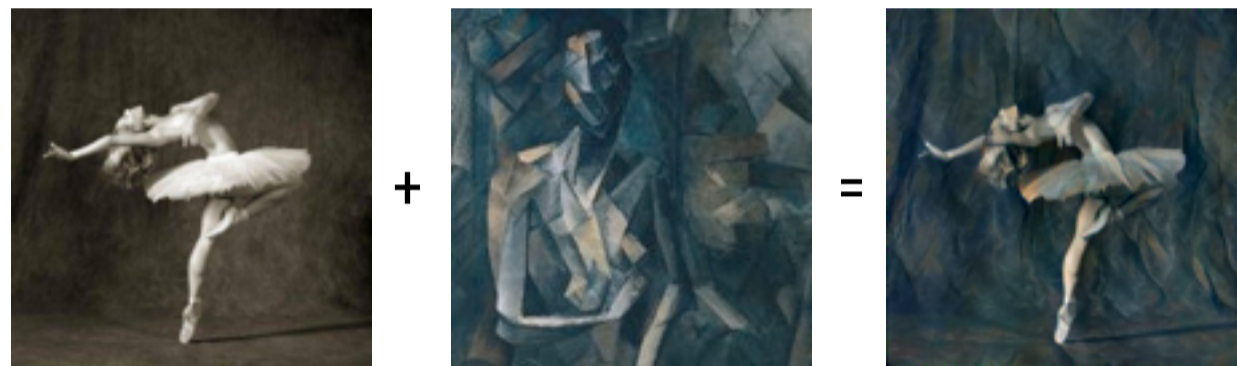


Instant Universal Artistic Style Transfer with Learned Normalization Parameters

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Intro

Neural style transfer can produce beautiful renditions of ordinary pictures



Neural style transfer w/ Picasso's Figure dans un fauteuil

In addition to producing stunning results, neural style transfer can give us insight into human artistic creativity

Background

Content and style loss used to optimize random noise into pastiche [1]

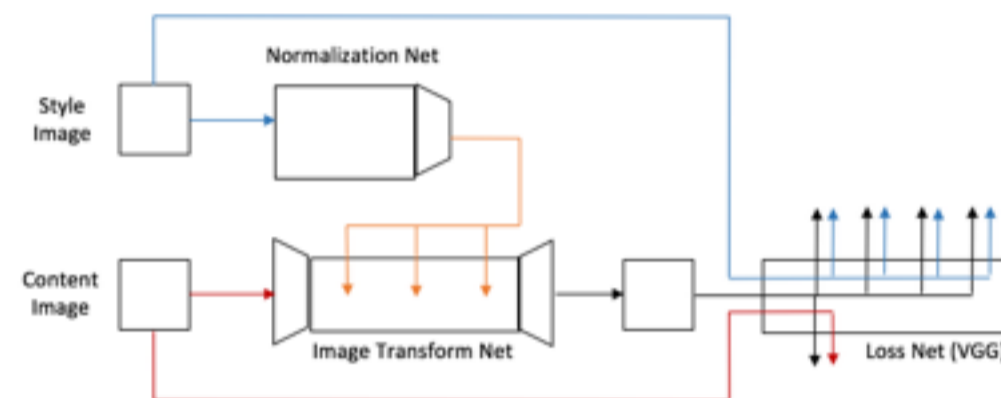
Image transformation network (ITN) developed to produce pastiche in one forward pass [2]

Found that unique normalization parameters are sufficient to represent many styles [3]

Can we learn the normalization parameters of an arbitrary style?

Method

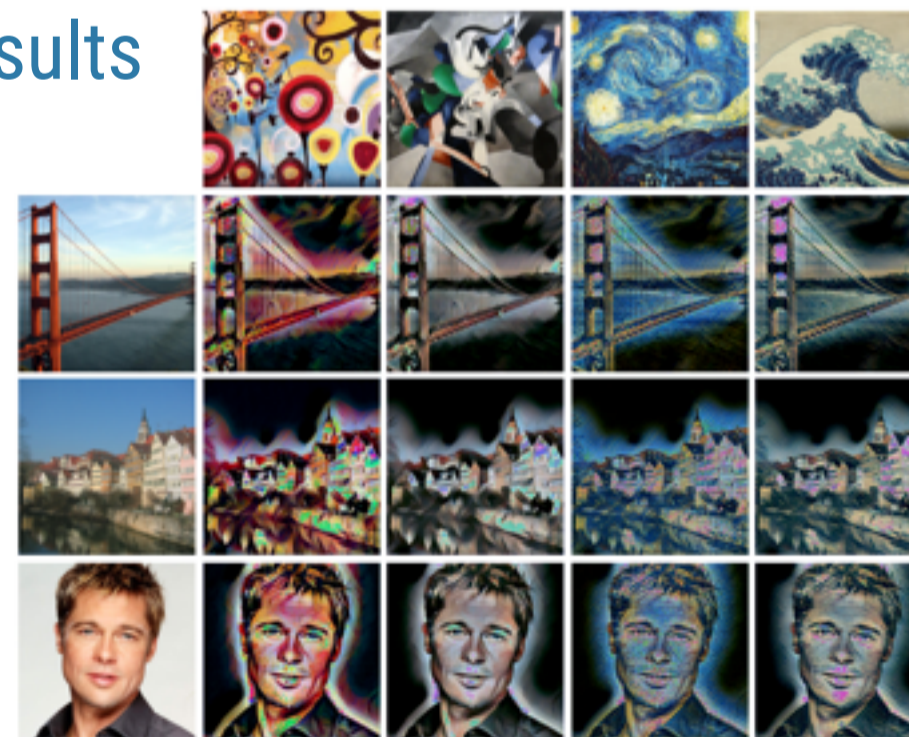
Architecture



System diagram

Our simple convolutional network (Normalization Network) can predict normalization parameters from styles

Results

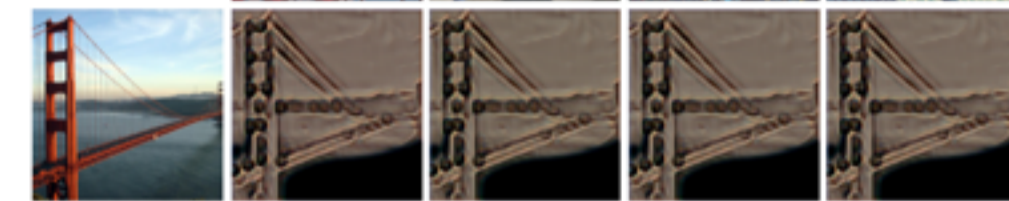


One network trained with four styles

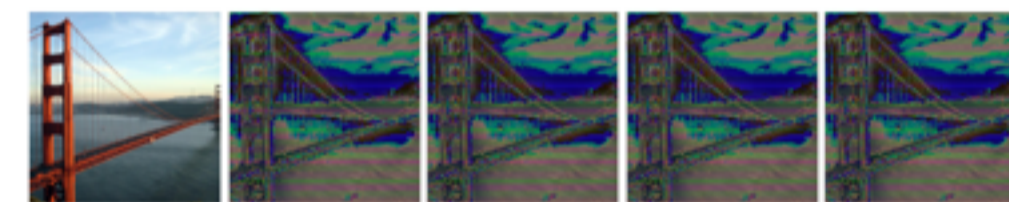
Network was **successfully** able to learn to represent **four unique artistic styles!**

Results (cont.)

C/S: 5:2000
LR: 1e-4



C/S: 5:1000
LR: 1e-3



C/S: 5:1000
LR: 1e-4



Generalization experiments done on the Kaggle "Painter by Numbers" painting dataset

Overfitting accomplished in experiments motivated us to try to accomplish **generalization**

Conclusion/Next Steps

A Normalization Network trained along with ITN can **learn to represent many distinct styles**

Fine-tuned hyperparameters may allow for this network to learn **arbitrary styles** and accomplish **universal style transfer** (WIP)

- [1] Leon A. Gatys, Alexander S. Ecker, and Matthias Bethge. A neural algorithm of artistic style. 2015.
- [2] Justin Johnson, Alexandre Alahi, and Li Fei-Fei. Perceptual losses for real-time style transfer and super-resolution. 2016.
- [3] Vincent Dumoulin, Jonathon Shlens, and Manjunath Kudlur. A learned representation for artistic style. 2016.