

# Artistic Image Colorization with Visual Generative Networks

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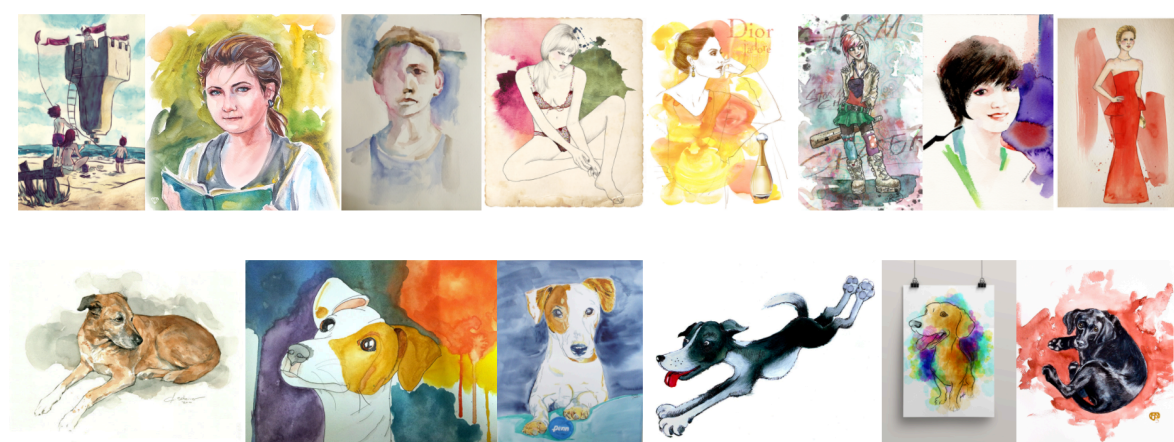
## Motivation

Generative models have achieved remarkable results in generating photorealistic visual images, while the problem of generating artistic images is relatively under investigated. In this project, we aim to design visual generative models for the problem of artistic image colorization to explore multiple settings of colorizing artistic images of different styles.



## Data

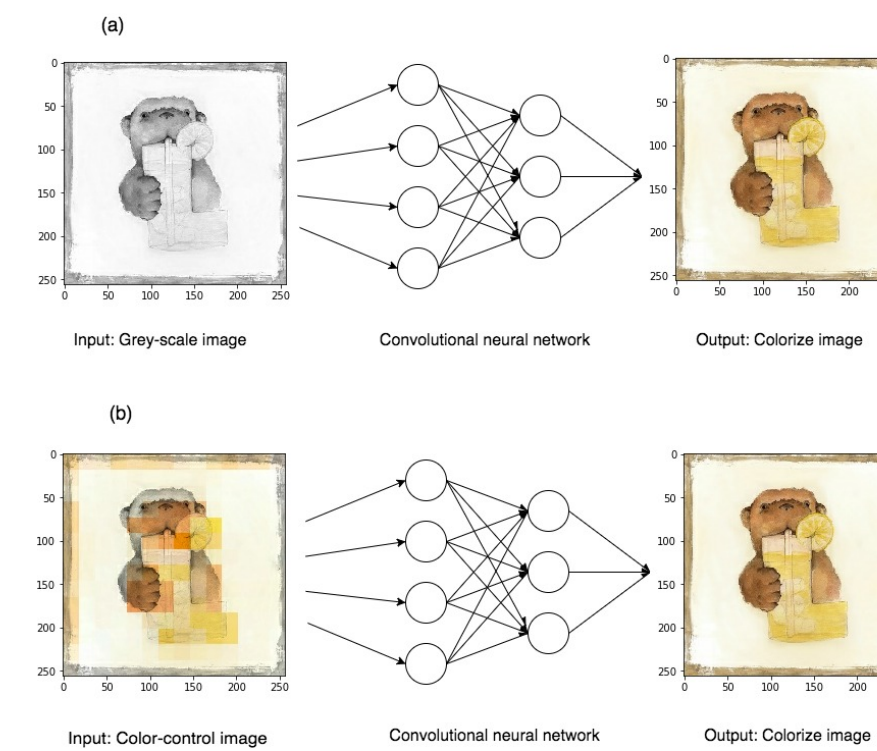
We use a recently released dataset of artistic images BAM. Each image in BAM is labeled with common object types, media types (i.e., visual style) and emotion. We use images with media type labels to form our training, validation and test set. We processed the images into grey-scale image with size 256 x 256 as input.



## Models

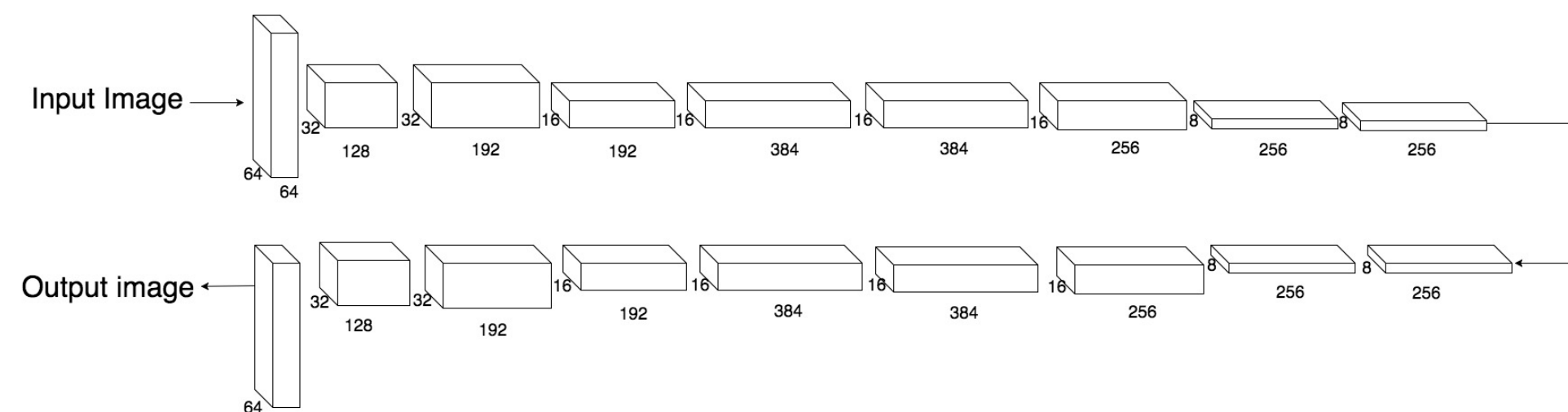
### High-level illustration of our systems:

- Given a gray-scale image, after processed by a convolutional neural network, generates a colorized image.
- Given a gray-scale image overlaid with a 14 x 14 color-controlling grid, the output is a colorized image, which is color-wise consistent with the control grid.

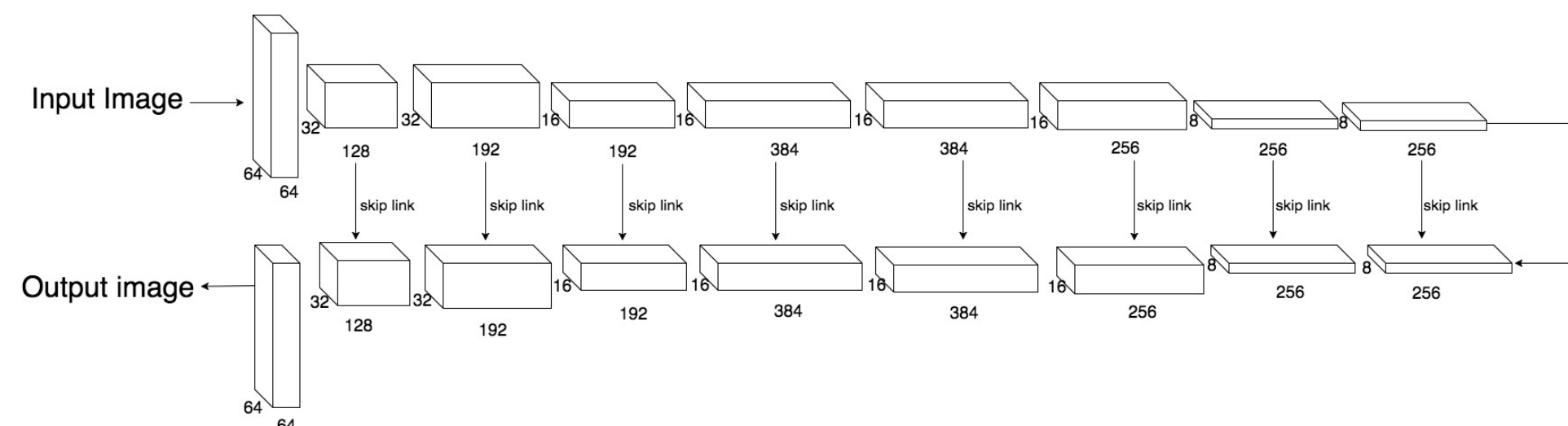


### Network design of encoder-decoder approach:

#### Network without skip link



#### Network with skip link



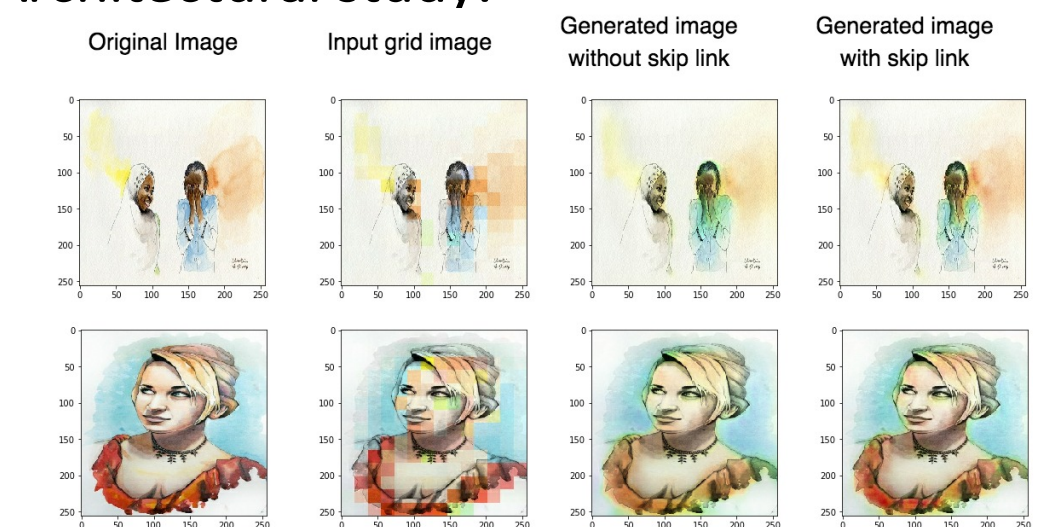
### Loss Function:

L2 reconstruction error between the network output and the target color image :

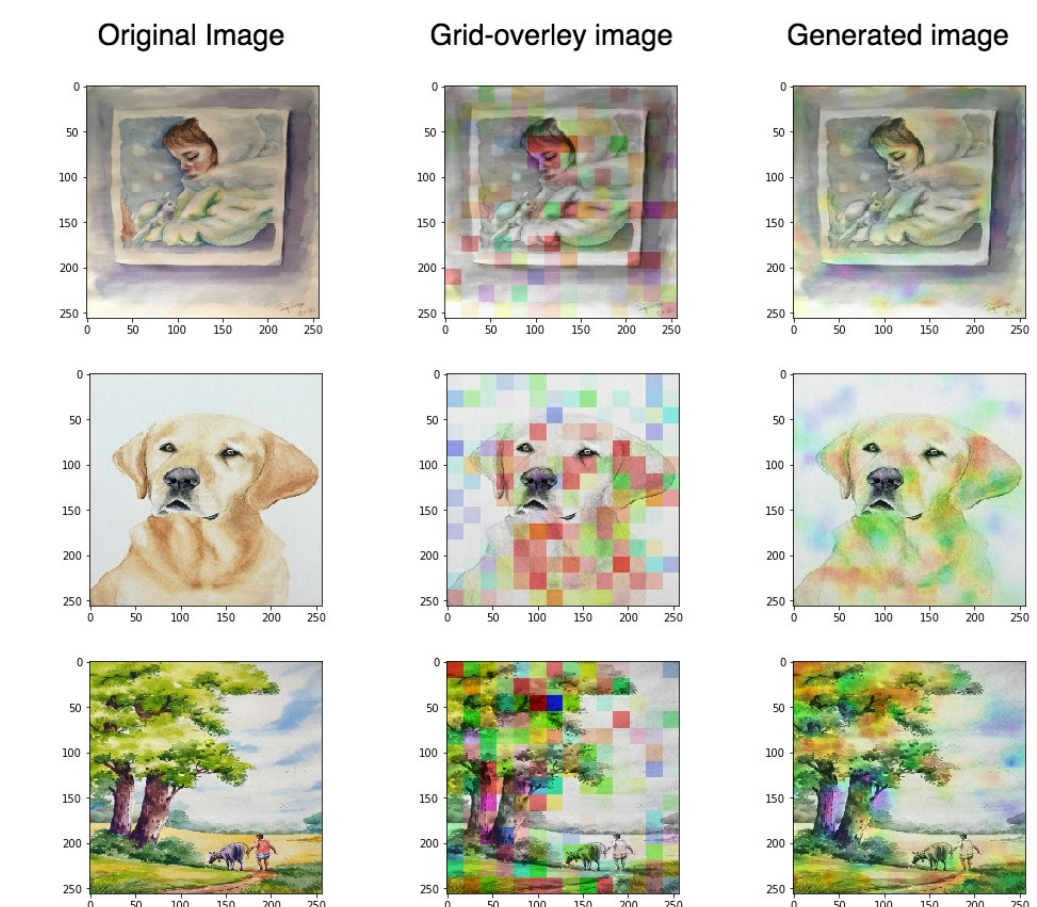
$$L = \frac{1}{m} (\hat{x} - x)^2, \text{ where } m \text{ is the batch size, } \hat{x} \text{ are the real data and } x \text{ are the reconstruction data.}$$

## Results

### Architectural study:



### Final Results with skip link:



## Future Work

Results for colorization for grey-scale image without color control grid:

