**Summary of *Wasserstein Style Transfer* by Youssef Mroueh**

This article covers common methods use for image style transfer and then goes into a new approach using and encoder/decoder framework. The idea with image style transfer is to take an image and process it in a way that allows for retention of the initial image content with an updated style that comes from some target image or set of images. An issue arose with defines a loss function for this problem. It was discovered that a loss function could be defined by matching the spatial distribution of images to the feature space of CNN. To speed this method up many different processes were employed including: feedforward network optimization (to stylize an image in a single pass) , instance normalization and conditional instance normalization (allowed for the inclusion of multiple styles), and the Whitening Coloring Transform which employs an encoder/decoder framework like the work in this paper.

This method in this paper relies on aspects of the methods noted above, but offers a few novelties as well. The author points out that the normalization layers are working as a transport map from the spatial distribution of a content image to the feature space of a style image. The use Gaussian transport maps because they have some desirable qualities which allow us to find a closed form optimal map between the content and style images. This paper also introduces a method that allows for the generation of new styles using Wasserstein Barycenters. The demonstrate the capabilities of these methods by showing an image pyramids with two style images and a target images and show an image grid generating photos based on different weights for the style image features.