

# Artistic Style Transfer using Convolutional Neural Networks

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## 1 Abstract

Convolutional Neural Networks and its variants have established themselves as state of the art tool for various computer vision tasks. The fact that while using CNN's for image classification and object recognition, the "style" and "content" of images are stored separately in hierarchical layers of convolution network is exploited in the work by Gatys et al.(2015). The objective of the task is to generate an image with close resemblance to texture with respect to the style image and original objects with respect to the content image. They proposed a unique methodology of minimizing the style loss between the style image and generated image, minimizing the content loss between content image and generated image and optimizing the total loss variation which is a linear combination of style and content loss. In short the style transfer problem can be posed as an optimization problem, where the loss function to be minimized can be decomposed into three distinct parts: the content loss, the style loss and the total variation loss. The combination image is fed into the CNN as a random collection of pixels, and once feature sets are generated from the respective layers, L-BFGS algorithm is used to iteratively optimize upon the loss function by passing the generated image once again through the network layers.