



COLORIZING AND RESTORING OLD IMAGES AND VIDEOS

Simply put, the mission of this project is to colorize and restore old images and old memories.




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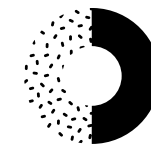
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Abstract

We propose a deep learning & ML approach for user-guided image colorization and restoration. The system directly maps a grayscale image, along with sparse, local user "hints" to an output colorization and restoration with a Generative adversarial networks(GAN). Rather than using hand-defined rules, the network propagates user edits by fusing low-level cues along with high-level semantic information, learned from large-scale data. We train on a hundreds of images, with simulated user inputs. To guide the project towards efficient input selection, the system recommends likely colors based on the input image and current user inputs. The colorization and restoration is performed in a single feed-forward pass, enabling real-time use. Even with randomly simulated user inputs, we show that the proposed system helps novice users quickly create realistic colorizations, and show large improvements in colorization and restoration quality with just a minute of use. In addition, we show that the framework can incorporate other user "hints" as to the desired colorization, showing an application to color histogram transfer

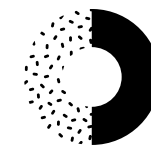
ABOUT OUR PROJECT

Simply put, the mission of this project is to colorize and restore old images and film footage. We'll get into the details in a bit, but first let's see some pretty pictures and videos!



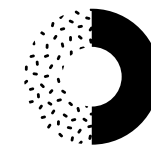
Strengths

Very Good in making old images and videos, black and white images and videos back to life and restoration.



Weaknesses


Contrast level can't be precise as we like.



Opportunities

There is always an opportunity to improve in code and use of this code in major project for face recognition with any type of image with accurate output result.

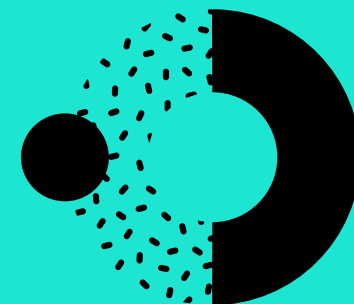
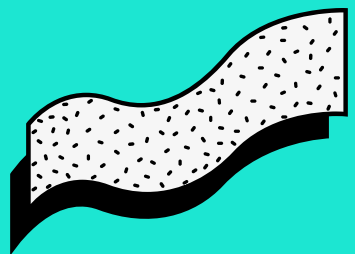
DATASET USED

 **Neural Network:** A neural network is a network or circuit of neurons, or in a modern sense, an artificial neural network, composed of artificial neurons or nodes.

Docker : Lightweight, standalone, executable package of software that includes everything needed to run an application: code, runtime, system tools, system libraries and settings.

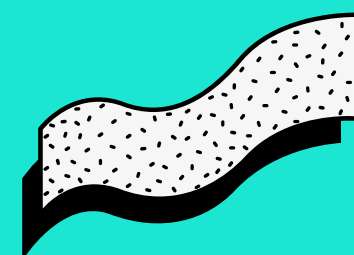
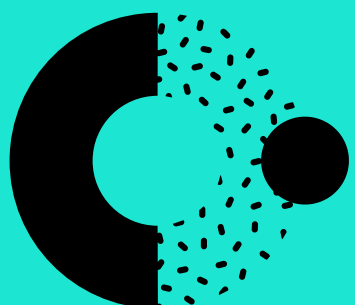
What we able to Acheive from this Project

- Glitches and artifacts are almost entirely eliminated
- Better skin (less zombies)
- More highly detailed and photorealistic renders
- Much less "blue bias"
- Video - it actually looks good!
- GAN - neural networks that generate material, such as images, music, speech, or text, that
- is similar to what humans produce..
- Restoration of blur and fast image click images.



RESTORE COLOR TO BLACK AND WHITE IMAGES

COLORIZATION



Example Image



How We Achieve Stable Images and Videos

GAN training is crucial to getting the kind of stable and colorful images seen in this iteration of Colorizer. GAN training wonderful colorization while eliminating the nasty side effects like flickering objects in video.

Believe it or not, video is rendered using isolated image generation without any sort of temporal modeling tacked on.

GAN

Generative adversarial networks (GANs) are neural networks that generate material, such as images, music, speech, or text, that is similar to what humans produce.

There Are three models we have used

- Artistic
- Stable
- Video

Why Three Models?

There are now three models to choose from in Colorizer. Each of these has key strengths and weaknesses, and so have different use cases.. But stable and artistic are both for images, and sometimes one will do images better than the other.

Artistic

Artistic - This model achieves the highest quality results in image coloration, in terms of interesting details and vibrance.

Drawback is you have to adjust the rendering resolution or render_factor to achieve this.

Stable

Stable - This model achieves the best results with landscapes and portraits. Notably, it produces less "zombies"- where faces or limbs stay gray rather than being colored in properly.

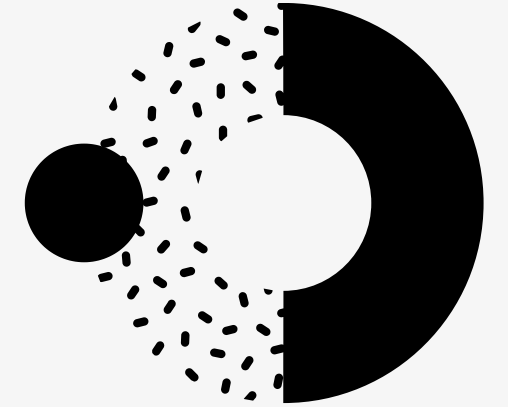
It generally has less weird miscolorations than artistic, but it's also less colorful in general.

Video

Video - This model is optimized for smooth, consistent and flicker-free video. This would definitely be the least colorful of the three models,

but it's honestly not too far off from "stable".

TWO TECHNIQUES USED



**Self-
Attention
Generative
Adversarial
Network**

**Two Time-
Scale Update
Rule**

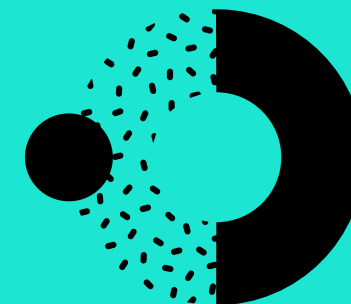
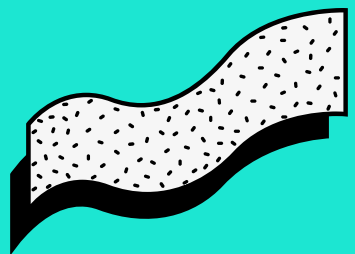
Self-Attention Generative Adversarial Network

I've just modified it to have the spectral normalization and self-attention. It's a pretty straightforward translation.

Two Time-Scale Update Rule

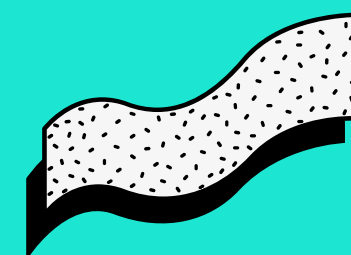
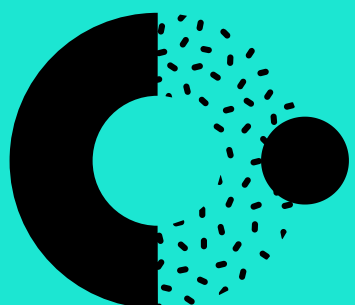
This is also very straightforward – it's just one to one generator/critic iterations and higher critic learning rate.

For Less Loss



REMOVE BLUR AND MISSING DETAILS FROM IMAGES

RESTORATION



Example For Restorasion



Image Restoration Technique

The image restoration application implements and analyzes few image restoration techniques, without using existing image processing libraries. The application provides an easy to use GUI built on PyQt4 to perform these operations on grayscale and colour images, and is completely implemented in Python. It was tested against a set of degraded images with varying levels of noise (AWGN) and known/unknown blur kernels.

Dependencies And Techniques Required

The image restoration techniques implemented are:

- Blur Removal
- Missing Gaps and pour.
- Render Factors
- Grayscale Removal

Dependencies

- python v3
- PyQt4 and GAN Neural Network
- python libraries : opencv (to read/ save images), numpy, matplotlib and many more.

Flowchart of Project

January

Decision making
regard project
we should work
on.

February

Learning about
dataset to be used
and about neaural
network.

March

Work on code for
colorization for
artistic and build of
our own dataset.

April

Work on code for
colorization for stable
and videos.

May

Work on code
for restorazion
and conclusion
this minor
project.

References

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THANK YOU

