entropy
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Approach

- Use the DRAW model to generate texture.
  - Generated images are small (28x28 only).
- Loss function:
  - Cross entropy → pixel-to-pixel correspondence is not suitable for texture
  - Filter-bank (FB) response.
Texture Reconstruction
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FB - no regularization
Texture Reconstruction

FB - no regularization

FB + color
Texture Reconstruction

- FB - no regularization
- FB + color
- FB + TV
Texture Reconstruction

- FB - no regularization
- FB + color
- FB + TV
- FB + color + TV
Texture Reconstruction

FB - no regularization

FB + color

FB + TV

FB + color + TV
Synthesizing Larger Texture

How can we synthesize larger texture?
Synthesizing Larger Texture

- Train networks to generate immediate neighbors.
- Feed generated neighbors as input to generate more tiles, and so on...
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