RESTORE-IT

My Implementation of the Paper titled: Bringing Old Photos Back to Life

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Photo-Restoration and Computer Vision Tasks
Reproducing Results from the Paper and Implementing on a New Dataset

Reproducing The Results

REFERENCE

1. I took reference from the official implementation of the paper to get the pre-trained model and inferencing code.
2. I used ChatGPT to get codes for Metric Functions
3. Dataset for reproducing results: Since the official dataset wasn't publicly available, I used the subset of the dataset released along with the official repository.

PROCEDURE

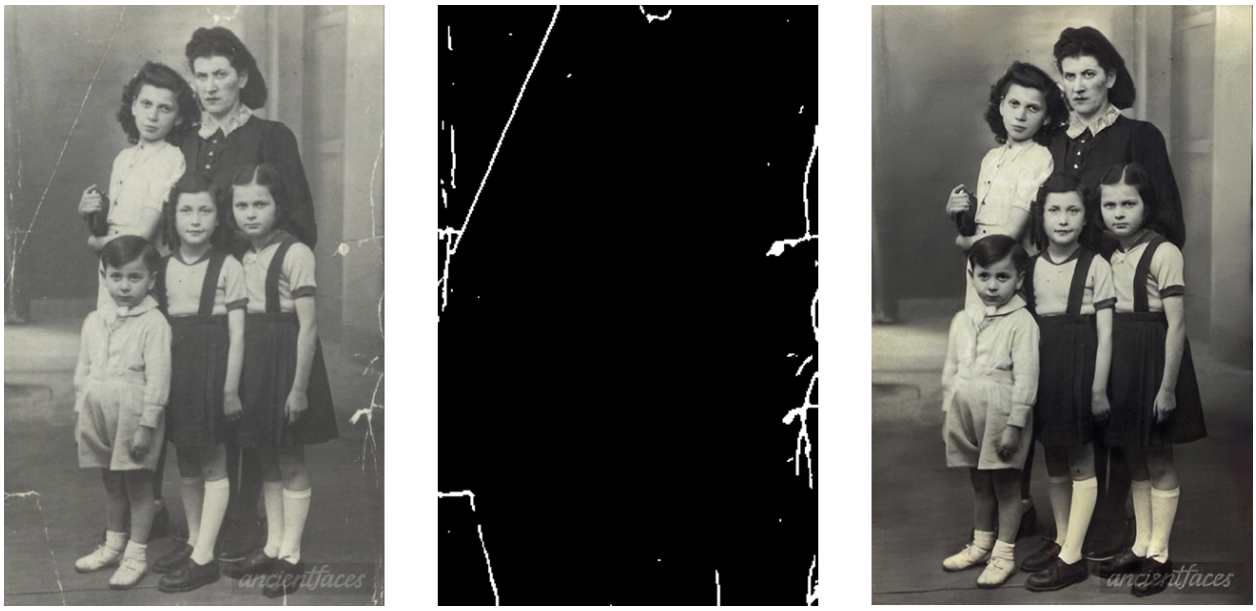
1. I first infer on the old photos available in the test dataset and generate the higher resolution images.
2. For this, we first run the pre-processing step on the images, which includes domain translation between low-quality images to higher-resolution images. (The training process for which has been discussed in the Reading assignment.) E.g.:

The image on the left was the original input image, the image in the middle is the domain-adjusted image, which we give input to our restoration model. Finally, the image on the right is the domain-restored image.

3. Next, we run a face-detection model, which looks for any faces in the image, and then we run a face enhancement pipeline:

These are the face detection and Face enhancement outputs from the same image.

4. Next, if we have run the scratch enhancement code, our model runs the global pipeline and first runs the scratch detection model.
5. Finally, the model infers a scratch-free image.



These are the scratch regions in the input image and our model removes these regions.

RESULTS AND QUANTITATIVE ANALYSIS

Generated images using without scratches and with scratches pipeline respectively:

A) 

B) 

For quantitative analysis of the results, I picked two of the metrics discussed in the paper: SSIM and PSNR. These two have been widely used to evaluate the quality of photographs and the representation of images between original photos and generated.

Metric	Result	Original Paper
PSNR	28.20	23.33
SSIM	0.8127	0.69

Here, we see results are much better than the original paper. However, we are inferring on a much smaller test set than the original paper using the fully-trained model. Hence, we get better results.

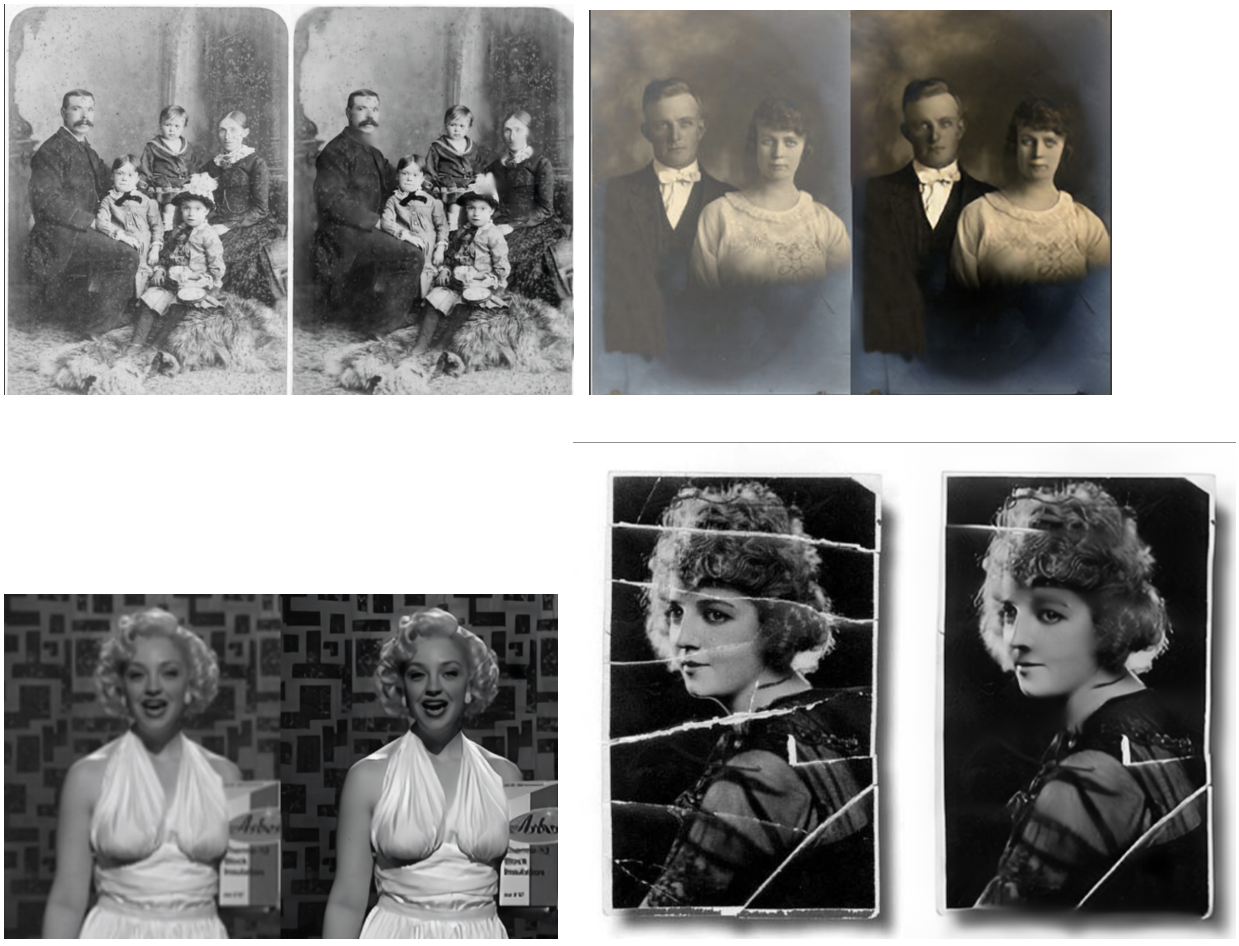
Trying On a New Dataset

DATASET USED

https://www.kaggle.com/datasets/noobyogi0100/low-resolution-photographs/

Above is a publicly available Kaggle dataset with old and distorted images, the same has been evaluated using blind face image restoration techniques like GFP-GAN, HighFaceGAN and PULSE.

RESULTS



Distorted images from the dataset and their corresponding restored images.

Metric	Value
PSNR	30.07
SSIM	0.3771

We see that on a new dataset, our model has a higher Peak Signal To Noise ratio while a much lower SSIM, i.e. much lower Structural Similarity than before. This shows it is much more suitable for denoising tasks.

CONCLUSION

Above is the implementation of the paper `Bringing Old Photos Back to Life` and testing it on a new dataset using PSNR and SSIM as metrics.