

DSP Survey Proposal

15 April 2015

Color Image Processing**1.1 Motivation**

To manipulate color, filter color, and record videos and images using MATLAB. To demonstrate the various phenomena of aliasing, color image processing, and hardware limitations.

1.2 Sampling and Recording

In order to be able to distort, filter, and manipulate colors in a video or image the first step of the process is to be able to load, record, and save images and video in MATLAB. There are two ways of doing so through screen capture or through webcam. For the purpose of demonstrating sampling and aliasing we'll use a webcam. Using functions such as `set(vid,'string',X), ;getdata'`, and `'avifile'` we can set the sampling rate of the camera, retrieve the data, and set the save location of the data. Having the ability to manipulate the frame rate gives potential of demonstrating video aliasing and camera limitations as each camera has set limits of capture.

1.3 Filtering

There are many applications of filters in videos and methods to implement them. Median filters, such as the built in `medfilt2`, which use data surrounding a point to get a better value for the point, removing noise and getting a blurrier but noiseless image. Color filters can be used to remove some colors from the image by splitting the video into RGB components with `filter2`, a 2-Dimensional filter. Each of these color channels can be manipulated separately to get effects such as black and white or sepia.

1.4 Color Tracking

With the implementation of image filtering in combination with mathematics, one can implement color tracking of an image or even a video (which is just a sequence of images). The theory behind color tracking in MATLAB from a video input is to first work with one RGB frame from the camera feed. If the object of interest was for example blue, the programmer

would then extract the Blue layer matrix from the RGB frame, in addition to the grey scale image. With both these frames obtained, one can find the 'blueness' of an object in a frame by subtracting the grayscale frame from the blue layer frame, and filtering out any unwanted noise. In order to be able to work with these frames in MATLAB, they need to be given numerical values, therefore the resulting frame should be converted to a Binary image map based on some threshold of 'blueness', if an area in the image is above the threshold, it is to be marked with a logic 1 and further applications of color/object tracking can be applied from there.