Color Me This

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BROWN

Motivation

Given a grayscale image as input, we attempt to provide an estimation of the image's RGB colors.
Color plays an important role in our understanding of images. As such, the aim of colorization can range from making an image more visually appealing, offering a new perspective, giving a glimpse of history, or perhaps simply allowing your grandparents to go on a vivid trip down memory lane.

Objectives

1. Find a insightful toy problem for image colorization
2. Create an interactive system for colorization
3. Develop subjective metrics to rank colorizers
4. Evaluate domain-specific properties colorization architectures and their model performance, based on hyperparameters
5. Make pretty pictures

Model

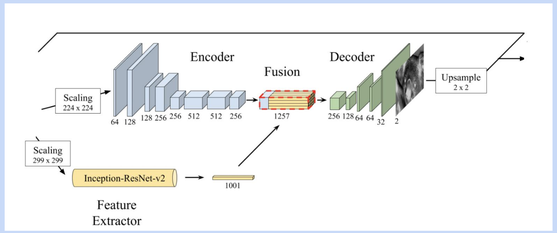
Dataset The initial colorizer was trained on the Tensorflow Flowers dataset, and the user hints model was trained on Oxford Flowers 102 with synthetic user hints.
Pipeline User uploads image. Initial colorizer creates a rough colorization and palette is selected. User selects spatial hints from palette. User hints model delivers colorization to user.

Colorization Pipeline

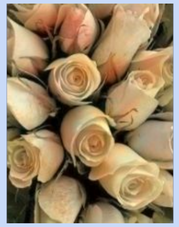
Upload Image

Grayscale

Initial Colorizer with Inception-Resnet-V2



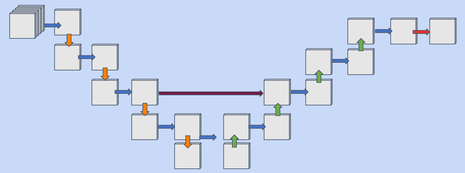
Colorize!

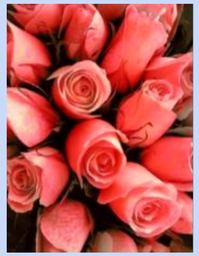


Extract Dominant Colors with K-means Clustering

Pick Color Hints

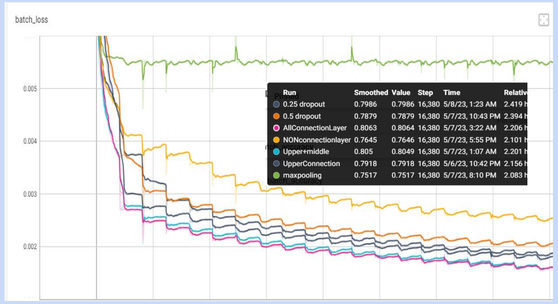
User Hints Colorizer



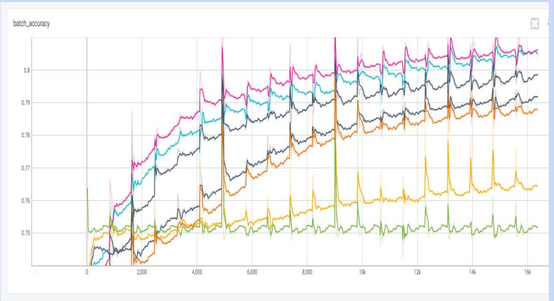


Impact of Architecture Choices

Batch Loss



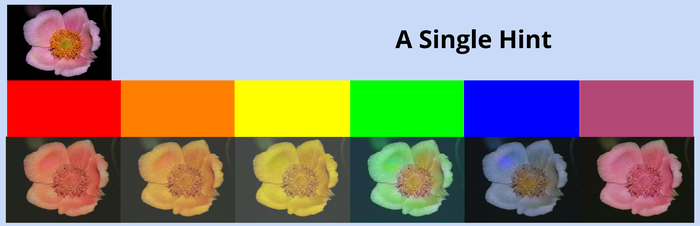
Batch Accuracy



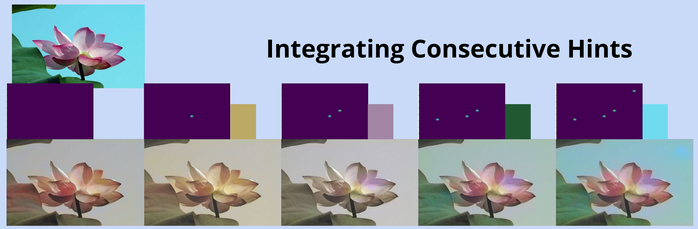
We found that a U-Net model with residual connections and convolutional up- and down-sampling performed best subjectively and under Huber loss.

Colorful Results

A Single Hint



Integrating Consecutive Hints



User Interface

Initial Automatic Colorization

Add Color Hints

References

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Acknowledgements

We would like to thank the CSCI 1430 staff and especially our project mentor TA Joel Manasseh.