

ABSTRACT

Images taken in extremely low light suffer from various problems such as heavy noise, blur, and color distortion. Assuming the low-light images contain a good representation of the scene content, current enhancement methods focus on finding a suitable illumination adjustment but often fail to deal with heavy noise and color distortion. Recently, some works try to suppress noise and reconstruct low-light images from raw data. But these works apply a network instead of an image signal processing pipeline (ISP) to map the raw data to enhanced results which leads to heavy learning burden for the network and get unsatisfactory results. In order to remove heavy noise, correct color bias and enhance details more effectively, we propose a two-stage Low Light Image Signal Processing Network named LLISP. The design of our network is inspired by the traditional ISP: processing the images in multiple stages according to the attributes of different tasks. In the first stage, a simple denoising module is introduced to reduce heavy noise. In the second stage, we propose a two-branch network to reconstruct the low-light images and enhance texture details. One branch aims at correcting color distortion and restoring image content, while another branch focuses on recovering realistic texture. Experimental results demonstrate that the proposed method can reconstruct high-quality images from low-light raw data and replace the traditional ISP.