CSE P567 - Winter 2010

Name_________________

Lab 4 – Adaptive Image Exposure Compensation

Overview

In this lab you will complete the design of the adaptive image filter. In this lab, instead of just a simple adaptive threshold filter, we will use the information about an image to adjust the brightness of the following image. (Note that to do this properly requires computing the cumulative distribution of the image values, which can be computed from a histogram of the image values. This is certainly possible – if you would like to tackle it, we can give you some guidance.)

Finishing Lab 3

Before you get started on Lab 4, you need to finish the last two parts of Lab 3 if you haven't already.

Part 3: 1-bit Thresholded Image Signoff____TA

Part 4: Adaptive Thresholded Image Progress Checkoff__________________________TA

Part 1 – Interpolation Module Simulation

For Homework 3, Problem 2, you designed and simulated a module that performs an interpolation of pixel values to adjust for the average pixel exposure. Demo this simulation to the TA. Don't worry too much if the values are off by one.

Interpolation Module Simulation Signoff ______________________________TA

Part 2 – Adaptive Exposure Demo

You now need to add this module to the filter module from part 4 of Lab 3, which computed the average pixel value. Compile and download the camera pipeline with this change to generate a gray-scale, exposure compensated image. See the course files for a template for adding the interpolate module to the filter module.

Grayscale Image Exposure Compensation Demo__________________________TA

Optional – Color Image Adaptive Exposure Demo

The final step is to change your implementation to perform the adaptive exposure compensation on each color channel independently to get a color image. This should also do a primitive form of color compensation.

Color Image Exposure Compensation Demo_________________________TA

Part 3 – Getting Started on the 2D Wavelet Filter

If you were able to finish the homework assignment before class, you should be able to reach this point sometime during the lab. The next lab assignment and the topic of Homework #4 is the design of a simple 2D wavelet filter. Please refer to the Homework writeup for the details of this design.

The wavelet transform operates on 2x2 blocks of pixels to generate 4 sub-images, each ¼ the size of the original image. We will display these 4 resulting images in the four quadrants of the display.

To get you started, design a filter module that takes in the pixel address and outputs the pixel address along with the pixel. Modify the pixel address so that pixels are sent to the sub-images as shown in Homework 4. The D00 pixels go to the upper left quadrant, D01 pixels to the upper right, D10 pixels to the lower left and the D11 pixels to the lower right. (Check out the demo solution.)

We will supply you with a new project that has a new interface for the filter module and a test fixture (quadrant_tf.v) that checks to make sure that you have done the pixel address transform correctly. (This test fixture does no other checking at all.)

Wavelet Transform Startup Demo Checkoff_____________________________TA