

Diversified Texture Synthesis with Feed-forward Networks Yijun Li¹, Chen Fang², Jimei Yang², Zhaowen Wang², Xin Lu², Ming-Hsuan Yang¹ ¹University of California, Merced ²Adobe Research Project website: <u>http://bit.ly/texturesynthesis</u>

• Contributions

A deep generative feed-forward network for diverse multi-texture synthesis and multi-style transfer Iterative optimization pipeline [Gatys et al., NIPS15, CVPR16]



Feed-forward pipeline [Ulyanov et al., ICML16][Johnson et al., ECCV16]

- Encourage diversity in outputs as the generator should be powerful enough to generate diverse results for one texture example
- Enable multi-texture synthesis in One single network to reduce the heavy burden of existing feed-forward methods which requires one network for one given texture

• Diversity loss

 $L_{diversity} = \frac{1}{N} \sum_{i=1}^{N} \|\Phi(P_i) - \Phi(Q_i)\|_1$

- ✤ P: Outputs in a batch
- ♦ Q: Reordering of outputs (Pi≠Qi)
- \bullet Φ : Enlarge feature distance



Texture

W/O diversity loss

W/ diversity loss

Multi-texture synthesis in one network



Top: original texture, Middle: Random, Bottom: Incremental

• Texture interpolation







Multi-style transfer in one network

Style 1

Style 2







Content

Results of a 1000-style transfer network

Outlook: from one to many to arbitrary

Learning-based: adaptive normalization layer [Huang et al., arXiv:1703.06868] [Ghiasi et al., arXiv:1705.06830] Non-learning-based: image reconstruction + feature transform [Li et al., arXiv:1705.08086]



Texture 1

Texture 2

[Gatys et al., Ours CVPR16]

Style 3 Style 4 Style 5

Style 6