Ink-To-Tint : Manga Artisan

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Motivation

- Artists in the manga industry often face overwork due to the meticulous nature of manga drawings, which typically involve detailed black-and-white sketches.
- However, this can diminish reader engagement, particularly when an anime adaptation of the manga is not available.
- Thus, we propose the implementation of Generative Adversarial Networks (GANs) for colorization as an effective solution.
- This innovation promises not only to alleviate the burden on manga artists but also to broaden the appeal of manga to diverse audiences.
- Our initiative aims to foster a greater appreciation of manga as an art form across a wider audience.
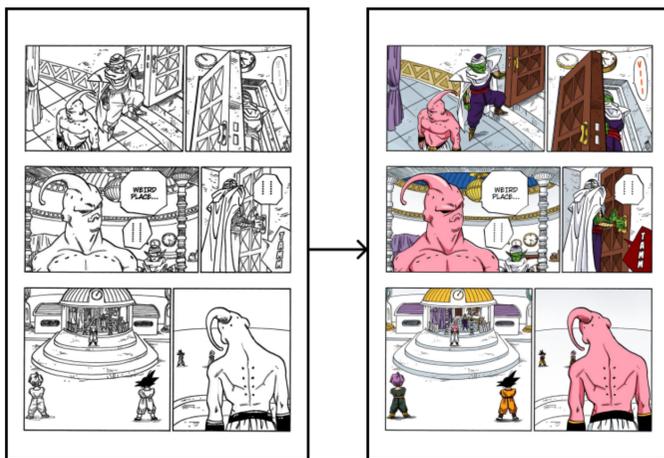

Figure 1: Ideal manga colorization

Related Work

- In **2019, "Manga Colorization using Generative Adversarial Nets"[1],** applied a pix2pix conditional deep convolutional GAN for manga colorization. Our method also employs a U-net based pix2pix conditional GAN, but unlike the prior study, we address the limitation of using textured grayscale pages as input—which tends to yield easier, yet unauthentic, colorization results. Instead, we focus on processing hand-drawn sketches that more accurately reflect the typical manga style, refining the data preprocessing pipeline for a more realistic outcome.

- In **2014**, the paper **"Conditional Generative Adversarial Nets"[2]** introduced an innovative training method for generative networks. We have adopted this technique by providing a 'condition' to the discriminator, consisting of the sketched input concatenated with the generated or actual output.

References

[1] Attaiki S., Manga Colorization using Generative Adversarial Nets., Research Gate, 2019.
[2] Mehdi Mirza and Simon Osindero, Conditional Generative Adversarial Nets, arXiv, 2014.

New Technique

Our project employs a variation of Pix2Pix conditional Generative Adversarial Networks (cGANs) to colorize manga directly from sketches, unlike other methods that use grayscale versions of colored mangas, which retain textures and simplify colorization. By modifying our dataset to better replicate the texture-light style of authentic manga, our approach presents a more challenging but accurate colorization process.
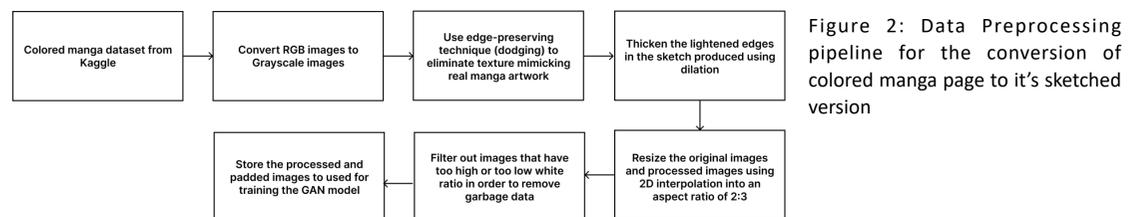

Figure 2: Data Preprocessing pipeline for the conversion of colored manga page to it's sketched version
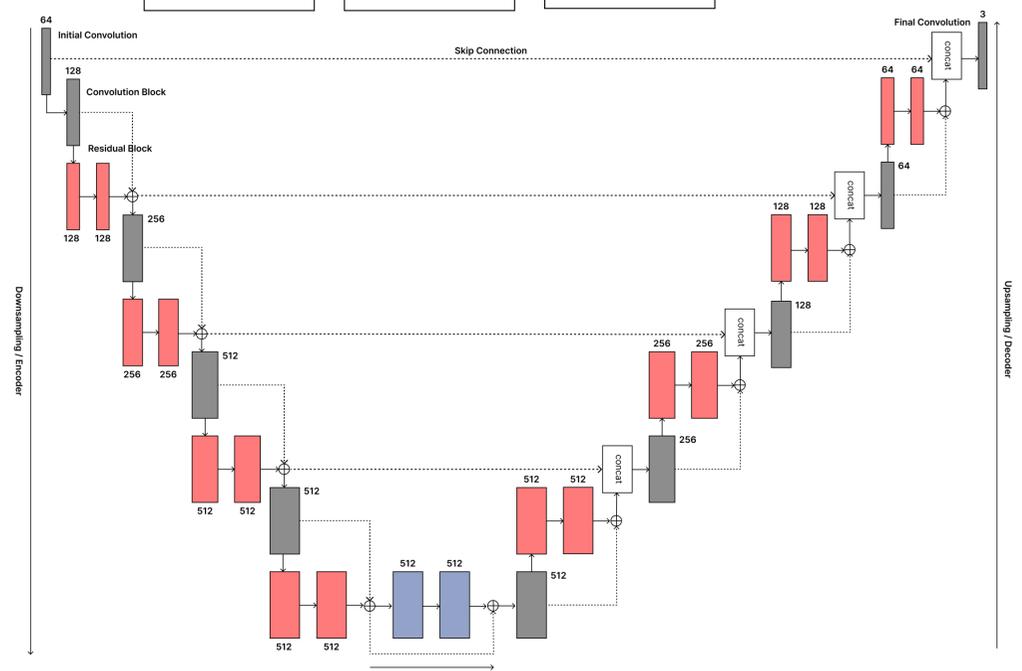

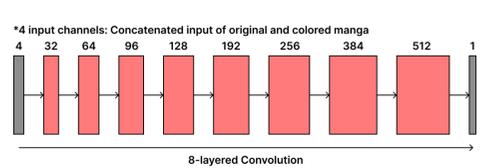Figure 3: U-net architecture for the Generator

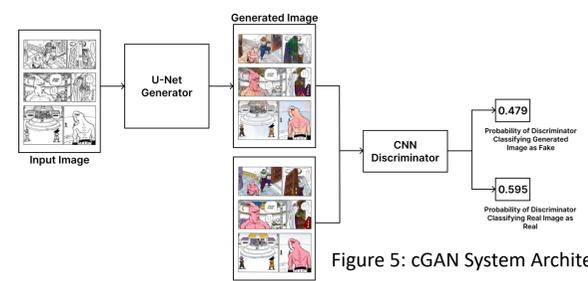Figure 4: Simple CNN Architecture for the Discriminator

Figure 5: cGAN System Architecture
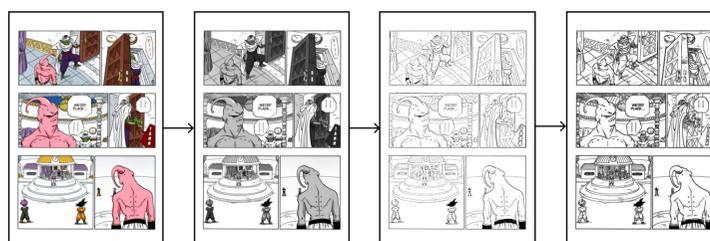
Experimental Results

Figure 6: Conversion of colored manga image to authentic manga style using grayscaling, dodging and dilation.

Dataset: Trained on 49,200 coloured manga pages.

Figure 7: Improvement of example colored output shown progressively
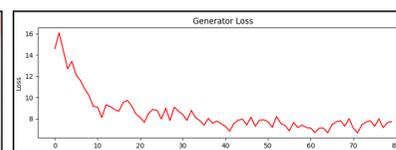

Figure 8: Prediction on unseen data
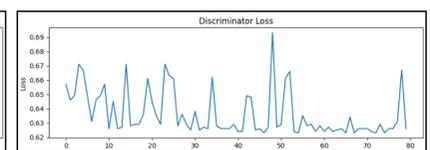

Figure 9: Loss graph for generator

Figure 10: Loss graph for discriminator

Loss	20 Epochs	40 Epochs	60 Epochs	80 Epochs
Generator Loss	10.76	8.817	7.513	7.446

Figure 11: Loss values for generator