USER-GUIDED IMAGE COLORIZATION

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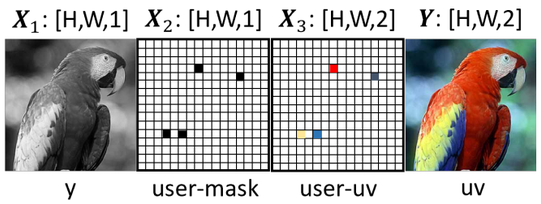
1. Introduction

User-guided image colorization aims to map a grayscale image with sparse, local user input to a color image. This approach allows for correction and refinement of the model output.

2. Data Pipeline

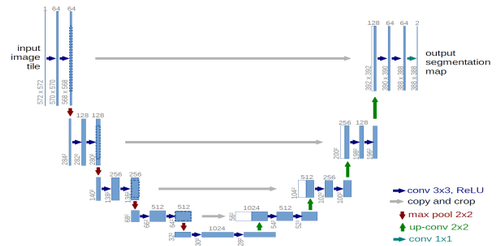
The ImageNet dataset with over 1.3 million images was used.

1. Filter out (nearly) grayscale images.
2. Resize image to 256×256 pixels.
3. Convert image from RGB to YUV.
4. Split YUV image into Y- and UV-components.
5. Simulate user input
   (a) Draw number of points from a geometric distribution.
   (b) Draw locations for each point from a 2D normal distribution.
   (c) Create a binary mask for the simulated user points.
   (d) Create a mask with UV-values from the original image.



3. Model

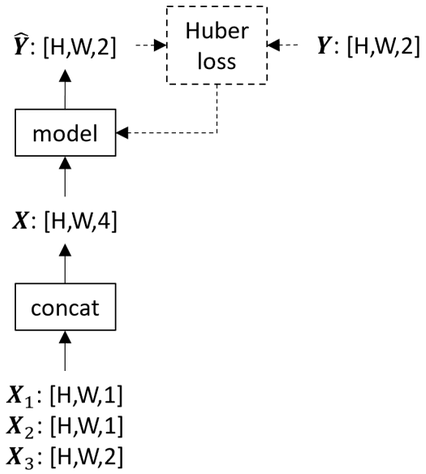
The model is based on a U-Net architecture that allows for customizable depth and width. The U-Net architecture has been proven to work well for various semantic segmentation and conditional generation tasks.



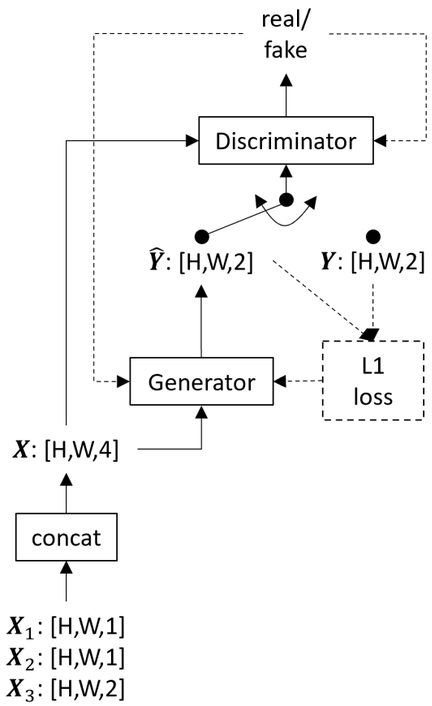
4. Training

A supervised approach was used to pretrain the model, followed by a cGAN training based on pix2pix for further refinement.

4.1 Supervised

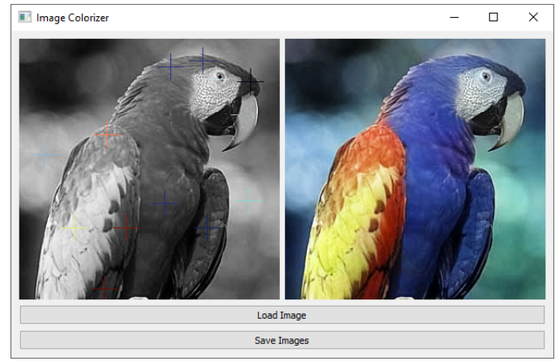


4.2 pix2pix



5. Image Colorizer

A GUI for user-friendly image colorization was implemented, allowing users to select colors for specific pixels, with the model adjusting its output accordingly. The GUI smoothly adapts to various image resolutions by resizing both the grayscale image and user input to fit the model's requirements. Output color channels are then resized and combined with the original grayscale image.



6. Conclusion

With just a few additional user inputs, more realistic colorization results can be achieved. The user-friendly GUI makes this approach easily accessible. The main issue is the small image size on which the network is trained, due to a lack of computational resources.

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