Photo colorization using deep learning.

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***Abstract*— colorizing black and white images using deep learning.**

I. Introduction

Photo colorization is form of media alteration which enables us to imbue a specific color palette into older forms of media. This provides a more modern tone and is a great form of media preservation. When you snap a picture in your smartphone using a black and white filter, most modern camera apps save the color information as metadata and hence can show you how the picture might have looked like if it had color. But older instruments which depended on more analog systems lack this certain ability. Our aim is to create and train a deep learning model which will roughly guess the color which might have been in a certain area using dataset which uses Lab coloring format.

II. Literature review

To learn about the very basics of color restoration, the first thing to learn about is the color palette and various color models, especially Lab color model. The Deep learning model is based on Transfer learning. I was able to learn most of the core mechanics on towardsDataScience blog and concerning youtube videos by the creators. In addition, I was able to read a few research papers concerning this matter.

III. Dataset used

The model uses a custom dataset of 2369 paintings. This dataset is available on Kaggle.

Source : https://www.kaggle.com/thedownhill/art-images-drawings-painting-sculpture-engraving

A secondary dataset was also provided to test custom images.

IV. Proposed architecture

To create this deep learning model, I used autoencoders.
The model has the following structure:
The model uses the InceptionResNetV2 as the base pretrained model.
1.Encoder: This consists of 8 conv2d layers with ReLu activation function for each layer.
2.Fusion :The fusion layer consists of a repeat vector and a single conv2d layer.
3. Decoder : This layer consists of 2 conv2d layers which have been upsampled by a (2,2) with ReLu as the activation function and 3 conv2d layers with Relu activation function.
Finally, the last layer is an upsampled (2,2) conv2d layer with tanh as the activation function.
The model is run for 25 epochs.

V. Result and Experiment analysis

The model performs has slight trouble with identifying the colors and can give a random chromatic patch with the features still intact.

VI. Conclusion and Future Scope

The current iteration could perform well if provided more compute power and better dataset.
I intend to replace the present architecture with a Generative adversarial networks (GANs), which has a better learning rate compared the current method used.

References

[1] Color scaling grey images by Emil Wallner.
[2] Colorizing with CV and Dl models by Adrian Rosebrock.
[3] Nicole Renotte on youtube.
[4] Alladin pearson on youtube.
[5] Edureka on youtube.