

Draft #1 and Draft #2

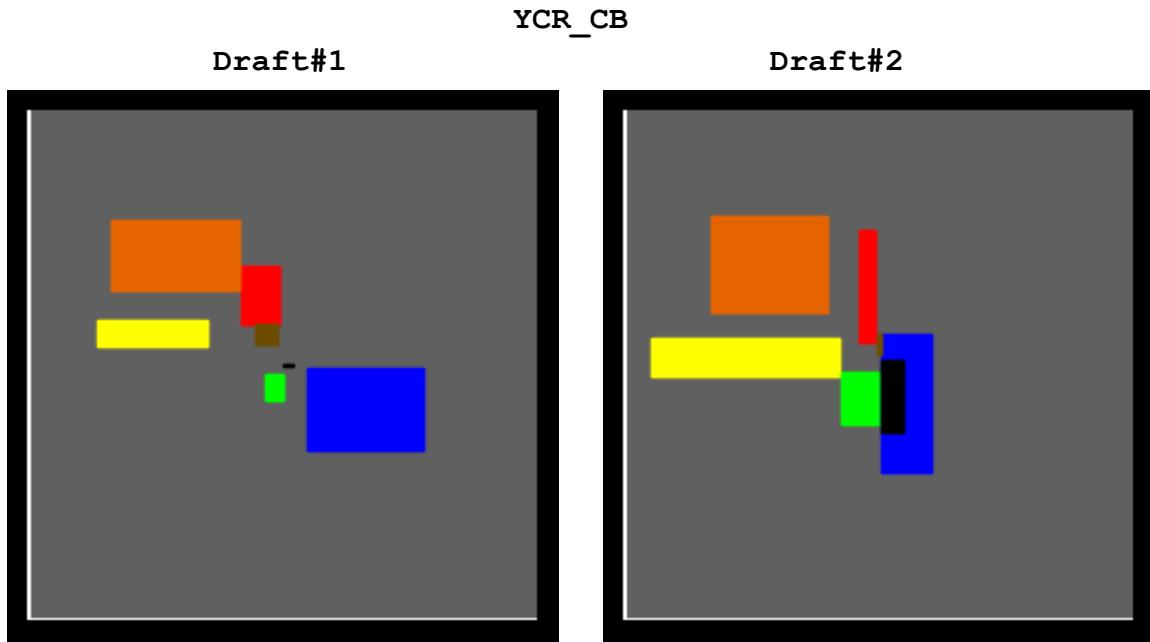
Threshold Value Comparison

*Note

Draft#1 was Human selected. (See ColorAnalysis Draft#1)

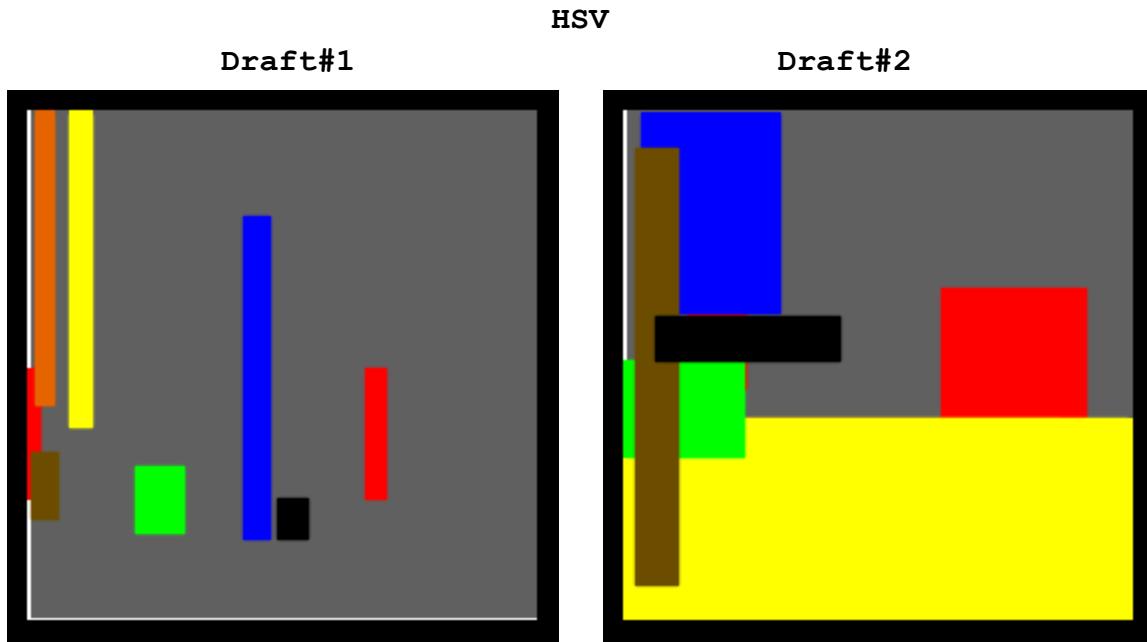
Draft#2 was Computer optimized.

COLOR SPACE VISUALIZATION



`^vChromianceRed (y-axis [0,255]), <>ChromianceBlue (x-axis [0,255])`

In Draft #2, the brown shifted towards different colors, because a different brown color was used. Both Draft #1 and #2 are approximations of the BROWN and GREEN block. Draft #1 used the spray-paint lid as a gage. Draft #2 used pictures of a BROWN and GREEN block from facebook as reference. Overall, the optimization best worked for the YCR_CB colorspace.



`^vValue (y-axis [0,255]), <>Hue (x-axis [0,179])`

The optimization process was not friendly to the HSV colorspace, most thresholds were optimized into bad solutions. The HSV BROWN solution is the only one of interest. It homed in on the darkened ORANGE blocks. But if optimization is to be done again, perhaps at the competition, it will be done only for the YCR_CB colorspace.

COMPUTER OPTIMIZATION PROCESS

This computer optimization process used a genetic type algorithm to randomly pick the best threshold values for each of the 7 colors specified.

Fitness Equation:

```
min( sum( |(Positive Result)-(Threshold)| ) )
```

Next Generation Production:

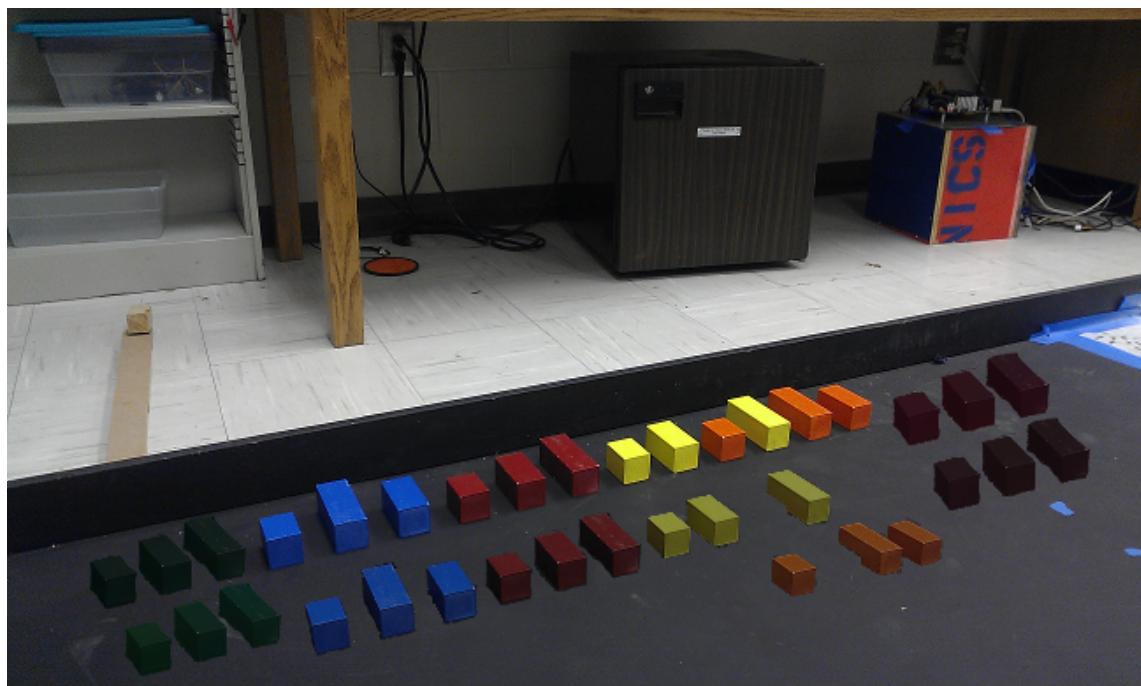
```
for each channel and both upper and lower bounds...
child.lowerb[0] = seed.lowerb[0] + Gaussian(mean = 0,sigma = 1)
```

```
next_generation = {20*{children},seed}
```

Stale Evolution Prevention:

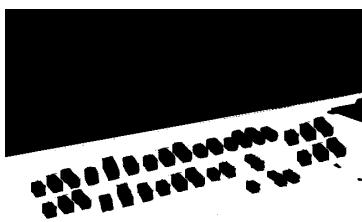
```
if 15 generations do not improve on the best score, then
    sigma = sigma + 1
```

TEST IMAGE

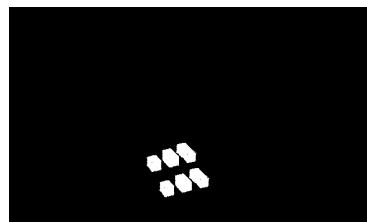


POSITIVE THRESHOLD RESULTS

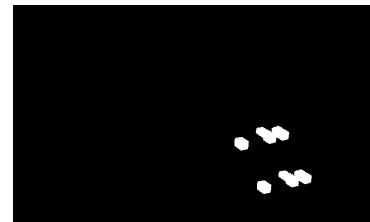
BLACK



RED



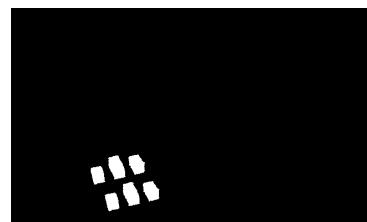
ORANGE



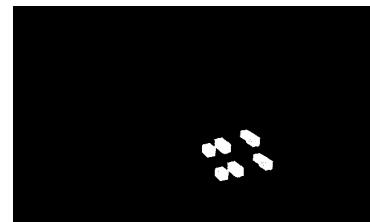
GREEN



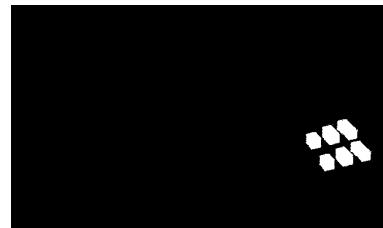
BLUE



YELLOW

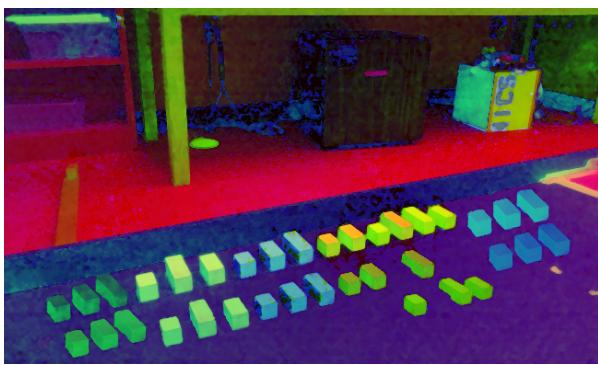


BROWN



DRAFT #1 THRESHOLDED

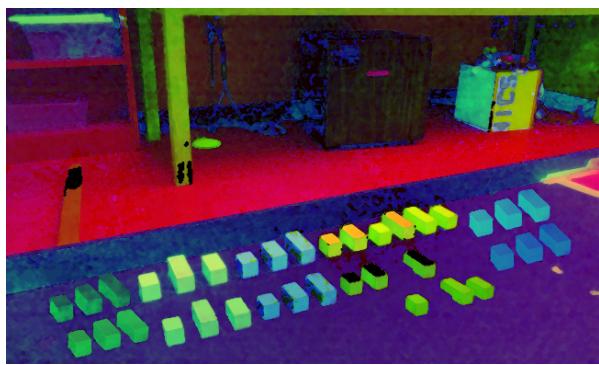
HSV BLACK



(140, 0, 41) -> (125, 39, 61)

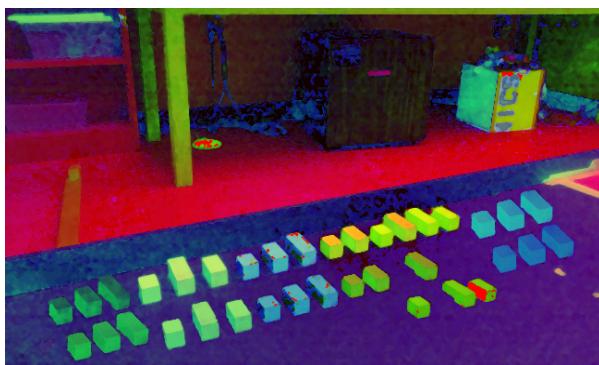
DRAFT #2 THRESHOLDED

HSV BLACK

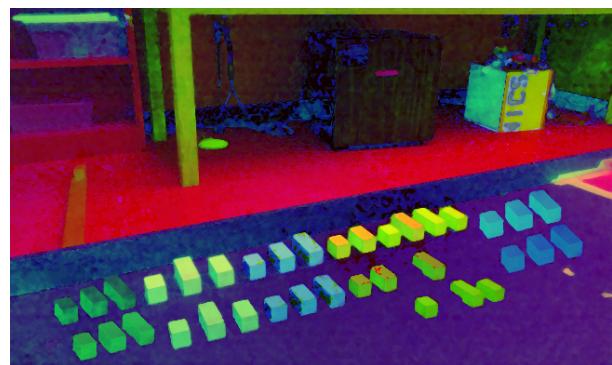


(16, 29, 130) -> (108, 194, 152)

HSV RED1

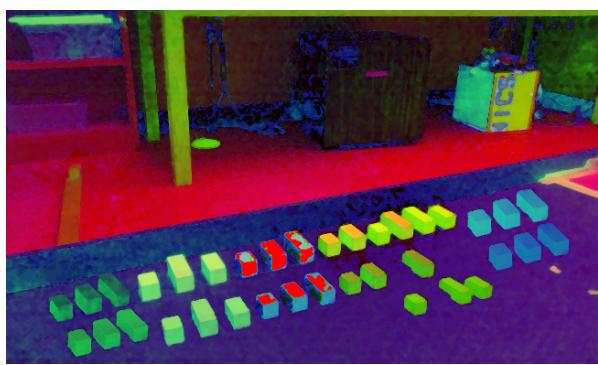


(0, 165, 61) -> (6, 212, 126)

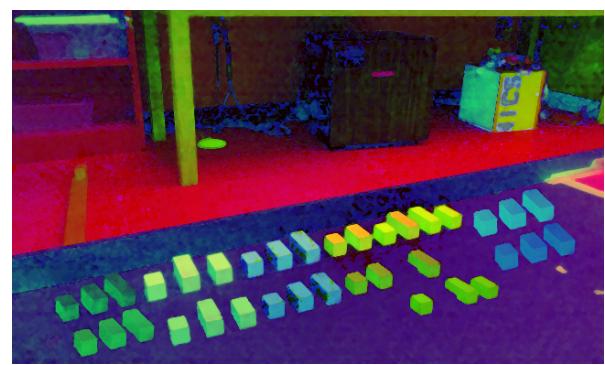


(32, 147, 116) -> (61, 224, 155)

HSV RED2

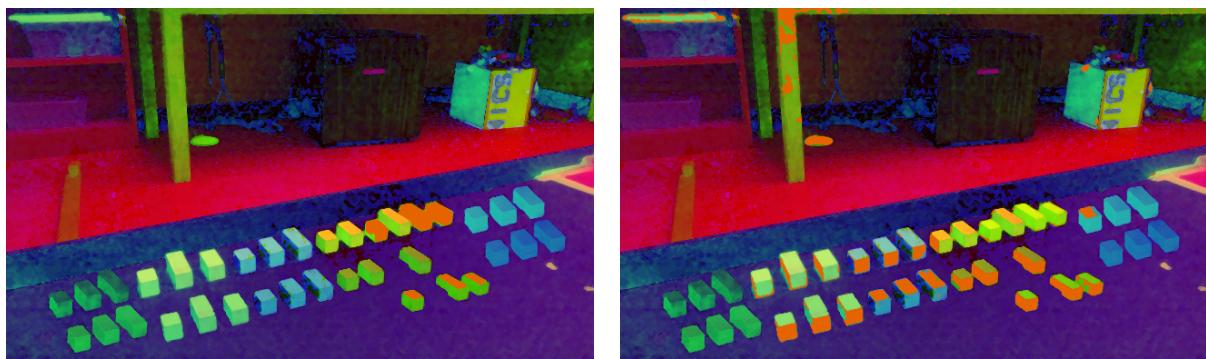


(169, 165, 61) -> (179, 212, 126)



(231, 129, 89) -> (159, 238, 166)

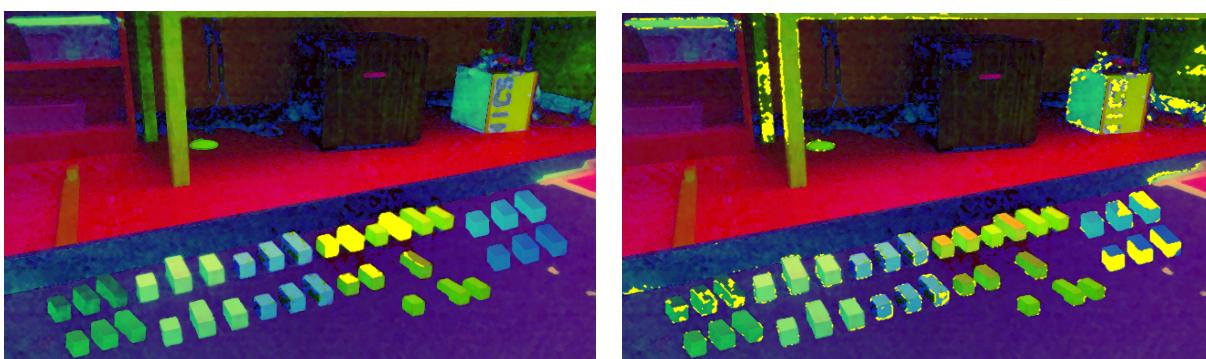
HSV ORANGE



(-4, 186, 108)->(13, 255, 255)

(-6, 154, 47)->(218, 222, 101)

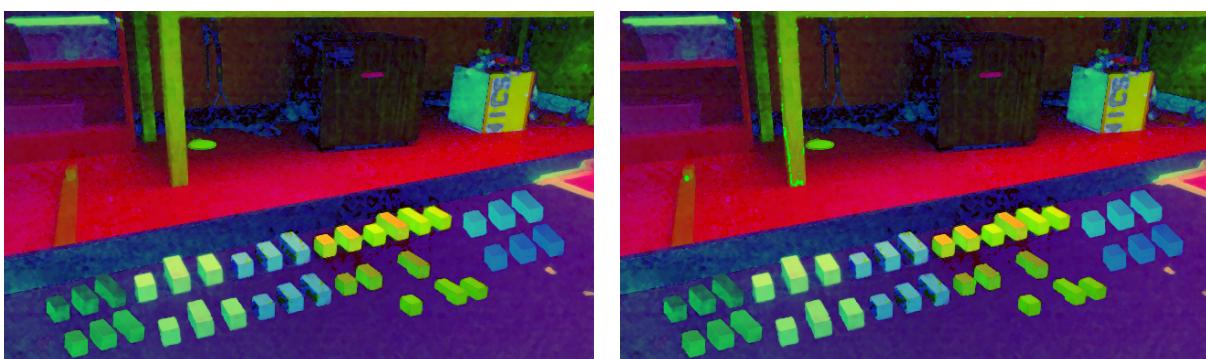
HSV YELLOW



(21, 148, 97)->(32, 255, 255)

(-0, 108, 0)->(255, 143, 101)

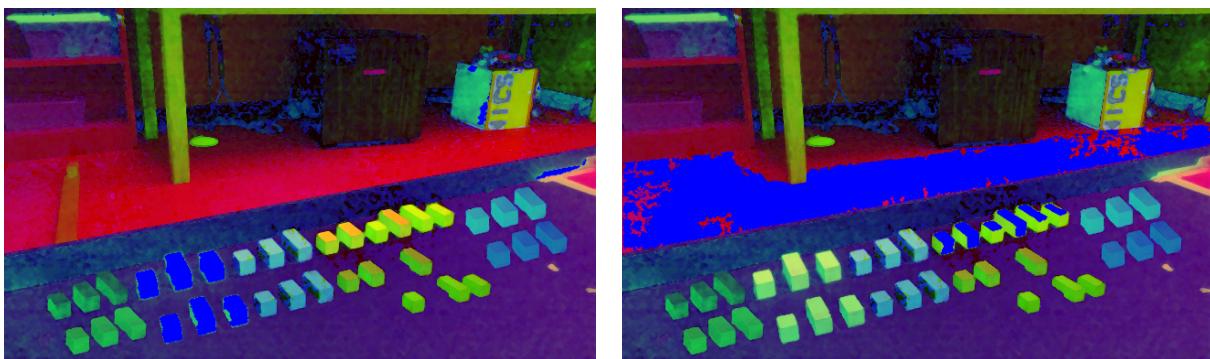
HSV GREEN



(54, 74, 44)->(78, 140, 77)

(-0, 108, 82)->(60, 123, 130)

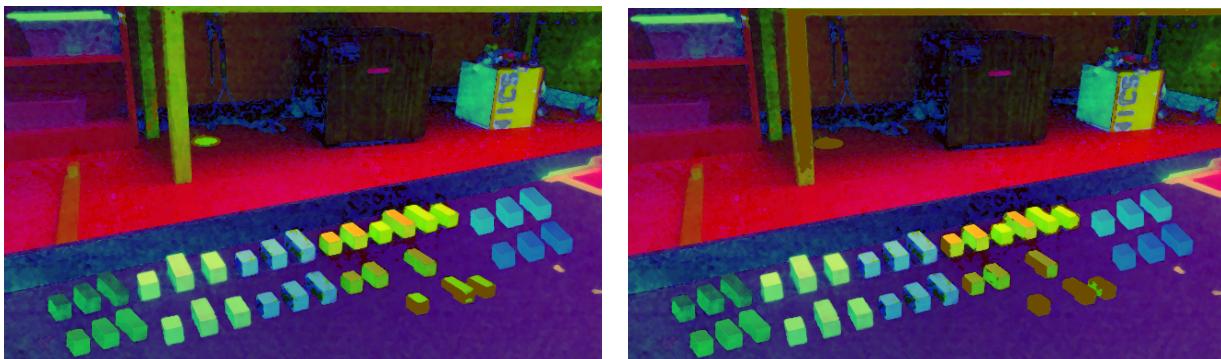
HSV BLUE



(18, 85, 140)->(117,126,198)

(9, 0, 154)->(78,255,254)

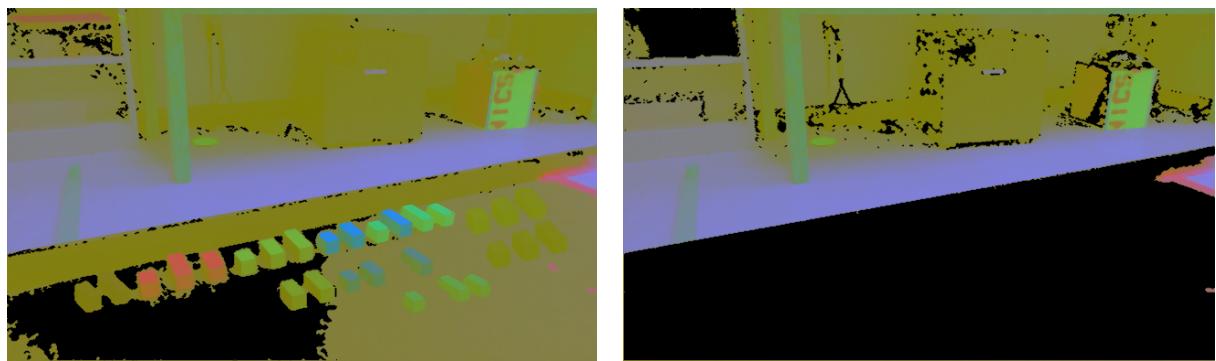
HSV BROWN



(31,138,114)->(66,148,125)

(6,133, 18)->(27,205,236)

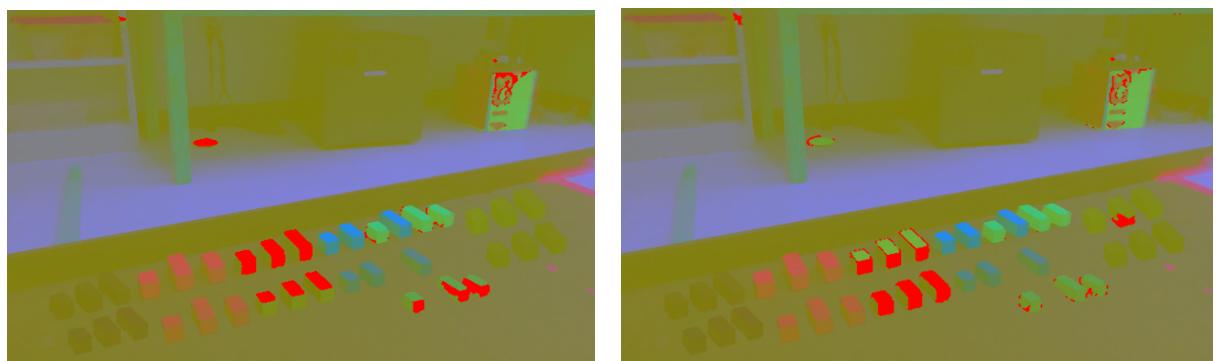
YCR_CB BLACK



(38,127,128)->(57,128,133)

(15, 94,129)->(86,130,140)

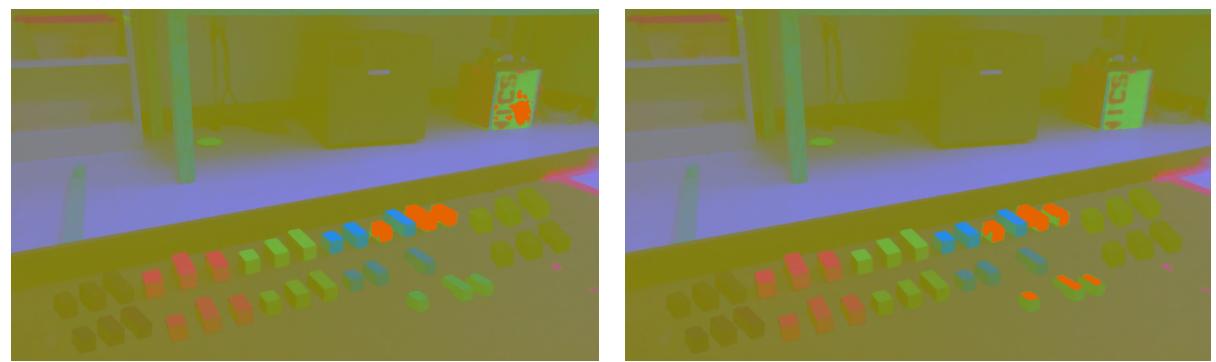
YCR_CB RED



(31,148,107)->(70,177,126)

(6,139,118)->(72,195,126)

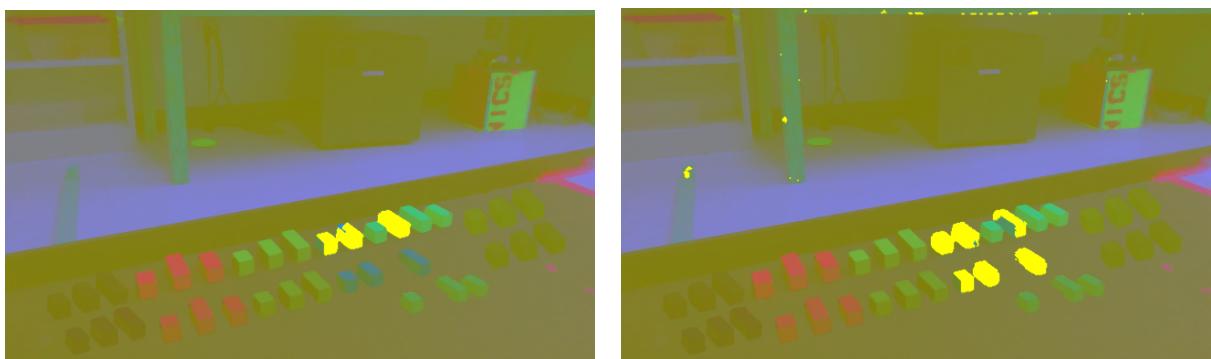
YCR_CB ORANGE



(49,165, 62)->(162,200,106)

(41,154, 44)->(176,202,102)

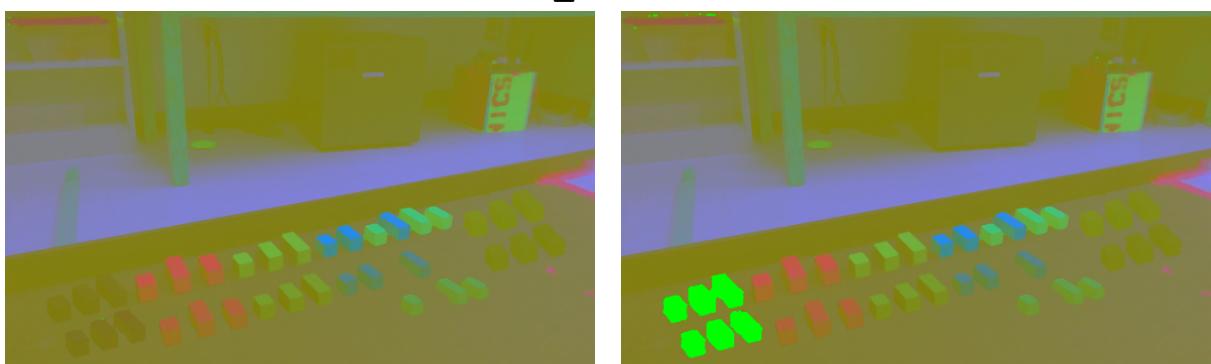
YCR_CB YELLOW



(78,137, 35)->(239,150, 90)

(37,122, 14)->(243,141,108)

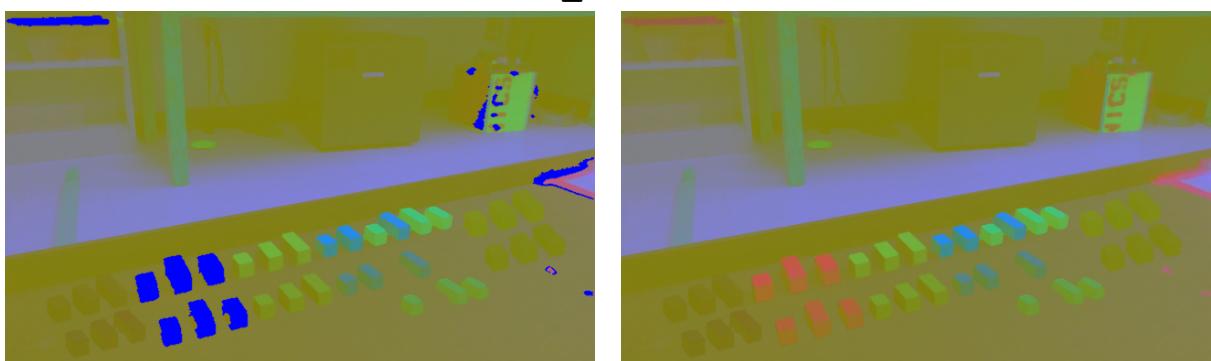
YCR_CB GREEN



(36,110,119)->(64,123,128)

(3, 98,109)->(37,124,130)

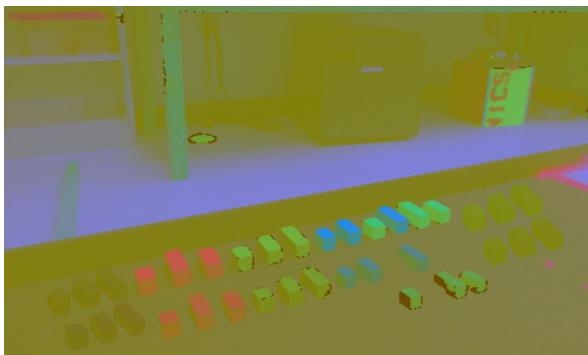
YCR_CB BLUE



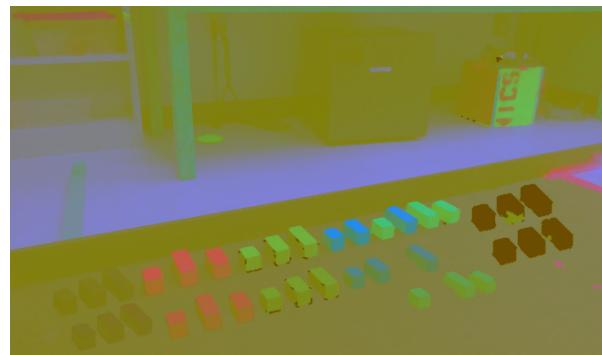
(18, 85,140)->(117,126,198)

(2, 74,154)->(86,119,203)

YCR_CB_BROWN



(18, 85,140)->(117,126,198)



(14,133,127)->(43,143,129)

ANALYSIS OF RESULTS

{ 0:"Fail": 1:"Poor", 2:"Okay", 3:"Good", 4:"Excellent" }

	DRAFT #1	DRAFT #2
Black: HSV	0	0
Black: YCR_CB	1	4
Red1: HSV	0	0
Red2: HSV	3	0
Red: YCR_CB	3	4
Orange: HSV	2	0
Orange: YCR_CB	3	4
Yellow: HSV	3	0
Yellow: YCR_CB	3	4
Green: HSV	0	0
Green: YCR_CB	0	4*
Blue: HSV	4	0
Blue: YCR_CB	4	0
Brown: HSV	0	0
Brown: YCR_CB	0	4*

*Still need actual blocks for testing

FINAL THRESHOLD VALUE DECISION

BLACK: YCR_CB Draft#2

RED: YCR_CB Draft#2

ORANGE: YCR_CB Draft#2

YELLOW: YCR_CB Draft#2

GREEN: YCR_CB Draft#2

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BROWN: YCR_CB Draft#2

BLUE: YCR_CB Draft#1