

PLAGIARISM SCAN REPORT

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Automated colorization of greyscale images has been subjected to much research within the computer vision and machine learning communities. Beyond simply being fascinating from an aesthetic and artificial intelligence perspective, such capability has broad practical applications. It is an area of research that possesses great potentials in applications: from black and white photo reconstruction, image augmentation, video restoration to image enhancement for improved interpretability. Image downscaling is an innately lossy process. The principal objective of super resolution imaging is to reconstruct a low resolution image into a high resolution one based on a set of low-resolution images to rectify the limitations that existed while the procurement of the original low-resolution images. This is to insure better visualization and recognition for either scientific or non-scientific purposes. Even if an upscaling algorithm is particularly good, there will always be some amount of high frequency data lost from a downscale-upscale function performed on the image. Ultimately, even the best upscaling algorithms are unable to effectively reconstruct data that does not exist. Traditional methods for image upsampling rely on low-information, smooth interpolation between known pixels. Such methods can be treated as a convolution with a kernel encoding no information about the original image. A solution to the problem is by using Generative Adversarial Networks (GANs) to hallucinate high frequency data in a super-scaled image that does not exist in the smaller image. Even though they increase the resolution of an image, they fail to produce the clarity desired in the super-resolution task. By using the above mentioned method, not a perfect reconstruction can be obtained albeit instead a rather plausible guess can be made at what the lost data might be, constrained to reality by a loss function penalizing deviations from the ground truth image. A huge number of raw images are present unprocessed and unnoticed in the Hubble Legacy Archives. These raw images are typically black and white, low-resolution and unfit to be shared with the world. It takes huge amounts of hours to process them. This processing is necessary because it's difficult for astronomers to distinguish objects from the raw images. Random and synthetic noise from the sensors in the telescope, changing optical characteristics in the system and noise from other bodies in the universe all make the processing further necessary. Furthermore, for the process of highlighting small features that ordinarily wouldn't be able to be picked out against noise of the image, we need colorization. The processing of the images is so time consuming that the images are rarely seen by human eyes. The problem is only likely to get worse. Not only is new data being continuously produced by Hubble Telescope, but new telescopes are soon to come online. A simplification of image processing by using artificial image colorization and superresolution can be done in an automated fashion to make it easier for astronomers to visually identify and analyze objects in Hubble dataset.