

# Image Noise Reduction with Auto-encoders using TensorFlow

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**Abstract:** Image noise reduction is a fundamental task in image processing with applications in an assortment of fields, including medical imaging, satellite imaging and photography. In this project, we propose an innovative method for image denoising utilizing autoencoders, a particular kind of neural network particularly suited for learning efficient representations of data. We implement our solution using TensorFlow, a popular deep learning framework, leveraging its flexibility and performance capabilities. Autoencoders consist of two encoders and a decoder, where the encoder maps the input data into a latent space with lower dimensions representation, and the decoder restores the initial input from this representation. By training the autoencoder on pairs of noisy and clean images, it learns to capture the underlying structure of the data while filtering out the noise. Furthermore, we explore extensions and enhancements to our basic model, including incorporating adversarial training techniques like GANs, or generative adversarial networks to further enhance denoising performance. We also discuss potential applications and future directions for research in image denoising using autoencoders. In summary, our work presents a comprehensive framework for image noise reduction utilizing autoencoders implemented in TensorFlow, offering promising results and insights for addressing this critical problem in image processing.

**Keywords:** Tensorflow, Auto-encoders, Image Denoising, Noise Reduction, Neural Networks, Image Processing, Data Augmentation, Test Data