Image Colorization

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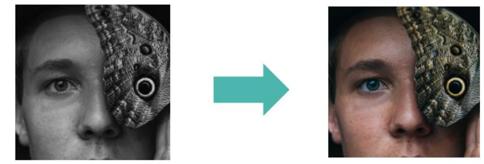
Predicting

- Despite several breakthroughs with 📱, the 📷 continues to be the most important feature to the consumer
- Focusing on the 📷 space, our only other criteria was that our deep learning model made us go □
- We chose to focus on colorization, which means adding realistic colors to grayscale images
- Input: One grayscale image => Output: colorized image

Data

- 10,000 images from Unsplash (95% train, 2.5% dev, 2.5% test)
- RGB to Lab (L = **grayscale**, a = **green**/**red**, b = **blue**/**yellow**)
- Vectorize the grayscale image; normalize and preprocess the input, generate zooms/flips/shears for generalization



Features

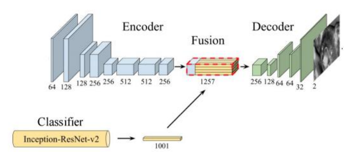
- Image Input
  - 256 x 256 pixel image
  - L channel intensity values from 0-100
- ResNet Input
  - Classification network trained on ImageNet
- Image Output
  - 256 x 256 pixel image
  - a,b channel pixel values from -128 - 128

Models

conv_color

- Conv - F:64, K:3, S:1, P:1, A: relu
- Conv - F:64, K:3, S:2, P:2, A: relu
- Conv - F:128, K:3, S:1, P:1, A: relu
- Conv - F:128, K:3, S:2, P:2, A: relu
- Conv - F:256, K:3, S:1, P:1, A: relu
- Conv - F:256, K:3, S:2, P:2, A: relu
- Conv - F:512, K:3, S:1, P:1, A: relu
- Conv - F:256, K:3, S:1, P:1, A: relu
- Conv - F:128, K:3, S:1, P:1, A: relu
- Conv - F:64, K:3, S:1, P:1, A: relu
- Conv - F:32, K:3, S:1, P:1, A: relu
- Conv - F:2, K:3, S:1, P:1, A: tanh

conv_res_color



Results

conv_color

Grayscale | Predicted | Ground Truth

conv_res_color

Results Pending

Expected

Grayscale | Predicted | Ground Truth

Discussion

- Difficult to understand what aspects of the model led to ideal colorization due to lack of reliable quantitative guiding metric, resulted in a more iterative approach. Science and art.
- Hard to overcome "browning". Brown decreases loss since similar to most colors. More diverse dataset increases browning.
- Best results achieved by transferring the classification layer of the Inception ResNet to the colorization network. Allows model to get a sense of what's in the picture

Future

- Implement color rebalancing as discussed in original colorization paper
- Experiment with alternative loss functions
- Apply to video -- additional objective of keeping adjacent frame colorization consistent

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