MCAS
Algorithm Specification

Version: 1.0.0
Date: 2012/07/13

ACUTE*logic*

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1　Introduction

This document is about MCAS which is the algorithm to correct color reproduction.

2 Specification

2.1 Feature

- To correct color reproduction.
- To adjust for every 20 domains on a color space.
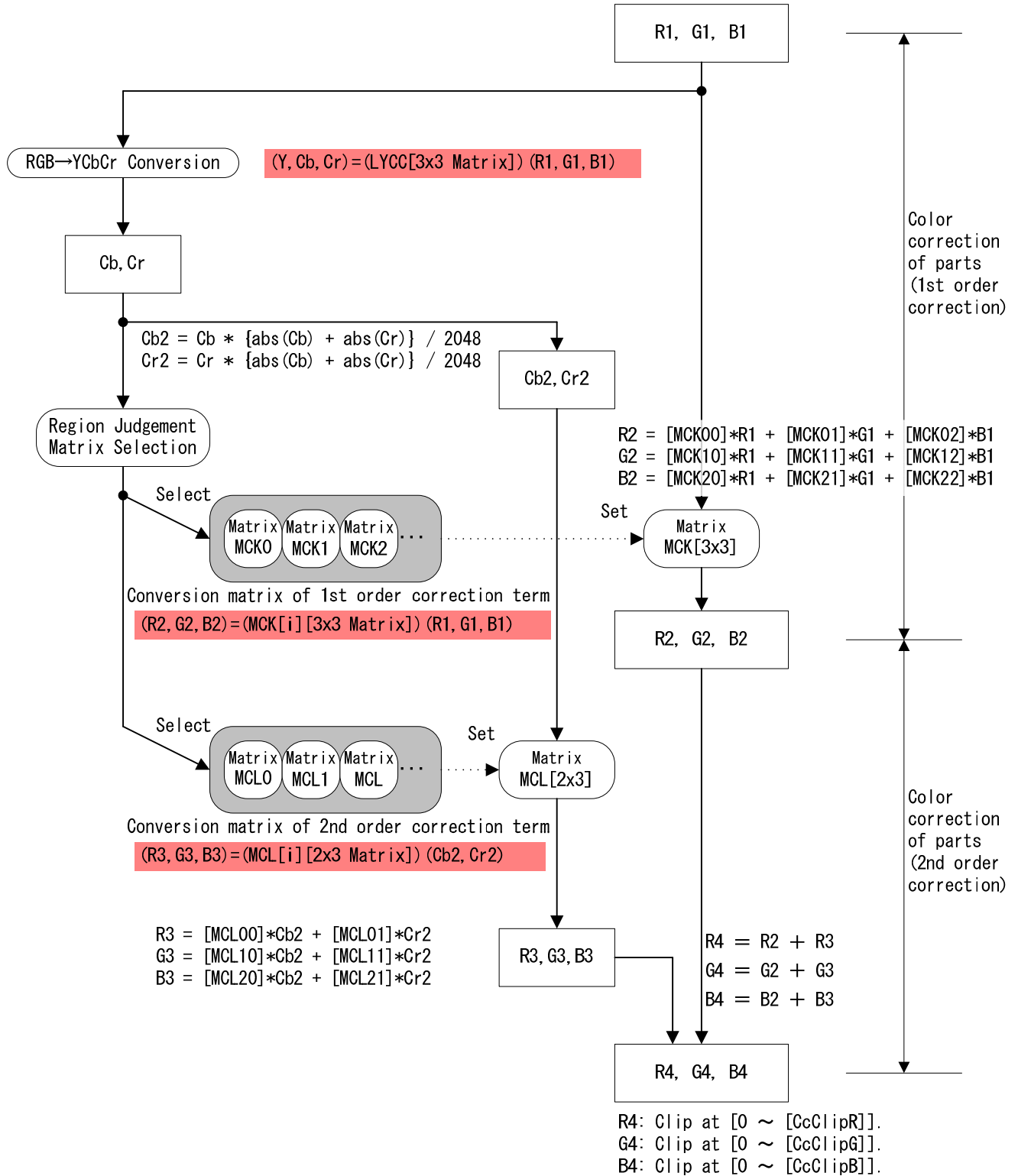
2.2 Input image

- Color format: RGB linear data
  - Data type   : Unsigned short (16bit)
  - Color order : BGR
  - Raster scan
- Maximum bit range : 12bit

2.3 Output image

- Color format: RGB linear data
  - Data type   : Unsigned short (16bit)
  - Color order : BGR
  - Raster scan

3 Process

3.1 Block diaglam

R1, G1, B1

RGB→YCbCr Conversion   (Y,Cb,Cr)=(LYCC[3x3 Matrix])(R1,G1,B1)

Color
correction
of parts
(1st order
correction)

Cb,Cr

Cb2 = Cb * {abs(Cb) + abs(Cr)} / 2048
Cr2 = Cr * {abs(Cb) + abs(Cr)} / 2048

Cb2,Cr2

R2 = [MCK00]*R1 + [MCK01]*G1 + [MCK02]*B1
G2 = [MCK10]*R1 + [MCK11]*G1 + [MCK12]*B1
B2 = [MCK20]*R1 + [MCK21]*G1 + [MCK22]*B1

Region Judgement
Matrix Selection

Select

Matrix MCK0 Matrix MCK1 Matrix MCK2 ...

Set

Matrix
MCK[3x3]

Conversion matrix of 1st order correction term
(R2,G2,B2)=(MCK[i][3x3 Matrix])(R1,G1,B1)

R2, G2, B2

Select

Matrix MCL0 Matrix MCL1 Matrix MCL ...

Set

Matrix
MCL[2x3]

Conversion matrix of 2nd order correction term
(R3,G3,B3)=(MCL[i][2x3 Matrix])(Cb2,Cr2)

Color
correction
of parts
(2nd order
correction)

R3 = [MCL00]*Cb2 + [MCL01]*Cr2
G3 = [MCL10]*Cb2 + [MCL11]*Cr2
B3 = [MCL20]*Cb2 + [MCL21]*Cr2

R3, G3, B3

R4 = R2 + R3
G4 = G2 + G3
B4 = B2 + B3

R4, G4, B4

R4: Clip at [0 ~ [CcClipR]].
G4: Clip at [0 ~ [CcClipG]].
B4: Clip at [0 ~ [CcClipB]].

3.2 Region Judgement

1. To judge a region which the given color belongs to.

   To find which quadrant the given color is.
   　+Cb +Cr -> 1st quadrant
   　-Cb +Cr -> 2st quadrant
   　-Cb -Cr -> 3st quadrant
   　+Cb -Cr -> 4st quadrant

   To find which region the given color is.
   　e.g.,At 1st quadrant,
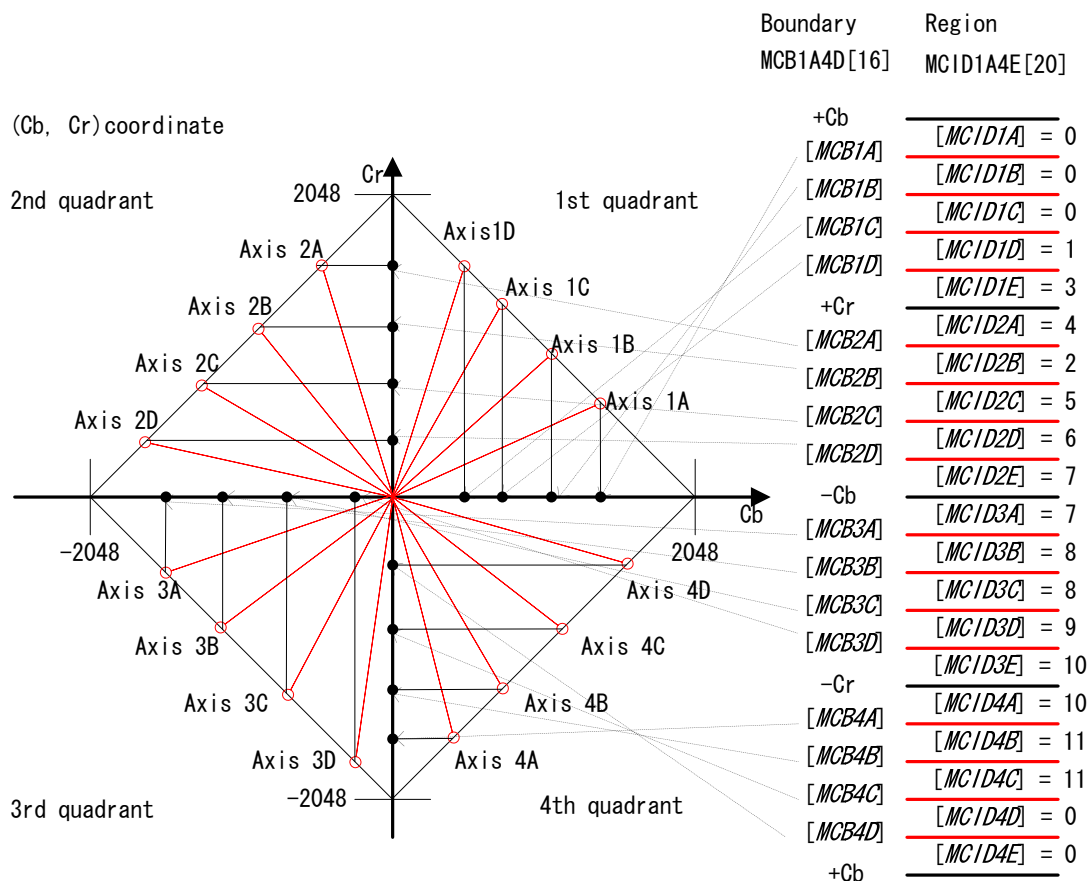   　Line A : y = x * Cr / Cb
   　Line B : x + y = 2048
   　To get the intersection coordinates of the line A and the line B.
   　x = 2048* Cb/(Cb + Cr)
   　This value is compared with the value of a parameter(MCB1A4D[]) in order to judge a region.

2. To select a matrix.
   The index of a matrix is given to each region into a parameter (MCID1A4E[])

Boundary   Region
MCB1A4D[16]   MCID1A4E[20]

(Cb, Cr)coordinate

2nd quadrant   2048   1st quadrant

Axis 2A   Axis1D
Axis 2B   Axis 1C
Axis 2C   Axis 1B
Axis 2D   Axis 1A

Cr

-2048   Cb   2048

Axis 3A   Axis 4D
Axis 3B   Axis 4C
Axis 3C   Axis 4B
Axis 3D   Axis 4A
          -2048

3rd quadrant   4th quadrant

Boundary	Region
+Cb	
[MCB1A]	[MCID1A] = 0
[MCB1B]	[MCID1B] = 0
[MCB1C]	[MCID1C] = 0
[MCB1D]	[MCID1D] = 1
+Cr	[MCID1E] = 3
[MCB2A]	[MCID2A] = 4
[MCB2B]	[MCID2B] = 2
[MCB2C]	[MCID2C] = 5
[MCB2D]	[MCID2D] = 6
-Cb	[MCID2E] = 7
[MCB3A]	[MCID3A] = 7
[MCB3B]	[MCID3B] = 8
[MCB3C]	[MCID3C] = 8
[MCB3D]	[MCID3D] = 9
-Cr	[MCID3E] = 10
[MCB4A]	[MCID4A] = 10
[MCB4B]	[MCID4B] = 11
[MCB4C]	[MCID4C] = 11
[MCB4D]	[MCID4D] = 0
+Cb	[MCID4E] = 0

改版履歴

日付	版数	改版内容	作成者
2012/07/13	1.0.0	Initial Version	Isao Yamada