AI-Assisted Creative Expression: a Case for Automatic Lineart Colorization

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Abstract

Introduction

Humans possess the ability to perceive and understand the world allowing us to accomplish a wide range of complex tasks through the combination of visual recognition, scene understanding, and communication. The ability to quickly and accurately extract information from a single image is a testament to the complexity and sophistication of the human brain and is often taken for granted. One of the Artificial Intelligence (AI) field's ultimate goals is to empower computers with such human-like abilities, one of them being creativity, being able to produce something original and worthwhile.

Computational creativity is the field at the intersection of AI, cognitive psychology, philosophy, and art, which aims at understanding, simulating, replicating, or in some cases enhancing human creativity. One definition of computational creativity is the ability to produce something that is novel and useful, demands that we reject common beliefs, results from intense motivation and persistence, or comes from clarifying a vague problem. Top-down approaches to this definition use a mix of explicit formulations of recipes and randomness such as procedural generation. On the opposite, bottom-up approaches use Artificial Neural Networks (ANNs) to learn patterns and heuristics from large datasets to enable non-linear generation.

- Deep Learning Breakthroughs
- Rise of Generative Neural Networks

Motivations

- A case for Lineart Colorization

Problem Statement

- Black & White Lineart VS Gray Scale
- Incomplete Information Challenge fo Computer Vision
- Natural Artisitic Control Back to the User

Contributions

- Recipe for curating datasets for the task of automatic colorization
- 3 Models exploring different aspect of the topic:
  - PaintsTorch: High Quality, User-Guided, Fast Realtime Feedback
  - StencilTorch: Human-Machine Collaboration, Human-in-the-Loop
  - StableTorch: Variance and Iterative Exploration
- A reflexion on Current Generative AI Ethical and Societal Impact in our Society

Concerns

- Raise awareness about

- – Deepfakes
- – Model Fabulations
- – Ownership & Copyright Ambiguities
- – Biases & Discrimination
- About this work
  - – Images used only for Educational and Research Purposes
  - – Only describe recipes for reproducibility
  - – Dataset and Weights are not Distributed (Only Code)

Outline

- Plain Language Expanded TOC

Background

History of Artificial Intelligence

Neural Networks

Autoencoders

Variational Autoencoders

Generative Adversarial Networks

Denoising Diffusion Models

Contrib I (Find Catchy Explicit Name)

State of the Art

Method

Setup

Results

Summary

Contrib II (Find Catchy Explicit Name)

State of the Art

Method

Setup

Results

Summary

Contrib III (Find Catchy Explicit Name)

State of the Art

Method

Setup

Results

Summary

Contrib IV (Find Catchy Explicit Name)

State of the Art

Method

Setup

Results

Summary

Ethical and Societal Impact

Conclusion

References