Tracking objects across spatially separated cameras with non overlapping field of views

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INTRODUCTION

Object tracking opens up questions like what could be analyzed about video. One intrinsic property of video is that it contains frames that can be converted to histograms. Histograms are made from a number of bins. Each frame is made up of pixels. Pixels are made of red, green and blue values. These values are separated and put into their bin. We research a color calibration in attempt to produce similar values as the compared image histograms from within the same camera. If histograms from across camera are close in value to the within results then the probability of an object being the same is great.

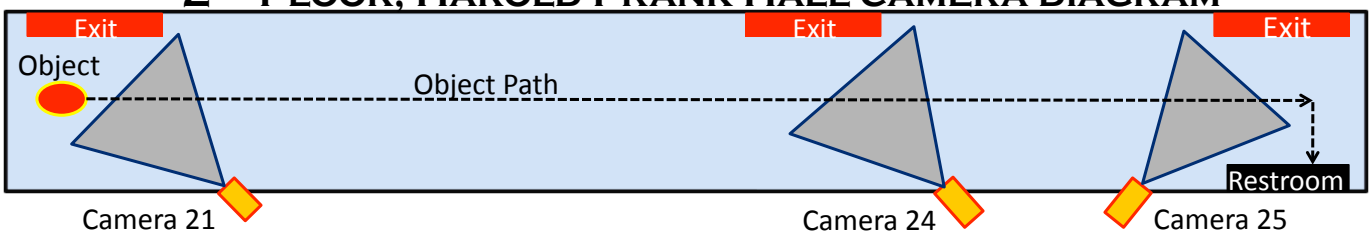
PROBLEM

Camera networks are set in multiple different and unique lighting environments. Because of different lighting and camera settings, the color description can significantly change for an object in each camera view. These variables create the challenge for tracking objects by color. This study looks at a method that attempts to remove the color differences across cameras in hope to produce a similar outcome like the within histogram comparison.

OBJECTIVE

Because an objects color histogram changes from camera to camera. We evaluate the use of a transform matrix to remove the color difference across the cameras, a process known as color calibration. In doing so, we hope to see the color histograms across cameras look more like histograms being compared within a camera. Also, we used a number of bins in search of the best results and using alternative color spaces has been considered, such as HSV.

2ND FLOOR, HAROLD FRANK HALL CAMERA DIAGRAM



Digital Images are made from pixels

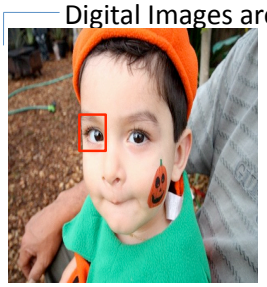
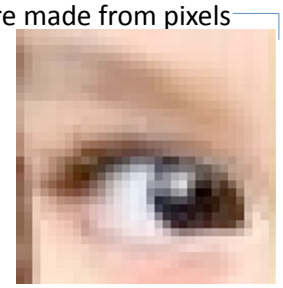
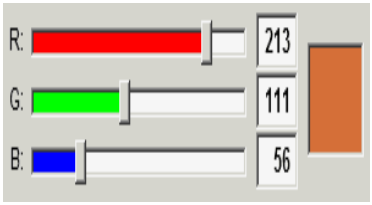


Image: Elias Flores Jr.



Pixels



Each pixel has a Red, Green, and Blue Value which produce a color in RGB color space

These values are separated and put into their correct bin

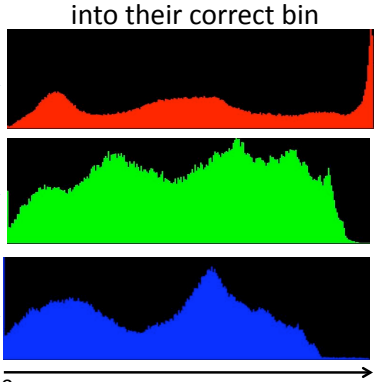
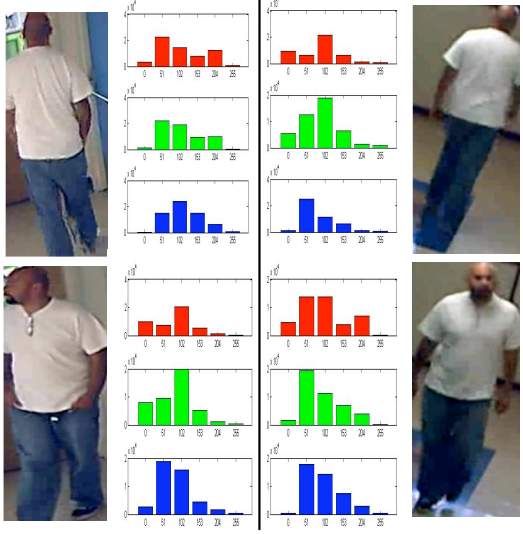


Image separated into its RGB values to produce these histograms

Camera 21 Camera 25



Histogram Intersection = $H(Target, Query) = \frac{\sum_{j=1}^{n}(H_T[j], H_g[j])}{\sum_{j=1}^{n} H_g[j]}$

To the left displays like images with two different cameras. Look at the similarities and their differences. The similar histograms within the same camera are used as a metric. Histogram intersection calculates these differences. Ideally we want them to be close in values. 50 images were used as training images with 10 as test images. The graphs to the right down the diagonal represent the difference within the same camera, 21 to 21, and so on. The values to the right, top are being compared to the values on the diagonal. after calibration the values are compared again. As you could see the red bar has increased. Just not enough data collected.