

Two Methods for Colour Comparison

User needs of professionals and others:

Absolute (professionals) und relative colorimetric reproduction

Absolute CIELAB data

h_{ab} hue
 C^*_{ab} chroma
 L^* lightness

Visual comparison softcopy – hardcopy

Test of agreement with test files

Relative CIELAB data

h_{ab} hue
 c^* relative chroma
 n^* relative blackness

Test of visual equal relative spacing of either softcopy or hardcopy

Test of equal spacing with test files

Advantages and disadvantages:

Advantage:

Colorimetric reproduction of hue, chroma, lightness

Disadvantage:

Colour spaces of TV and Print show differences, often important colour areas are clipped

Advantage:

Colorimetric reproduction of hue, relative chroma and relative lightness

Colour spaces of TV and Print show differences, No colour areas are clipped

Disadvantage:

Tolerable small changes of chroma and lightness

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Colorimetric measurement problem for fluorescent (foto) paper

Measurement problem only for absolute and not for relative colour reproduction

Absolute colour reproduction

For equal measurement data of A and B the visual colour difference is $\Delta b^*_{A2,B2} = 9$
 This is three times above the colour tolerance $\Delta E^*_{ab} = 3$ of ISO/IEC 15775.

Result:

Measurement device A is **not** appropriate.

Relative colour reproduction

Measurement differences of A and B: $\Delta b^*_{A1,A2} = 10$ and $\Delta b^*_{B1,B2} = 9$
 This is a measurement failure of $\Delta b^* = 1$
 The failure is three times below the colour tolerance $\Delta E^*_{ab} = 3$ of ISO/IEC 15775.

Result:

Measurement device A is appropriate.

Example of measurement

Two measurement devices A and B measure two CIELAB b^* data for two yellow colours no. 1 and 2:
 Device A without measurement of fluorescence (example xy-device) $b^*_{A1} = 100$ and $b^*_{A2} = 90$.
 Device B with measurement of fluorescence (professional device) $b^*_{B1} = 90$ and $b^*_{B2} = 81$.

Remarks: compare CIE 163:2004, The effects of fluorescence in the characterization of imaging media.

For the achromatic colour no. 1 the devices A and B may measure:

$b^*_{A1} = 0$ and $b^*_{B1} = -10$

This is again an measurement shift $\Delta b^*_{A1,B1} = -10$

which is based on the fluorescent paper in the application.

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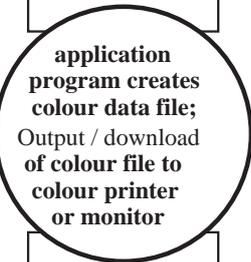
User input and output needs:

Interpretation of input data rgb as undefined colour data $rgb (-> rgb)$
 no special device colours

Interpretation of input data rgb as device colour data $rgb (-> olv^*)$
 Device lookup table $olv^* - rgb'$, $8LCH^*$ data

Interpretation of input data rgb as elementary colour data $rgb (-> rgb^*)$
 Device lookup table $rgb^* - rgb''$, $8LCH^*$ data

Remark:
 For output linearisation see ISO/IEC TR 19797



Test: Equally spaced device and elementary hue output?

Purpose:

Output linearisation
 If the output is regular then measure lookup table $rgb - LCH^*$ and calculate lookup tables $olv^* - rgb'$, $rgb^* - rgb''$

Test with test file:

Is the device output equally spaced for any of the six device hues $OYLCVM$ and for the grey scale?

Test with test file:

Is the device output equally spaced for any of the four elementary hues $RJGB$ and for the grey scale?

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Colour data in file, user choice and output needs:

Colour data file with input data rgb as undefined colour data $rgb (-> rgb)$
 no special device colours

User interpretation

1. Default output device as interpretation as elementary data
2. Output interpretation as device data
3. Output interpretation as elementary data

Test: Equally spaced device and elementary hue output?

Device uses default value:

Device uses lookup table $olv^* - rgb'$ for output.
 Is the device output equally spaced for any of the six device hues $OYLCVM$?

Device uses lookup table $olv^* - rgb'$ for output.

Is the device output equally spaced for any of the six device hues $OYLCVM$?

Device uses lookup table $rgb^* - rgb''$ for output.

Is the device output equally spaced for any of the four elementary hues $RJGB$?

Remark:
 For output linearisation see ISO/IEC TR 19797

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