

PROJECT ABSTRACT

Old Photo Restoration using DeOldify

A DeOldify-based pipeline that colorizes and restores vintage photographs, delivered as a built-to-order student project with code, trained weights, report, PPT and viva kit.

01. Title

Old Photo Restoration using DeOldify

02. Introduction / Background

Millions of photographs exist only as fading black-and-white prints: grandparents' portraits, decades-old wedding shots, scans marred by scratches and dust. Recovering color and repairing damage by hand is slow expert work. DeOldify, Jason Antic's open-source deep-learning pipeline, automates both steps: a U-Net with self-attention colorizes grayscale imagery, and an artifact-repair pass cleans scratches and scan defects. The model is trained with the NoGAN approach — first as a plain colorizer, then refined with a GAN-style critic on fastai — so predicted colors look natural rather than washed out. This project turns that pipeline into a complete, demoable student build with a Flask web app.

03. Problem Statement

Family and archive photographs deteriorate and exist only as damaged grayscale scans. Manual restoration requires expert retouchers and does not scale to personal photo collections. The project addresses this by building a deep-learning restoration pipeline that colorizes scanned vintage photos and repairs common damage, wrapped in a simple demo app where the result can be judged visually against the original.

04. Objectives

- Integrate the DeOldify colorizer (U-Net with self-attention, NoGAN-trained) and its artifact-repair pass into a single restoration pipeline.
- Build a Flask demo app with photo upload, a draggable before-after comparison slider, an adjustable render factor, and batch processing of scan folders.
- Assemble a sample restoration gallery with documented failure cases (heavy damage, faded faces) as the qualitative evaluation of the build.
- Deliver the complete student kit: source code, pre-trained weights, report, PPT and viva Q&A document.

05. Proposed System / Working

The system has three stages. (1) Preprocessing: the scanned photo is resized and contrast-normalized with OpenCV. (2) Model: the NoGAN-trained U-Net colorizer predicts a color for every pixel, with self-attention keeping colors consistent across large regions; the artifact-repair pass then cleans scratches, dust and scan lines. (3) Demo application: a Flask app serves the pipeline behind an upload form, renders the original and restored images behind a before-after slider, exposes the render-factor quality/speed control, and offers a batch mode plus a download button.

06. Technologies / Components Used

- Python 3.10, PyTorch, fastai-based DeOldify model code
- OpenCV, NumPy, PIL (scanning prep, resizing, post-processing)
- Flask demo web app with upload and before-after slider UI
- Pre-trained DeOldify colorizer and artifact-repair weights
- ImageNet-subset imagery used to train the colorizer
- Sample restoration gallery with documented failure cases

07. Key Features

- Grayscale-to-color conversion of scanned vintage photos
- Scratch, dust and scan-artifact repair on the same photo
- One-click upload with draggable before-after comparison
- Adjustable render factor trading quality against inference time
- Batch mode for processing folders of scans
- Bundled restoration gallery with documented failure cases
- Downloadable restored photos

08. Applications / Use Cases

- Family photo restoration demos and archive digitization projects (prototype scope)
- Teaching material for colorization, U-Net architectures and GAN-style refinement
- Reference build for other image-to-image translation student projects
- Starting point for portrait-specific restoration experiments

09. Results & Scope

Photo restoration has no single correct answer — there is no ground-truth color for a faded 1960s portrait — so this build makes no numeric claims at all and no numeric scores are claimed. Quality is judged visually: the deliverable includes a sample restoration gallery and a documented set of failure cases (heavy damage, faded faces) instead of scores. Scope is single-image colorization and artifact repair of scanned grayscale photos; it does not recover original true colors, does not reconstruct large missing regions reliably, and is an educational prototype rather than a professional restoration service.

10. Conclusion

Old Photo Restoration using DeOldify delivers an end-to-end applied deep-learning project: a relatable real-world problem, Jason Antic's NoGAN-trained U-Net pipeline, a Flask demo that makes the transformation visible in seconds, and an honest qualitative evaluation through a restoration gallery with documented failure cases. The visual nature of the task — and the discussion of what the model gets wrong — gives the student rich, defensible material for the report and viva.

11. References

- Antic, J. — DeOldify: A Deep Learning based project for colorizing and restoring old images (GitHub, jantic/DeOldify); NoGAN training approach built on fastai.
- fastai documentation (docs.fast.ai) — training framework used by the DeOldify pipeline.
- Deng, J. et al. — ImageNet: A Large-Scale Hierarchical Image Database (CVPR 2009), the dataset family whose subset imagery trained the colorizer.
- Goodfellow, I. et al. — Generative Adversarial Nets (arXiv:1406.2661), the adversarial-training concept behind the NoGAN refinement stage.