

Super-resolution, denoise, and demosaicking image processing

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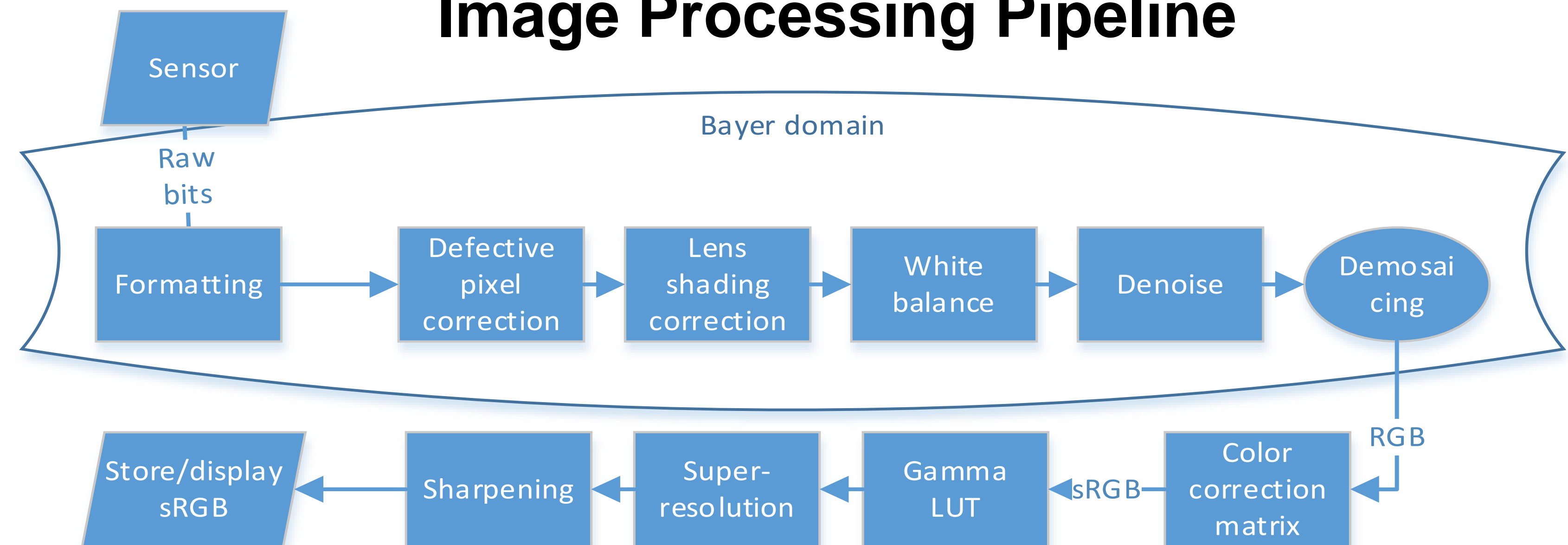
Introduction

Processing raw Bayer images is a challenging task given the corrections that have to be made prior to displaying/printing the image.

In this project, an image signal processing pipeline is implemented with super-resolution post-processing from a single image.

Adaptive denoise and a special demosaicking technique based on local polynomial approximation is implemented.

Image Processing Pipeline



- Pipeline design is flexible -> can be adapted for any raw input (utilized OOP).
- Tested for high-end Sony and cost-effective Omnivision sensors (13Mp and 5Mp).
- DPC, denoise, demosaicking, and super-resolution (among others) are tunable.

Super-resolution

The algorithm goes as follows:

- 1) Measure camera point spread function (PSF).
- 2) Deconvolve image F with $PSF \rightarrow \hat{G}$.
- 3) *Interpolate* $\hat{G} \rightarrow$ high resolution image G .



Denoise and color filter array interpolation (demosaicking)

Joint demosaicking and denoising using noisy LPA-ICI algorithm -> subpar result.

alternative: denoise (adaptive Wiener) -> demosaic using LPA-ICI -> adequate.

