ABSTRACT

In Photography, a Color Filter Array (CFA), or color filter mosaic (CFM), is a periodic Array of small color filters placed over the pixel sensors of an image sensor to capture color information. To capture image from Small electronic handheld device, single sensor CFA array technique is used. Extraction process of color component Red, Green and Blue from the output of single sensor CFA raw data called Demosaicing. The extraction of good quality image from CFA with color artifact is a challenging task. The color artifacts like Edge blurring, Zipper Effect, Aliasing and False coloring are the major artifacts (noise) arise at the time of Demosaicing.

In our proposed method, the spatial chromatic sampling framework includes three steps. The first step is, design of optimal sampling pattern, design with image formation model and second step is demosaicing by Edge preserve non threshold Interpolation algorithm and followed by applying Hybrid Edge-adaptive median demosaicing Artifact filtering to filter out noise, and extract good color components from noisy CFA data source. Finally evaluate the performance using PSNR value and sCIELAB measurements.

In optimal sampling pattern design, we have developed optimal spectral sensitivity function, it is used for image formation and also designed an optimal CFA RGBYC pattern. The newly proposed CFA pattern yields good spectral sensitivity in terms of mean and standard deviation. This five color channel RGBYC pattern gives better results than the other conventional periodic CFA patterns.
Edge preserve non threshold Interpolation algorithm is adopted for interpolation step. It will find the missing all three color channel. To filter the demosaicing artifacts we apply Hybrid Edge-adaptive median demosaicing Artifact filtering to filter out demosaicing artifacts. The output of post-processing step yields full color demosaiced image.

The performance evaluation results are highlighted that our proposed method yields highly notable performance in terms of PSNR values, s-CIELAB or Human Visual System (HVS). The demosaiced output PSNR values of proposed demosaicing are compared with other recent works related to CFA demosaicing. This shows that our proposed camera image pipeline flow gives superior results than state of art of conventional methods.