Roosa Kuusivaara & Väinö-Waltteri Granat

Digital Image Formation And Processing - Report

Faculty of Information Technology and Communication Sciences (ITC)
Laboratory Report

Abstract

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This report documents the work done in the Digital Image Formation And Processing assignment as a part of the Advanced signal processing laboratory course. In this assignment we familiarized ourselves with basics of digital image formation from raw sensor data as well as image processing.

Keywords: Image processing, Image formation.

Contents

1 Introduction

In this report we describe our work done in the 'Digital Image Formation and Processing' laboratory assignment for the Advanced Signal Processing Laboratory course. In this assignment we implemented a basic raw image formation and processing pipeline in Matlab to construcut RGB images from raw sensor data.

2 Methodology

In this section we will present our implementation of the image processing pipeline, by going over the main parts of the Matlab code as well as explaining the the decisions we took when requirements we ambigious.

2.1 Overview of the pipeline

2.2 Reading images and converting to doubles

2.3 Image visualization and Bayer mosaic

2.4 Sliding window

2.5 Scatterplots and regression

2.6 Transformation and reverse transformation

2.7 DCT denoising

```matlab
function [denoised] = DCTImageDenoising(image, lambda, transformBlockSize)

    % Create a custom function to be applied to each block
    fun = @(block_struct) idct2(thresholdDCT(block_struct.data, lambda));

    % Apply the function to each block
    denoised = blockproc(image, transformBlockSize, fun);
end

function denoised = thresholdDCT(input, lambda)

    % Apply DCT to the block
    dctBlock = dct2(input);

    % Threshold the DCT coefficients
    dctBlock(abs(dctBlock) < lambda) = 0;
    denoised = dctBlock;
end
```

2.8 Demosaicking

2.9 White balancing

2.10 Contrast and saturation correction

3 Results

4 Conclusions