TARSIERS:
AN UNSUPERWISED LOW LIGHT IMAGE ENHANCEMENT USING MULTI-LEVEL ATTENTION NETWORKS

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A dissertation submitted in partial fulfilment of the requirement for
Bachelor of Engineering (Honours) degree in Software Engineering

Department of Computing
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in collaboration with
University of Westminster, UK

2021

Abstract

The images capture in poor lighting conditions is called low light images. They can be varying from absolute dark to twilight lightning conditions. low contrast, color distortion, and significant noise are the main characteristics of those images.

With modern hardware, it is not an easy task to take images in dark environments. It was found that the general camera and mobile users were unable to capture images in those low light conditions. The research is carried out to address that issue with a deep learning approach. TARSIERS an alternative approach to taking images in low light conditions by taking images in normal light settings and enhancing them afterward. The proposed model can automatically enhance those images by estimating image-specific curves. The model consists of two-loss function pathways, for the original image and its inverted. The carefully designed model has feature attention clocks of color attention and pixel attention blocks to keep images' important details remain during the enhancement process. Influenced by unsupervised learning, the model does not require the paired or unpaired image for training. The product component consists of a web app that can be used to upload images and to change image properties. This approach, even the low-end mobile devices can use to get the advantages of computational photography.

TARSIERS lightweight image enhancement model is capable of enhancing low light images without introducing noise and preserving image details. In testing phase model performed 500 fps in the range of 500px to 1000px. The modularized system is also capable of act as a middle layer for other computer vision tasks. This was tested with low light face recognition.

The source code, trained model, and dataset will be published as an open-source project after the research marking was completed. The future enhancement will be carried out video enhancement and usage of image segmentation to enhance high-resolution images.
This abstract was submitted to IESL Young Members Section Technical Conference 2021.

Keywords: Artificial intelligence, Computer vision, Image Processing, Machine Learning, Deep learning