

# Image Regeneration for Old Damaged Monument Reel Picture using Deep Learning

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**Abstract:** We suggest a deep learning approach for restoring severely degraded old photos. However, unlike conventional restoration tasks that can be solved through supervised learning, restoring real photos is challenging due to the complexity of the degradation and the domain gap between synthetic images and real old photos, which makes the network unable to generalize. To overcome this, we propose a novel triplet domain translation network that uses both real photos and a large number of synthetic image pairs. Our approach involves training two variational autoencoders (VAEs) to transform old and clean photos into two separate latent spaces, with synthetic paired data used to learn the translation between these spaces. This translation is effective because the domain gap is closed in the compact latent space, which allows it to generalize well to real photos. To address the challenge of multiple degradations mixed in one old photo, we design a global branch that includes a partial nonlocal block to target structured defects such as scratches and dust spots, and a local branch to address unstructured defects such as noise and blur. The two branches are fused in the latent space, leading to improved capability to restore old photos from multiple defects. Our proposed method outperforms state-of-the-art methods in terms of visual quality for restoring old photos.

**Keywords:** Deep Learning

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