Package 'colorscience'

April 22, 2024

Type Package

Title Color Science Methods and Data

Version 1.0.9

Encoding UTF-8

Date 2024-04-22

Maintainer Glenn Davis <gdavis@gluonics.com>

Description Methods and data for color science - color conversions by observer, illuminant, and gamma. Color matching functions and chromaticity diagrams. Color indices, color differences, and spectral data conversion/analysis. This package is deprecated and will someday be removed; for reasons and details please see the README file.

License GPL (>= 3)

Depends R (>= 2.10), Hmisc, pracma, sp

LazyData yes

Author Jose Gama [aut], Glenn Davis [aut, cre]

Repository CRAN

NeedsCompilation no

Date/Publication 2024-04-22 08:22:46 UTC

R topics documented:

`ASTM.D1925.YellownessIndex`

ASTM D 1925 Yellowness Index for Plastics

Description

`ASTM.D1925.YellownessIndex` was developed for the definition of the Yellowness of homogeneous, non-fluorescent, almost neutral-transparent, white-scattering or opaque plastics as they will be reviewed under daylight condition.

Usage

```
ASTM.D1925.YellownessIndex(XYZmatrix)
```

Arguments

`XYZmatrix`	tri-stimulus values for the calculated for illuminant C

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
XYZ<-c(0.1146538, 0.08391198, 0.08222077)
ASTM.D1925.YellownessIndex(XYZ)
```

`ASTM.E313.Whiteness` *ASTM E313 Whiteness*

Description

`ASTM.E313.Whiteness` ASTM E313 Whiteness.

Usage

```
ASTM.E313.Whiteness(XYZmatrix)
```

Arguments

`XYZmatrix`	tri-stimulus values for the calculated for illuminant C

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
XYZ<-c(0.1146538, 0.08391198, 0.08222077)
ASTM.E313.Whiteness(XYZ)
```

ASTM.E313.YellownessIndex *ASTM E313 Yellowness*

Description

ASTM.E313.YellownessIndex ASTM E313 has successfully been used for a variety of white or near white materials.

Usage

```
ASTM.E313.YellownessIndex(XYZmatrix)
```

Arguments

XYZmatrix	tri-stimulus values for the calculated for illuminant C

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
XYZ<-c(0.1146538, 0.08391198, 0.08222077)
ASTM.E313.YellownessIndex(XYZ)
```

Berger59.Whiteness *Berger (59) Whiteness*

Description

Berger59.Whiteness formula was developed by A. Berger (formerly employee of Bayer AG, Germany and was presented in 1959.

Usage

```
Berger59.Whiteness(xyYmatrix, illuminant = "C", observer = 2, RefWhite =
                 get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

xyYmatrix	CIE values for illuminant C
illuminant	illuminant
observer	observer
RefWhite	White Reference

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
Berger59.Whiteness(xyY)
```

BVR2XYZ *convert from BVR coordinates to XYZ temperature (Robertson)*

Description

BVR2XYZ convert from BVR coordinates to XYZ.

Usage

```
BVR2XYZ(BVRmatrix)
```

Arguments

BVRmatrix	BVR coordinates

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

---

cccie31 *CIE (1931) 2-deg chromaticity coordinates*

Description

`cccie31` is a table with CIE (1931) 2-deg chromaticity coordinates.

Usage

```
cccie31
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

x x chromaticity coordinate

y y chromaticity coordinate

z z chromaticity coordinate

Author(s)

Jose Gama

Source

Commission Internationale de l'Eclairage Proceedings, 1931 Cambridge: Cambridge University Press.

References

Commission Internationale de l'Eclairage Proceedings, 1931 Cambridge: Cambridge University Press.

Examples

```
data(cccie31)
cccie31
```

---

cccie64 *CIE (1964) 10-deg chromaticity coordinates*

Description

cccie64 is a table with CIE (1964) 10-deg chromaticity coordinates.

Usage

```
cccie64
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

x x chromaticity coordinate

y y chromaticity coordinate

z z chromaticity coordinate

Author(s)

Jose Gama

Source

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

References

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

Examples

```
data(cccie64)
cccie64
```

CCT2XYZ *Convert CCT to XYZ*

Description

CCT2XYZ Converts correlated color temperature (CCT) to CIE tristimulus XYZ.

Usage

```
CCT2XYZ(CCTmatrix)
```

Arguments

CCTmatrix	CCT values

Value

CIE tristimulus XYZ

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 Color Calculator http://www.brucelindbloom.com/

References

Bruce Justin Lindbloom, 2013 Color Calculator http://www.brucelindbloom.com/

Examples

```
CCT2XYZ(c(0.310897, 0.306510, 74.613450))
```

CentralsISCCNBS *Central notations for the revised ISCC-NBS*

Description

CentralsISCCNBS is a table with Central notations for the revised ISCC-NBS Color-Name Blocks.

Usage

```
CentralsISCCNBS
```

Format

This data frame contains the following data:

Number notation number

Name notation name

MunsellSpec Munsell specification

Author(s)

Glenn Davis

References

Kelly, Kenneth Low, 1910 Central notations for the revised ISCC-NBS Color-Name Blocks Journal of Research of the National Bureau of Standards Research Paper 2911, Vol. 61 No. 5, November 1958

Examples

```
data(CentralsISCCNBS)
CentralsISCCNBS
```

CheckColorLookup *Check that the color block number is correct*

Description

`CheckColorLookup` Checks that the color block number is correct.

Usage

```
CheckColorLookup(DataISCCNBS)
```

Arguments

`DataISCCNBS`	data.frame with columns MunsellSpec and Number

Value

logic

Author(s)

Glenn Davis

`ChromaticAdaptation` *Chromatic adaptation algorithms*

Description

`ChromaticAdaptation` chromatic adaptation algorithms implemented as a linear transformation (XYZ Scaling, Bradford and Von Kries).

Usage

```
ChromaticAdaptation
```

Format

This array frame contains the following dimensions:

1 rows transformation matrix 3x3

2 columns transformation matrix 3x3

3 linear transformation (XYZ Scaling, Bradford or Von Kries)

4 transformation "direct" or "inverse"

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 Color Calculator http://www.brucelindbloom.com/

References

Bruce Justin Lindbloom, 2013 Color Calculator http://www.brucelindbloom.com/

Examples

```
data(ChromaticAdaptation)
ChromaticAdaptation
```

chromaticity.diagram *Plot the chromaticity diagram*

Description

chromaticity.diagram Plots the chromaticity diagram AKA "horse shoe".

Usage

```
chromaticity.diagram(chromaticityCoordinates=get("cccie31", envir = environment()),
conversionFunction=NULL,...)
```

Arguments

chromaticityCoordinates	chromaticity coordinates
conversionFunction	optional function to perform the coordinate conversion
...	optional parameters for the plot command

Value

none

Author(s)

Jose Gama

Examples

```
chromaticity.diagram()
xl<-yl<-0:1
chromaticity.diagram(xlim=xl,ylim=yl)
chromaticity.diagram(conversionFunction=CIE1931XYZ2CIE1976uv, xlim=xl,ylim=yl,
xlab="u'",ylab="v'")
```

chromaticity.diagram.color *Plot the chromaticity diagram line with color*

Description

chromaticity.diagram.color Plots the chromaticity diagram AKA "horse shoe", as a black line, a color line or a polygon.

Usage

```
chromaticity.diagram.color(chromaticityCoordinates=get("cccie31", envir = environment()),
conversionFunction=NULL, granularity=10, ...)
```

Arguments

chromaticityCoordinates	chromaticity coordinates
conversionFunction	optional function to perform the coordinate conversion
granularity	granularity = number of calculated points
...	optional parameters for the plot command

Value

none

Author(s)

Jose Gama

Examples

```
chromaticity.diagram.color()
xl<-yl<-0:1
chromaticity.diagram.color(xlim=xl,ylim=yl)
chromaticity.diagram.color(conversionFunction=CIE1931XYZ2CIE1976uv, xlim=xl,
ylim=yl,xlab="u'",ylab="v'")
```

CIE.Whiteness *CIE Whiteness*

Description

CIE.Whiteness The CIE Whiteness index is widely used in the industry for D65 for 2 or 10 deg observer.

Usage

```
CIE.Whiteness(xyYmatrix, illuminant = "D65", observer = 2, RefWhite
                = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

xyYmatrix	xyY data
illuminant	illuminant
observer	observer
RefWhite	Reference White

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
CIE.Whiteness(xyY)
```

CIE1931xy2CIE1960uv *Convert CIE 1931 xy color space to CIE 1960 uv color space*

Description

CIE1931xy2CIE1960uv Converts CIE 1931 xy color space to CIE 1960 uv color space.

Usage

```
CIE1931xy2CIE1960uv(xymatrix)
```

Arguments

xymatrix	xy coordinates

Value

CIE 1960 uv coordinates

Author(s)

Jose Gama

Source

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

References

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

Examples

```
xyY <- cbind(0.4083308, 0.2988462, 0.08391198)
CIE1931xy2CIE1960uv(xyY)
```

`CIE1931xy2CIE1976uv` *Convert CIE 1931 xy color space to CIE 1976 uv color space*

Description

`CIE1931xy2CIE1976uv` Converts CIE 1931 xy color space to CIE 1976 uv color space.

Usage

```
CIE1931xy2CIE1976uv(xymatrix)
```

Arguments

`xymatrix`	xy coordinates

Value

CIE 1976 uv coordinates

Author(s)

Jose Gama

Source

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

References

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

Examples

```
xyY <- cbind(0.4083308, 0.2988462, 0.08391198)
CIE1931xy2CIE1976uv(xyY)
```

CIE1931XYZ2CIE1931xyz *Convert CIE 1931 XYZ color space to CIE 1931 xyz color space*

Description

CIE1931XYZ2CIE1931xyz Converts CIE 1931 XYZ color space to CIE 1931 xyz color space.

Usage

```
CIE1931XYZ2CIE1931xyz(XYZmatrix)
```

Arguments

XYZmatrix	XYZ coordinates

Value

CIE 1931 xyz coordinates

Author(s)

Jose Gama

Source

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

References

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
CIE1931XYZ2CIE1931xyz(XYZ)
```

CIE1931XYZ2CIE1960uv *Convert CIE 1931 XYZ color space to CIE 1960 uv color space*

Description

CIE1931XYZ2CIE1960uv Converts CIE 1931 XYZ color space to CIE 1960 uv color space.

Usage

```
CIE1931XYZ2CIE1960uv(XYZmatrix)
```

Arguments

XYZmatrix	XYZ coordinates

Value

CIE 1960 uv coordinates

Author(s)

Jose Gama

Source

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

References

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
CIE1931XYZ2CIE1960uv(XYZ)
```

CIE1931XYZ2CIE1976uv *Convert CIE 1931 XYZ color space to CIE 1976 uv color space*

Description

CIE1931XYZ2CIE1976uv Converts CIE 1931 XYZ color space to CIE 1976 uv color space.

Usage

```
CIE1931XYZ2CIE1976uv(XYZmatrix)
```

Arguments

XYZmatrix	XYZ coordinates

Value

CIE 1976 uv coordinates

Author(s)

Jose Gama

Source

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

References

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
CIE1931XYZ2CIE1976uv(XYZ)
```

CIE1960UCS2CIE1964 *Convert CIE 1960 UCS color space to CIE 1964 color space*

Description

CIE1960UCS2CIE1964 Converts CIE 1960 UCS color space to CIE 1964 color space.

Usage

```
CIE1960UCS2CIE1964(uvYmatrix, illuminant = "D65", observer = 2, RefWhite =
                 get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

uvYmatrix	uvY data
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

CIE 1976 uv coordinates

Author(s)

Jose Gama

Source

Wikipedia, 2014 CIE 1964 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

References

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

Examples

```
CIE1960UCS2CIE1964(c(0.1633789, 1.322222, 0.08391198))
```

CIE1960UCS2xy *Convert CIE 1960 UCS color space to 1960 xy color space*

Description

CIE1960UCS2xy Converts CIE 1960 UCS color space to 1960 xy color space.

Usage

```
CIE1960UCS2xy(uvMatrix)
```

Arguments

uvMatrix	uv coordinates

Value

CIE 1960 xy coordinates

Author(s)

Jose Gama

Source

Wikipedia, 2014 CIE 1964 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

References

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

Examples

```
CIE1960UCS2xy(c(0.1633789, 1.322222 ))
```

CIE1976chroma *CIE 1976 chroma formula for CIELab and CIELuv*

Description

CIE1976chroma CIE 1976 chroma formula for CIELab and CIELuv.

Usage

```
CIE1976chroma(CIELMatrix)
```

Arguments

CIELMatrix	CIELab or CIELuv data

Author(s)

Jose Gama

Source

R. W. G. Hunt, M. R. Pointer, 2011 Measuring Colour Volume 23 of The Wiley-IS&T Series in Imaging Science and Technology John Wiley & Sons

References

R. W. G. Hunt, M. R. Pointer, 2011 Measuring Colour Volume 23 of The Wiley-IS&T Series in Imaging Science and Technology John Wiley & Sons

Examples

```
CIELMatrix<-c(34.78467, 28.15159, 3.024663)
CIE1976chroma(CIELMatrix)
```

CIE1976hueangle *CIE 1976 hue angle formula for CIELab and CIELuv*

Description

CIE1976hueangle CIE 1976 hue angle formula for CIELab and CIELuv.

Usage

```
CIE1976hueangle(CIELMatrix)
```

Arguments

CIELMatrix	CIELab or CIELuv data

Author(s)

Jose Gama

Source

R. W. G. Hunt, M. R. Pointer, 2011 Measuring Colour Volume 23 of The Wiley-IS&T Series in Imaging Science and Technology John Wiley & Sons

References

R. W. G. Hunt, M. R. Pointer, 2011 Measuring Colour Volume 23 of The Wiley-IS&T Series in Imaging Science and Technology John Wiley & Sons

Examples

```
CIELMatrix<-c(34.78467, 28.15159, 3.024663)
CIE1976hueangle(CIELMatrix)
```

CIE1976uv2CIE1931xy *CIE-1976 u'v' to CIE-1931 xy*

Description

CIE1976uv2CIE1931xy CIE-1976 u'v' to CIE-1931 xy.

Usage

```
CIE1976uv2CIE1931xy(uvmatrix)
```

Arguments

uvmatrix	CIE-1976 u'v' data

Author(s)

Jose Gama

Source

Paul Schils, 2014 Color theory phenomena http://www.color-theory-phenomena.nl/10.03.htm

References

Paul Schils, 2014 Color theory phenomena http://www.color-theory-phenomena.nl/10.03.htm

Examples

```
CIE1976uv2CIE1931xy(c(0.2830965, 0.4661789))
```

`CIE1976uv2CIE1960uv` *CIE-1976 u'v' to CIE-1960 uv*

Description

`CIE1976uv2CIE1960uv` CIE-1976 u'v' to CIE-1960 uv.

Usage

```
CIE1976uv2CIE1960uv(uvmatrix)
```

Arguments

`uvmatrix`	CIE-1976 u'v' data

Author(s)

Jose Gama

Source

Paul Schils, 2014 Color theory phenomena http://www.color-theory-phenomena.nl/10.03.htm

References

Paul Schils, 2014 Color theory phenomena http://www.color-theory-phenomena.nl/10.03.htm

Examples

```
CIE1976uv2CIE1960uv(c(0.2830965, 0.4661789))
```

CIE1976uvSaturation *CIE 1976 uv Saturation*

Description

CIE1976uvSaturation CIE 1976 uv Saturation.

Usage

```
CIE1976uvSaturation(uvMatrix, whitepoint)
```

Arguments

uvMatrix	CIELuv data
whitepoint	white point

Author(s)

Jose Gama

Source

R. W. G. Hunt, M. R. Pointer, 2011 Measuring Colour Volume 23 of The Wiley-IS&T Series in Imaging Science and Technology John Wiley & Sons

References

R. W. G. Hunt, M. R. Pointer, 2011 Measuring Colour Volume 23 of The Wiley-IS&T Series in Imaging Science and Technology John Wiley & Sons

Examples

```
CIE1976uvSaturation(cbind(34.78467, 28.15159, 3.024663), as.numeric(
get("XYZperfectreflectingdiffuser",
envir = environment())[which(get("XYZperfectreflectingdiffuser",
envir = environment())[["Illuminant"]]=='C'),c('X2','Y2')]))
```

CIELabtoDIN99 *Conversion from CIELAB color space to DIN99 coordinates*

Description

CIELabtoDIN99 Converts from CIELAB color space to DIN99 coordinates.

Usage

```
CIELabtoDIN99(Lab)
```

Arguments

Lab	CIELAB

Value

DIN99

Author(s)

Jose Gama

Source

CIELAB to DIN99 coordinates, 2014 https://de.wikipedia.org/w/index.php?title=Diskussion:DIN99-Farbraum

References

CIELAB to DIN99 coordinates, 2014 https://de.wikipedia.org/w/index.php?title=Diskussion:DIN99-Farbraum

Examples

```
CIELabtoDIN99(c(0.310897, 0.306510, 74.613450))
```

CIEluminanceY2NCSblackness *approximated NCS blackness s by the CIE luminance factor Y*

Description

`CIEluminanceY2NCSblackness` approximated NCS blackness s by the CIE luminance factor Y.

Usage

```
CIEluminanceY2NCSblackness(Y)
```

Arguments

`Y`	CIE values for illuminant C

Author(s)

Jose Gama

Source

Hsien-Che Lee, 2005 Introduction to Color Imaging Science Cambridge University Press pp. 366

References

Hsien-Che Lee, 2005 Introduction to Color Imaging Science Cambridge University Press pp. 366

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
CIEluminanceY2NCSblackness(xyY[3])
```

CIETint *Tint indices: CIE Tint and ASTM E313 Tint*

Description

`CIETint` Tint indices: CIE Tint and ASTM E313 Tint.

Usage

```
CIETint(xymatrix,illuminant='D65',observer=2)
```

Arguments

xymatrix	matrix with xy data
illuminant	illuminant
observer	observer

Value

Tint

Author(s)

Jose Gama

Source

CIE, 2004 CIE Publication 15:2004, "Colorimetry" ASTM E313, "Standard Practice for Calculating Yellowness and Whiteness Indices from Instrumentally Measured Color Coordinates"

References

CIE, 2004 CIE Publication 15:2004, "Colorimetry" ASTM E313, "Standard Practice for Calculating Yellowness and Whiteness Indices from Instrumentally Measured Color Coordinates"

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
CIETint(xyY)
```

---

ciexyz31 *CIE 1931 2-deg, XYZ CMFs*

Description

ciexyz31 is a table with CIE 1931 2-deg, XYZ color matching functions.

Usage

```
ciexyz31
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

xbar x CMF

ybar y CMF

zbar z CMF

Author(s)

Jose Gama

Source

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

References

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

Examples

```
data(ciexyz31)
ciexyz31
```

---

ciexyz64 *CIE 1964 10-deg, XYZ CMFs*

Description

`ciexyz64` is a table with CIE 1964 10-deg, XYZ color matching functions.

Usage

```
ciexyz64
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

xbar x CMF

ybar y CMF

zbar z CMF

Author(s)

Jose Gama

Source

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

References

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

Examples

```
data(ciexyz64)
ciexyz64
```

CMY2CMYK *Convert CMY coordinates to CMYK*

Description

CMY2CMYK Converts CMY coordinates to CMYK.

Usage

```
CMY2CMYK(CMYmatrix)
```

Arguments

CMYmatrix	CMY coordinates

Value

CMYK coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
CMY2CMYK(c(0.59072, 0.85570, 0.80283))
```

CMY2RGB *Convert CMYK coordinates to RGB*

Description

CMY2RGB Converts CMYK coordinates to RGB.

Usage

```
CMY2RGB(CMYmatrix)
```

Arguments

CMYmatrix	CMY coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
CMY2RGB(c(0.310897, 0.306510, 74.613450))
```

CMYK2CMY *Convert CMYK coordinates to CMY*

Description

CMYK2CMY Converts CMYK coordinates to CMY.

Usage

```
CMYK2CMY(CMYKmatrix)
```

Arguments

CMYKmatrix	CMYK coordinates

Value

CMY coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
CMYK2CMY(c(.342, .768, .683, .378))
```

ColorBlockFromMunsell *Get HVC, ISCC-NBS Number and ISCC-NBS Name from Munsell notation*

Description

ColorBlockFromMunsell Get HVC, ISCC-NBS Number and ISCC-NBS Name from Munsell notation.

Usage

```
ColorBlockFromMunsell(HVC)
```

Arguments

HVC	Munsell hue, value and chroma

Format

HVC[1] Munsell hue, on the ASTM D1535 100 point circular scale. All values are valid.

HVC[2] Munsell value, must be between 0 and 10

HVC[3] Munsell chroma, must be non-negative

Value

HVC, ISCC-NBS Number, ISCC-NBS Name

Author(s)

Glenn Davis

`compuphaseDifferenceRGB` *compuphase Difference RGB*

Description

`compuphaseDifferenceRGB` compuphase Difference RGB.

Usage

```
compuphaseDifferenceRGB(RGB1, RGB2)
```

Arguments

`RGB1`	RGB color sample
`RGB2`	RGB color reference

Value

Delta E

Author(s)

Jose Gama

Source

Thiadmer Riemersma, 2012 CompuPhase https://www.compuphase.com/cmetric.htm

References

Thiadmer Riemersma, 2012 CompuPhase https://www.compuphase.com/cmetric.htm

Examples

```
compuphaseDifferenceRGB(c(124,63,78),c(241,65,78))
```

`conversionIlluminance` *Conversion Factors for Units of Illuminance*

Description

`conversionIlluminance` is a table of conversion factors for units of Illuminance

Usage

```
conversionIlluminance
```

Format

This data frame contains the following columns:

footcandles foot-candles

lux lm/m2 = lux

phot phot

milliphot milliphot

units units

Author(s)

Jose Gama

Source

J. Meyer-Arendt, "Radiometry and Photometry: Units and Conversion Factors," Appl. Opt. 7, 2081-2081 (1968).

References

J. Meyer-Arendt, "Radiometry and Photometry: Units and Conversion Factors," Appl. Opt. 7, 2081-2081 (1968).

Examples

```
data(conversionIlluminance)
conversionIlluminance
```

`conversionLuminance` *Conversion Factors for Units of Luminance*

Description

`conversionLuminance` is a table of conversion factors for units of Luminance

Usage

```
conversionLuminance
```

Format

This data frame contains the following columns:

cd.m.2 cd/m^2 = nit

cd.cm.2 cd/cm^2 = stilb

cd.ft.2 cd/ft^2

cd.in.2 cd/in^2

apostilb apostilb = blondel

millilambert millilambert

footlambert foot-lambert

Author(s)

Jose Gama

Source

J. Meyer-Arendt, "Radiometry and Photometry: Units and Conversion Factors," Appl. Opt. 7, 2081-2081 (1968).

References

J. Meyer-Arendt, "Radiometry and Photometry: Units and Conversion Factors," Appl. Opt. 7, 2081-2081 (1968).

Examples

```
data(conversionLuminance)
conversionLuminance
```

createIsoTempLinesTable *table of isotemperature lines for use with the Robertson Method*

Description

createIsoTempLinesTable table of isotemperature lines for use with the Robertson Method (Robertson, 1968) to interpolate isotemperature lines from the CIE 1960 UCS.

Usage

```
createIsoTempLinesTable(SPD=NA,CIETable = get("ciexyz31", envir = environment()),
TCS = get("TCSdata", envir = environment()))
```

Arguments

SPD	light source spd
CIETable	reference data values
TCS	spectral reflectance data of 14 color test samples for CRI

Value

Iso temperature lines table

Author(s)

Jose Gama

Source

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf

References

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf

Examples

```
# illuminant A
SPD = illuminants[1:51*2-1,c('wlnm','A')] # every 10 nm
isoTempLinesTable <- createIsoTempLinesTable(SPD)
```

`daylightcomponents` *daylight components*

Description

`daylightcomponents` table with the mean relative spectral radiant power distribution and first two eigenvectors for the CIE method of calculating daylight.

Format

This data frame contains the following columns:

wlnm wavelength in nm

S0 mean relative spectral radiant power distribution

S1 first eigenvector

S2 second eigenvector

Author(s)

Jose Gama

Source

Wyszecki, G. and Stiles, W.S., 1982 Color Science: Concepts and Methods, Quantitative data and formulae. John Wiley & Sons.

References

Wyszecki, G. and Stiles, W.S., 1982 Color Science: Concepts and Methods, Quantitative data and formulae. John Wiley & Sons.

Examples

```
data(daylightcomponents)
str(daylightcomponents)
```

deltaE1976 *Delta E (CIE 1976)*

Description

deltaE1976 The color difference Delta E (CIE 1976).

Usage

```
deltaE1976(Lab1, Lab2)
```

Arguments

Lab1	CIE Lab color sample
Lab2	CIE Lab color reference

Value

Delta E

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 Color Calculator http://www.brucelindbloom.com

References

Bruce Justin Lindbloom, 2013 Color Calculator http://www.brucelindbloom.com

Examples

```
RGB1<-c(124,63,78)
RGB2<-c(95,213,184)
deltaE1976(RGB1,RGB2)
```

`deltaE1994` *Delta E (CIE 1994)*

Description

`deltaE1994` The color difference Delta E (CIE 1994).

Usage

```
deltaE1994(Lab1, Lab2, textiles = FALSE)
```

Arguments

`Lab1`	CIE Lab color sample
`Lab2`	CIE Lab color reference
`textiles`	boolean, TRUE = version for textiles

Value

Delta E

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 Color Calculator http://www.brucelindbloom.com

References

Bruce Justin Lindbloom, 2013 Color Calculator http://www.brucelindbloom.com

Examples

```
RGB1<-c(124,63,78)
RGB2<-c(95,213,184)
deltaE1994(RGB1,RGB2)
```

deltaE2000 *Delta E (CIE 2000)*

Description

deltaE2000 The color difference Delta E (CIE 2000).

Usage

```
deltaE2000(Lab1, Lab2)
```

Arguments

Lab1	CIE Lab color sample
Lab2	CIE Lab color reference

Value

Delta E

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 Color Calculator http://www.brucelindbloom.com

References

Bruce Justin Lindbloom, 2013 Color Calculator http://www.brucelindbloom.com

Examples

```
RGB1<-c(124,63,78)
RGB2<-c(95,213,184)
deltaE2000(RGB1,RGB2)
```

deltaECMC *Delta E CMC*

Description

deltaECMC The color difference method of the Color Measurement Committee (the CMC) .

Usage

```
deltaECMC(Lab1, Lab2, L, C)
```

Arguments

Lab1	CIE Lab color sample
Lab2	CIE Lab color reference
L	parameter L
C	parameter C

Value

Delta E

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 Color Calculator http://www.brucelindbloom.com

References

Bruce Justin Lindbloom, 2013 Color Calculator http://www.brucelindbloom.com

Examples

```
RGB1<-c(124,63,78)
RGB2<-c(95,213,184)
deltaECMC(RGB1,RGB2)
```

DeMarcoPokornySmith2degConeFundamentals1992 *DeMarco, Pokorny & Smith (1992) versions of the Smith-Pokorny 2-deg fundamentals*

Description

DeMarcoPokornySmith2degConeFundamentals1992 DeMarco, Pokorny & Smith (1992) versions of the Smith-Pokorny 2-deg fundamentals based on the CIE Judd-Vos 2-deg CMFs.

Usage

```
DeMarcoPokornySmith2degConeFundamentals1992
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

L2 L-cone spectral sensitivity, L2(lambda)

M2 M-cone spectral sensitivity, M2(lambda)

S2 S-cone spectral sensitivity, S2(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(DeMarcoPokornySmith2degConeFundamentals1992)
DeMarcoPokornySmith2degConeFundamentals1992
```

DIN6167.YellownessIndex *CIE Whiteness*

Description

DIN6167.YellownessIndex The CIE Whiteness index is widely used in the industry for D65 for 2 or 10 deg observer.

Usage

```
DIN6167.YellownessIndex(XYZmatrix, illuminant = "C", observer = 2, RefWhite
                 = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

XYZmatrix	CIE values for illuminant C
illuminant	illuminant
observer	observer
RefWhite	Reference White

Author(s)

Jose Gama

Source

Scandinavian Pulp, paper and board, 2003 Basic equations for optical properties SCAN-G 5:03 Revised 2003

References

Scandinavian Pulp, paper and board, 2003 Basic equations for optical properties SCAN-G 5:03 Revised 2003

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
DIN6167.YellownessIndex(XYZ)
```

DIN99toCIELab *Conversion from DIN99 coordinates to CIELAB color space*

Description

DIN99toCIELab Conversion from DIN99 coordinates to CIELAB color space.

Usage

```
DIN99toCIELab(Lab99o)
```

Arguments

Lab99o	Lab99o coordinates

Value

CIELAB coordinates

Author(s)

Jose Gama

Source

DIN99 coordinates to CIELAB color space https://de.wikipedia.org/w/index.php?title=Diskussion:DIN99-Farbraum

References

DIN99 coordinates to CIELAB color space https://de.wikipedia.org/w/index.php?title=Diskussion:DIN99-Farbraum

Examples

```
DIN99toCIELab(c(0.59072, 0.85570, 0.80283))
```

`dkl2dklCart` *converts between spherical and cartesian coordinates for DKL*

Description

`dkl2dklCart` Converts DKL, from spherical coordinates to cartesian. `dklCart2rgb` Converts DKL, from cartesian to spherical coordinates.

Usage

```
dkl2dklCart(dklMatrix)
```

Arguments

`dklMatrix`	DKL coordinates

Value

DKL coordinates

Author(s)

Jose Gama

Source

Package psychopy for Python

Graph-Based Visual Saliency (MATLAB source code) Jonathan Harel California Institute of Technology

References

Package psychopy for Python

Graph-Based Visual Saliency (MATLAB source code) Jonathan Harel California Institute of Technology

Examples

```
RGB<-c(124,63,78)
d <- rgb2dklCart(RGB)
dklCart2dkl(d)
dkl2dklCart(c(1.647176, 60.8308, 91.45825))
d
```

dkl2rgb *convert RGB to DKL*

Description

dkl2rgb Converts DKL, spherical coords coordinates to sRGB. dklCart2rgb Converts DKL, cartesian coords coordinates to sRGB.

Usage

```
dkl2rgb(dklMatrix, conversionMatrix = NA)
```

Arguments

dklMatrix	DKL coordinates
conversionMatrix	conversion matrix

Value

RGB coordinates

Author(s)

Jose Gama

Source

Package psychopy for Python

Graph-Based Visual Saliency (MATLAB source code) Jonathan Harel California Institute of Technology

References

Package psychopy for Python

Graph-Based Visual Saliency (MATLAB source code) Jonathan Harel California Institute of Technology

Examples

```
dklC <- rgb2dklCart(c(54,75,121))
dklCart2dkl(dklC)
```

DominantWavelength *Converts xyY coordinates to wavelength*

Description

DominantWavelength Converts xyY coordinates to wavelength.

Usage

```
DominantWavelength(xyYmatrix, illuminant='D65',observer=2,
RefWhiteIllum=get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

xyYmatrix	xyY matrix
illuminant	illuminant
observer	observer
RefWhiteIllum	Reference White

Value

Dominant Wavelength

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 http://www.brucelindbloom.com/index.html?ColorCalculator.html

References

Bruce Justin Lindbloom, 2013 http://www.brucelindbloom.com/index.html?ColorCalculator.html

Examples

```
DominantWavelength(c(0.59072, 0.85570, 0.80283))
```

`emittanceblackbodyPlanck` *emittance of a black body of temperature T at a given wavelength*

Description

`emittanceblackbodyPlanck` emittance of a black body of temperature T at a given wavelength (in metres).

Usage

```
emittanceblackbodyPlanck(wlnm, T)
```

Arguments

`wlnm`	wavelength in nm
`T`	temperature in Kelvin

Value

emittance

Author(s)

Jose Gama

Source

Planck's radiation law https://en.wikipedia.org/wiki/Planck%27s_law

References

Planck's radiation law https://en.wikipedia.org/wiki/Planck%27s_law

Examples

```
emittanceblackbodyPlanck(555,2000)
```

`footcandle2candela.steradian.sqmeter` *converts foot candle to candela steradian / square meter*

Description

`footcandle2candela.steradian.sqmeter` converts foot candle to candela steradian / square meter [cd*sr/m^2].

Usage

```
footcandle2candela.steradian.sqmeter(ftcl)
```

Arguments

`ftcl`	foot candle

Value

watts / square centimeter

Author(s)

Jose Gama

Source

Translators cafe https://www.translatorscafe.com/unit-converter/en-US/illumination

References

Translators cafe https://www.translatorscafe.com/unit-converter/en-US/illumination

Examples

```
footcandle2candela.steradian.sqmeter(5)
```

`footcandle2lux` *convert foot candle to Lumens/lux*

Description

`footcandle2lux` converts foot candle to Lumens/lux.

Usage

```
footcandle2lux(ftcl)
```

Arguments

`ftcl`	foot candle

Value

Lumens/lux

Author(s)

Jose Gama

Source

Translators cafe https://www.translatorscafe.com/unit-converter/en-US/illumination

References

Translators cafe https://www.translatorscafe.com/unit-converter/en-US/illumination

Examples

```
footcandle2lux(5)
```

`footcandle2watt.sqcentimeter`
converts foot candle to watts / square centimeter

Description

`footcandle2watt.sqcentimeter` converts foot candle to watts / square centimeter [w/cm^2] (at 555 nm) .

Usage

```
footcandle2watt.sqcentimeter(ftcl)
```

Arguments

ftcl	foot candle

Value

watts / square centimeter

Author(s)

Jose Gama

Source

Translators cafe https://www.translatorscafe.com/unit-converter/en-US/illumination

References

Translators cafe https://www.translatorscafe.com/unit-converter/en-US/illumination

Examples

```
footcandle2watt.sqcentimeter(5)
```

GanzGrieser.Tint *Ganz and Grieser Tint*

Description

GanzGrieser.Tint Ganz Grieser Tint Method.

Usage

```
GanzGrieser.Tint(xyYmatrix)
```

Arguments

xyYmatrix	CIE xyY values for illuminant C

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
GanzGrieser.Tint(xyY)
```

GanzGrieser.Whiteness *Ganz and Grieser Whiteness*

Description

GanzGrieser.Whiteness Dr. E. Ganz (formerly employee of Ciba AG, Switzerland) and Mr.R. Griesser (formerly employee of J.R.Geigy) developed the Ganz Grieser Whiteness Method.

Usage

```
GanzGrieser.Whiteness(xyYmatrix)
```

Arguments

xyYmatrix	CIE xyY values for illuminant C

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
GanzGrieser.Whiteness(xyY)
```

`heuristic.wlnm2RGB` *Approximations from wavelengths to RGB*

Description

`heuristic.wlnm2RGB` Approximations from wavelengths to RGB.

Usage

```
heuristic.wlnm2RGB(wavelength, Gamma = 0.8, IntensityMax = 1)
```

Arguments

`wavelength`	wavelength data
`Gamma`	Gamma
`IntensityMax`	maximum intensity

Value

RGB coordinates

Author(s)

Jose Gama

Source

Dan Bruton's, 2004 http://www.midnightkite.com/color.html Earl F. Glynn 2006 Delphi conversion http://www.efg2.com/Lab/ScienceAndEngineering/Spectra.htm

References

Dan Bruton's, 2004 http://www.midnightkite.com/color.html Earl F. Glynn 2006 Delphi conversion http://www.efg2.com/Lab/ScienceAndEngineering/Spectra.htm

Examples

```
heuristic.wlnm2RGB(555)
```

HSL2RGB *Convert HSL coordinates to RGB*

Description

HSL2RGB Converts HSL coordinates to RGB.

Usage

```
HSL2RGB(HSLmatrix)
```

Arguments

HSLmatrix	HSL coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
HSL<-c(0.9590164, 0.3262032, 0.3666667)
HSL2RGB(HSL)
HSL2RGB(rbind(HSL,HSL,HSL,HSL,HSL))
```

HSV2RGB *Convert HSV coordinates to RGB*

Description

HSV2RGB Converts HSV coordinates to RGB.

Usage

```
HSV2RGB(HSVmatrix)
```

Arguments

HSVmatrix	HSV coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
HSV<-c(0.9590164, 0.4919355, 0.4862745)
HSV2RGB(HSV)
```

Hue.2.RGB *Convert Hue to RGB*

Description

Hue.2.RGB Converts Hue to RGB for HSL conversion.

Usage

```
Hue.2.RGB(v1, v2, vH)
```

Arguments

v1	value 1
v2	value 2
vH	value of hue

Value

RGB coordinates

Author(s)

Jose Gama

Source

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html

References

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html

Examples

```
Hue.2.RGB(1,2,3)
```

huedegree *convert Munsell hue to degree*

Description

huedegree convert Munsell hue to degree.

Usage

```
huedegree(MunIn)
```

Arguments

MunIn	Munsell hue color

Value

Munsell hue degree

Author(s)

Jose Gama

Source

Takahiro Onodera, 2010 Color-Model-Munsell-Util http://annocpan.org/dist/Color-Model-Munsell-Util

References

Takahiro Onodera, 2010 Color-Model-Munsell-Util http://annocpan.org/dist/Color-Model-Munsell-Util

Examples

```
huedegree('1P')
```

huedegreemunsell *Table with Munsell hue degrees*

Description

huedegreemunsell table with Munsell hue degrees.

Usage

```
huedegreemunsell
```

Format

This data frame contains the following columns:

HueDegree hue degree

HueMunsell hue in Munsell H

Author(s)

Jose Gama

Source

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

References

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

Examples

```
data(huedegreemunsell)
huedegreemunsell
```

Hunter60.WhitenessIndex

Hunter 60 Whiteness Index

Description

`Hunter60.WhitenessIndex` Hunter 60 Whiteness Index.

Usage

```
Hunter60.WhitenessIndex(LabHunterMatrix)
```

Arguments

`LabHunterMatrix`
: Lab Hunter values for illuminant C

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
HunterLab<-c(28.96756, 2.363884, 0.4821515)
Hunter60.WhitenessIndex(HunterLab)
```

HunterLab2XYZ *Convert HunterLab coordinates to XYZ*

Description

`HunterLab2XYZ` Converts HunterLab coordinates to XYZ.

Usage

```
HunterLab2XYZ(HunterLabmatrix, illuminant = "D65", observer = 2,
           RefWhite = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

`HunterLabmatrix`
: HunterLab coordinates

`illuminant`
: illuminant

`observer`
: observer

`RefWhite`
: Reference White

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
HunterLab2XYZ(c(0.310897, 0.306510, 74.613450))
```

---

illuminantA — *Relative spectral power distributions of CIE illuminant A at 1 nm interval*

Description

`illuminantA` is a table with Relative spectral power distributions of CIE illuminant A at 1 nm interval.

Usage

```
illuminantA
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

intensity Relative spectral power

Author(s)

Jose Gama

Source

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

References

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

Examples

```
data(illuminantA)
illuminantA
```

`illuminantD65` *Relative spectral power distributions of CIE illuminant D65 at 1 nm interval*

Description

`illuminantD65` is a table with Relative spectral power distributions of CIE illuminant D65 at 1 nm interval.

Usage

```
illuminantD65
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

intensity Relative spectral power

Author(s)

Jose Gama

Source

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

References

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

Examples

```
data(illuminantD65)
illuminantD65
```

`illuminants` *Relative spectral power distributions of CIE illuminants at 5 nm interval*

Description

`illuminants` is a table with Relative spectral power distributions of CIE illuminants at 5 nm interval.

Usage

```
illuminants
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

A illuminant A

B illuminant B

C illuminant C

D50 illuminant D50

D55 illuminant D55

D65 illuminant D65

D75 illuminant D75

D93 illuminant D93

E illuminant E

Natural illuminant Natural

PlusWhite illuminant PlusWhite

TL84 illuminant TL84

Polylux3000 illuminant Polylux3000

Polylux4000 illuminant Polylux4000

KolorRite illuminant KolorRite

FL1 illuminant FL1

FL2 illuminant FL2

FL3 illuminant FL3

FL4 illuminant FL4

FL5 illuminant FL5

FL6 illuminant FL6

FL7 illuminant FL7

FL8 illuminant FL8

FL9 illuminant FL9

FL10 illuminant FL10

FL11 illuminant FL11

FL12 illuminant FL12

Author(s)

Jose Gama

Source

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

References

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

Examples

```
data(illuminants)
illuminants
```

`ISObrightnessReflectometerRSD` *Weighting factors for the calculation of ISO brightness*

Description

`ISObrightnessReflectometerRSD` is a table with the weighting factors for the calculation of ISO brightness.

Usage

```
ISObrightnessReflectometerRSD
```

Format

This data frame contains the following data:

wln wavelength

F factor

weights weight

Author(s)

Jose Gama

Source

Scandinavian Pulp, paper and board, 2003 Basic equations for optical properties SCAN-G 5:03 Revised 2003

References

Scandinavian Pulp, paper and board, 2003 Basic equations for optical properties SCAN-G 5:03 Revised 2003

Examples

```
data(ISObrightnessReflectometerRSD)
ISObrightnessReflectometerRSD
```

---

kelvin2xy — *Blackbody radiator color temperature to CIE 1931 x,y chromaticity approximation function*

Description

`kelvin2xy` Blackbody radiator color temperature to CIE 1931 x,y chromaticity approximation function.

Usage

```
kelvin2xy(T)
```

Arguments

`T`	temperature in Kelvin

Value

color temperature

Author(s)

Jose Gama

Source

Kim et al., 2002 "Design of Advanced Color - Temperature Control System for HDTV Applications" https://www.jkps.or.kr/journal/view.html?uid=5163&vmd=Full

References

Kim et al., 2002 "Design of Advanced Color - Temperature Control System for HDTV Applications" https://www.jkps.or.kr/journal/view.html?uid=5163&vmd=Full

Examples

```
kelvin2xy(300)
```

Lab2LCHab *Convert CIE Lab coordinates to LCHab*

Description

Lab2LCHab Converts CIE Lab coordinates to LCHab.

Usage

```
Lab2LCHab(LabMatrix)
```

Arguments

LabMatrix	CIE Lab coordinates

Value

LCHab coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
Lab2LCHab(c(0.310897, 0.306510, 74.613450))
```

LAB2LUV *Convert CIE Lab coordinates to CIE Luv*

Description

LAB2LUV Converts CIE Lab coordinates to CIE Luv.

Usage

```
LAB2LUV(Labmatrix)
```

Arguments

Labmatrix	CIE Lab coordinates

Value

XYZ coordinates

Author(s)

Jose Gama

Examples

```
LAB2LUV(c(0.310897, 0.306510, 74.613450))
```

Lab2XYZ *Convert CIE Lab coordinates to XYZ*

Description

Lab2XYZ Converts CIE Lab coordinates to XYZ.

Usage

```
Lab2XYZ(Labmatrix, illuminant = "D65", observer = 2, RefWhite
                 = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

Labmatrix	CIE Lab coordinates
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
Lab2XYZ(c(0.310897, 0.306510, 74.613450))
```

LCHab2Lab *Convert LCHab coordinates to CIE Lab*

Description

LCHab2Lab Converts LCHab coordinates to CIE Lab.

Usage

```
LCHab2Lab(LCHabmatrix)
```

Arguments

LCHabmatrix	LCHab coordinates

Value

CIE Lab coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
LCHab2Lab(c(0.310897, 0.306510, 74.613450))
```

LCHuv2Luv *Convert LCHuv coordinates to CIE Luv*

Description

LCHuv2Luv Converts LCHuv coordinates to CIE Luv.

Usage

```
LCHuv2Luv(LCHuvmatrix)
```

Arguments

LCHuvmatrix	LCHuv coordinates

Value

CIE Luv coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
LCHuv2Luv(c(0.310897, 0.306510, 74.613450))
```

LEF2RGB *Convert LEF coordinates to RGB*

Description

LEF2RGB Converts LEF coordinates to RGB.

Usage

```
LEF2RGB(LEFmatrix)
```

Arguments

LEFmatrix	LEF coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Kang, Henry R, 2006 Computational color technology Spie Press Bellingham

References

Kang, Henry R, 2006 Computational color technology Spie Press Bellingham

Examples

```
LEF<-c(176.66667, 53.50000, -12.99038)
LEF2RGB(LEF)
```

LMS2DKL *Convert LMS coordinates to DKL*

Description

LMS2DKL Converts LMS coordinates to DKL.

Usage

```
LMS2DKL(bg, diffcone.coords, DKL2LMS = FALSE)
```

Arguments

bg	LMS coordinates
diffcone.coords	LMS coordinates
DKL2LMS	boolean, FALSE = DKL to LMS, TRUE = LMS to DKL

Value

DKL coordinates

Author(s)

Jose Gama

Source

David H. Brainard Cone Contrast and Opponent Modulation Color Spaces pp. 563 PART IV: CONE CONTRAST AND OPPONENT MODULATION COLOR SPACES

References

David H. Brainard Cone Contrast and Opponent Modulation Color Spaces pp. 563 PART IV: CONE CONTRAST AND OPPONENT MODULATION COLOR SPACES

Examples

```
#LMS<-c(3.822394, 10.17498, 1.130049)
#LMS2DKL(LMS)
```

LMS2RGB *Convert LMS coordinates to RGB*

Description

LMS2RGB Converts LMS coordinates to RGB.

Usage

```
LMS2RGB(LMSmatrix)
```

Arguments

LMSmatrix	LMS coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Francoise Vienot, Hans Brettel,John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

References

Francoise Vienot, Hans Brettel,John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

Examples

```
LMS<-c(3.822394, 10.17498, 1.130049)
LMS2RGB(LMS)
```

LMS2XYZ *Convert LMS coordinates to XYZ*

Description

LMS2XYZ Converts LMS coordinates to XYZ.

Usage

```
LMS2XYZ(LMSmatrix)
```

Arguments

LMSmatrix	LMS coordinates

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Francoise Vienot, Hans Brettel,John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

References

Francoise Vienot, Hans Brettel,John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

Examples

```
LMS<-c(3.822394, 10.17498, 1.130049)
LMS2XYZ(LMS)
```

LSLM2RGB *Convert LSLM coordinates to RGB*

Description

LSLM2RGB Converts LSLM coordinates to RGB.

Usage

```
LSLM2RGB(LSLMmatrix)
```

Arguments

LSLMmatrix	LSLM coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Francoise Vienot, Hans Brettel,John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

References

Francoise Vienot, Hans Brettel,John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

Examples

```
LSLM<-c(-0.4186083, 0.007563981, 0.4918533)
LSLM2RGB(LSLM)
```

LUV2LAB *Convert CIE Luv coordinates to CIE Lab*

Description

LUV2LAB Converts CIE Luv coordinates to CIE Lab.

Usage

```
LUV2LAB(Luvmatrix)
```

Arguments

Luvmatrix	Luv matrix

Value

XYZ coordinates

Author(s)

Jose Gama

Examples

```
LUV2LAB(c(0.310897, 0.306510, 74.613450))
```

Luv2LCHuv *Convert CIE Luv coordinates to LCHuv*

Description

Luv2LCHuv Converts CIE Luv coordinates to LCHuv.

Usage

```
Luv2LCHuv(LuvMatrix)
```

Arguments

LuvMatrix	Luv coordinates

Value

LCHuv coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
Luv2LCHuv(c(0.310897, 0.306510, 74.613450))
```

Luv2XYZ *Convert CIE Luv coordinates to XYZ*

Description

Luv2XYZ Converts CIE Luv coordinates to XYZ.

Usage

```
Luv2XYZ(Luvmatrix, illuminant = "D65", observer = 2, RefWhite
                  = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

Luvmatrix	Luv matrix
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
Luv2XYZ(c(0.310897, 0.306510, 74.613450))
```

`Luv2Yuv` *Convert CIE Luv coordinates to Yuv*

Description

`Luv2Yuv` Converts CIE Luv coordinates to Yuv.

Usage

```
Luv2Yuv(Luvmatrix,illuminant='D65',observer=2,RefWhite=
get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

`Luvmatrix`	CIE Luv coordinates
`illuminant`	illuminant
`observer`	observer
`RefWhite`	Reference White

Value

Yuv coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
Luv2Yuv(c(0.310897, 0.306510, 74.613450))
```

`makeChromaticAdaptationMatrix` *Generate a Chromatic Adaptation matrix*

Description

`makeChromaticAdaptationMatrix` Generates a Chromatic Adaptation matrix.

Usage

```
makeChromaticAdaptationMatrix(ChromaticAdaptationAlgorithm = "VonKries",
                 illuminantSource = "C", illuminantDestination = "D65",
                 observer = 2, ChromaticAdaptationArray =
                 get("ChromaticAdaptation", envir = environment()),
 referenceWhiteArray = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

`ChromaticAdaptationAlgorithm`	Chromatic adaptation algorithm
`illuminantSource`	illuminant source
`illuminantDestination`	illuminant destination
`observer`	observer
`ChromaticAdaptationArray`	Chromatic adaptation array
`referenceWhiteArray`	reference white

Value

Chromatic Adaptation matrix

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

`MaterialReferenceData` *Material Reference Data from Principles of Digital Image Synthesis*

Description

`MaterialReferenceData` Material Reference Data from Principles of Digital Image Synthesis, Appendix G Andrew S. Glassner 16 August 1994.

Usage

```
MaterialReferenceData
```

Format

This data frame contains the following data:

wavelength wavelength (nm)

DarkSkin spectra of: dark skin

LightSkin spectra of: light skin

BlueSky spectra of: blue sky

Foliage spectra of: foliage

BlueFlower spectra of: blue flower

BluishGreen spectra of: bluish green

Orange spectra of: orange

PurplishBlue spectra of: purplish blue

ModerateRed spectra of: moderate red

Purple spectra of: purple

YellowGreen spectra of: yellow green

OrangeYellow spectra of: orange yellow

Blue spectra of: blue

Green spectra of: green

Red spectra of: red

Yellow spectra of: yellow

Magenta spectra of: magenta

Cyan spectra of: cyan

White spectra of: white

Neutral spectra of: neutral

Neutral6.5 spectra of: neutral 6.5

Neutral5 spectra of: neutral 5

Neutral3.5 spectra of: neutral 3.5

Black spectra of: black
PineNeedles spectra of: pine needles
SilverMapleLeaf spectra of: silver maple leaf
DarkGreenMapleLeaf spectra of: dark green maple leaf
RedMapleLeaf spectra of: red maple leaf
Grass spectra of: grass
Soil spectra of: soil
VineLeaf spectra of: vine leaf
Alphalt spectra of: alphalt
DaisyWhitePetals spectra of: daisy white petals
DaisyYellowCenter spectra of: daisy yellow center
MarigoldOrange spectra of: marigold orange
MarigoldYellow spectra of: marigold yellow
DarkBlueJeans spectra of: dark blue jeans
FadedJeans spectra of: faded jeans
DarkBlueSweatPants spectra of: dark blue sweat pants
Denim spectra of: denim
WheatBread spectra of: wheat bread
WheatBreadCrust spectra of: wheat bread crust
Pancake spectra of: pancake
SwissArmyKnife spectra of: swiss army knife
PineWood spectra of: pine wood
MapleWood spectra of: maple wood
OakWood spectra of: oak wood
Bamboo spectra of: bamboo
Redwood spectra of: redwood
WalnutWood spectra of: walnut wood
YellowBanana spectra of: yellow banana
RipeBrownBanana spectra of: ripe brown banana
Cucumber spectra of: cucumber
CornKernel spectra of: corn kernel
CornHusk spectra of: corn husk
YellowDeliciousApple spectra of: yellow delicious apple
GreenPepper spectra of: green pepper
LemonSkin spectra of: lemon skin
Lettuce spectra of: lettuce
Carrot spectra of: carrot
BarleySeeds spectra of: barley seeds
LentilSeeds spectra of: lentil seeds
BrownRiceSeeds spectra of: brown rice seeds
Sand spectra of: sand

Author(s)

Jose Gama

Source

Andrew S. Glassner, 1995 Principles of Digital Image Synthesis The Morgan Kaufmann Series in Computer Graphics and Geometric Modeling

References

Andrew S. Glassner, 1995 Principles of Digital Image Synthesis The Morgan Kaufmann Series in Computer Graphics and Geometric Modeling

Examples

```
data(MaterialReferenceData)
str(MaterialReferenceData)
```

MaxChromaFromExtrapRenotationData

Table with maximum chroma for which extrapolated renotation data is available

---

Description

`MaxChromaFromExtrapRenotationData` table with maximum chroma for which extrapolated renotation data is available.

Usage

```
MaxChromaFromExtrapRenotationData
```

Format

This data frame contains the following columns:

H Hue

V Value

MaximumChroma Maximum Chroma

Author(s)

Jose Gama

Source

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

References

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

Examples

```
data(MaxChromaFromExtrapRenotationData)
MaxChromaFromExtrapRenotationData
```

MaxChromasForStandardMunsellHuesAndValues

Table with maximum Munsell chroma, for a given Munsell hue and value, for which an extrapolated renotation value is available

---

Description

`MaxChromasForStandardMunsellHuesAndValues` table with maximum Munsell chroma, for a given Munsell hue and value, for which an extrapolated renotation value is available.

Usage

```
MaxChromasForStandardMunsellHuesAndValues
```

Format

This data frame contains the following columns:

H Hue

V Value

MaximumChroma Maximum Chroma (MacAdam limit)

Author(s)

Jose Gama

Source

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

References

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

Examples

```
data(MaxChromasForStandardMunsellHuesAndValues)
MaxChromasForStandardMunsellHuesAndValues
```

Maxwell.triangle *Plot the Maxwell triangle*

Description

`Maxwell.triangle` Plots the Maxwell triangle, as a black line, a color line or a polygon.

Usage

```
Maxwell.triangle(primariesRGB=get("whitepointsRGB", envir = environment()),
conversionFunction=NULL,...)
```

Arguments

`primariesRGB`	primarie valuess for RGB color spaces
`conversionFunction`	optional function to perform the coordinate conversion
`...`	optional parameters for the plot command

Value

none

Author(s)

Jose Gama

Examples

```
Maxwell.triangle()
xl<-yl<-0:1
Maxwell.triangle(xlim=xl,ylim=yl)
Maxwell.triangle(conversionFunction=CIE1931XYZ2CIE1976uv,
xlim=xl,ylim=yl,xlab="u'",ylab="v'")
```

Munsell100hues55 *Chromaticity diagram showing values for x and y for Illuminant A for 100 hues at 5/5*

Description

`Munsell100hues55` Chromaticity diagram showing Tristimulus Values and Trilinear Coordinates for Illuminant A for 100 hues at 5/5.

Usage

```
Munsell100hues55
```

Format

This data frame contains the following columns:

BookNotation Munsell color notation from the Munsell book

MunsellProductionNo

X Tristimulus Value X

Y Tristimulus Value Y

Z Tristimulus Value Z

x Trilinear Coordinate x

y Trilinear Coordinate y

z Trilinear Coordinate z

Author(s)

Jose Gama

Source

Hermann VON Schelling, Dean Farnsworth, 1949 Trichromatic Specifications of the Munsell 100 Hues at 5/5 for Illuminant a Defense Technical Information Center NAVAL MEDICAL RESEARCH LAB NEW LONDON CONN.

References

Hermann VON Schelling, Dean Farnsworth, 1949 Trichromatic Specifications of the Munsell 100 Hues at 5/5 for Illuminant a Defense Technical Information Center NAVAL MEDICAL RESEARCH LAB NEW LONDON CONN.

Examples

```
data(Munsell100hues55)
Munsell100hues55
```

Munsell100hues55FM100 *Munsell 100-Hues at 5/5, production numbers 101 to 200 and Farnsworth-Munsell 100 Hue test*

Description

`Munsell100hues55FM100` Munsell 100-Hues at 5/5, production numbers 101 to 200 and Farnsworth-Munsell 100 Hue test.

Usage

```
Munsell100hues55FM100
```

Format

This data frame contains the following columns:

FMtest Farnsworth-Munsell 100 Hue test value

MunsellNumber Munsell 100-Hues at 5/5, production number

Author(s)

Jose Gama

Source

Hermann VON Schelling, Dean Farnsworth, 1949 Trichromatic Specifications of the Munsell 100 Hues at 5/5 for Illuminant a Defense Technical Information Center NAVAL MEDICAL RESEARCH LAB NEW LONDON CONN.

References

Hermann VON Schelling, Dean Farnsworth, 1949 Trichromatic Specifications of the Munsell 100 Hues at 5/5 for Illuminant a Defense Technical Information Center NAVAL MEDICAL RESEARCH LAB NEW LONDON CONN.

Examples

```
data(Munsell100hues55FM100)
Munsell100hues55FM100
```

`MunsellHues` *Table with Munsell Hues*

Description

`MunsellHues` table with Munsell Hues.

Usage

```
MunsellHues
```

Author(s)

Jose Gama

Source

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

References

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

Examples

```
data(MunsellHues)
MunsellHues
```

`MunsellNeutrals2sRGB` *Table with Munsell Neutrals and corresponding sRGB*

Description

`MunsellNeutrals2sRGB` table with Munsell Neutrals and corresponding sRGB.

Usage

```
MunsellNeutrals2sRGB
```

Format

This data frame contains the following columns:

MunsellNeutral Munsell N

R sRGB R

G sRGB G

B sRGB B

Author(s)

Jose Gama

Source

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

References

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

Examples

```
data(MunsellNeutrals2sRGB)
MunsellNeutrals2sRGB
```

MunsellSpecToHVC *convert Munsell notation to numeric HVC*

Description

MunsellSpecToHVC Converts convert Munsell notation to numeric Hue,Value,Chroma.

Usage

```
MunsellSpecToHVC(MunsellSpecString)
```

Arguments

MunsellSpecString	string with the Munsell hue, value and chroma.

Value

numeric Hue,Value,Chroma

Author(s)

Glenn Davis

MunsellSpectral *Table with Munsell spectral data*

Description

MunsellSpectral table for 1250 matt Munsell color chips with Munsell notation values, XYZ, xyY, RGB, CIE Lab, CIE Luv and spectral data.

Usage

```
MunsellSpectral
```

Author(s)

Jose Gama

Source

Spectral Color Research group, 1989 University of Kuopio, Finland School of Computing and the Department of Physics and Mathematics Database - Munsell Colors Matt (AOTF) https://sites.uef.fi/spectral/databases-software/munsell-colors-matt-aotf-measured/

Parkkinen, J. P. S., Hallikainen, J. and Jaaskelainen, 1989 "Characteristic spectra of Munsell colors," Journal of the Optical Society of America Vol. 6, No. 2, February 1989, pp. 318-322.

References

Spectral Color Research group, 1989 University of Kuopio, Finland School of Computing and the Department of Physics and Mathematics Database - Munsell Colors Matt (AOTF) https://sites.uef.fi/spectral/databases-software/munsell-colors-matt-aotf-measured/

Parkkinen, J. P. S., Hallikainen, J. and Jaaskelainen, 1989 "Characteristic spectra of Munsell colors," Journal of the Optical Society of America Vol. 6, No. 2, February 1989, pp. 318-322.

Examples

```
## Not run:
data(MunsellSpectral)
MunsellSpectral

## End(Not run)
```

`MunsellV2relativeLuminanceY`

Munsell value V to relative luminance Y

Description

`MunsellV2relativeLuminanceY` Munsell value V to relative luminance Y.

Usage

```
MunsellV2relativeLuminanceY(V)
```

Arguments

`V`	Munsell value

Value

CIE XYZ "Y"

Author(s)

Jose Gama

Source

Mark D. Fairchild, 2013 Color Appearance Models, 3rd Ed. Wiley-IS&T

References

Mark D. Fairchild, 2013 Color Appearance Models, 3rd Ed. Wiley-IS&T

Examples

```
MunsellV2relativeLuminanceY(5)
```

`MunsellV2Y` *Munsell value to CIE XYZ "Y"*

Description

`MunsellV2Y` Munsell value to CIE XYZ "Y" .

Usage

```
MunsellV2Y(V)
```

Arguments

`V`	Munsell value

Value

CIE XYZ "Y"

Author(s)

Jose Gama

Source

ASTM, 2008 ASTM Standard D1535-08

References

ASTM, 2008 ASTM Standard D1535-08

Examples

```
MunsellV2Y(5)
```

NickersonColorDifference
Nickerson Color Difference

Description

NickersonColorDifference Nickerson's Color Difference.

Usage

```
NickersonColorDifference(MunsellHVC1, MunsellHVC2)
```

Arguments

MunsellHVC1	Munsell HVC 1
MunsellHVC2	Munsell HVC 2

Value

Delta E

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 Color Calculator http://www.brucelindbloom.com

References

Bruce Justin Lindbloom, 2013 Color Calculator http://www.brucelindbloom.com

Examples

```
NickersonColorDifference('10B 5/6','5B 5/4')
```

PhotoYCC2RGB *Convert PhotoYCC to RGB*

Description

PhotoYCC2RGB Converts PhotoYCC to RGB.

Usage

```
PhotoYCC2RGB(PhotoYCCmatrix)
```

Arguments

PhotoYCCmatrix	PhotoYCC coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
p <- c(0.4560569, 155.9415709, 137.3026467)
PhotoYCC2RGB(p)
```

PreucilAngle *Preucil Angle*

Description

PreucilAngle Preucil Angle.

Usage

```
PreucilAngle(RGBmatrix)
```

Arguments

RGBmatrix	RGB coordinates

Value

Angle

Author(s)

Jose Gama

Source

Robert William Gainer Hunt, 1987 The Reproduction of Colour Fountain Press Edition 4, illustrated

References

Robert William Gainer Hunt, 1987 The Reproduction of Colour Fountain Press Edition 4, illustrated

Examples

```
PreucilAngle(c(24,72,44))
```

PreucilPercentGreyness *Preucil Percentage of Greyness*

Description

PreucilPercentGreyness Preucil Percentage of Greyness.

Usage

```
PreucilPercentGreyness(RGBmatrix)
```

Arguments

RGBmatrix RGB coordinates

Value

Percentage of Greyness

Author(s)

Jose Gama

Source

Robert William Gainer Hunt, 1987 The Reproduction of Colour Fountain Press Edition 4, illustrated

References

Robert William Gainer Hunt, 1987 The Reproduction of Colour Fountain Press Edition 4, illustrated

Examples

```
PreucilPercentGreyness(c(24,72,44))
```

PreucilPercentHueError

Preucil Percentage of Greyness

Description

PreucilPercentHueError Preucil Percentage of Hue Error.

Usage

```
PreucilPercentHueError(RGBmatrix)
```

Arguments

RGBmatrix RGB coordinates

Value

Percentage of HueError

Author(s)

Jose Gama

Source

Robert William Gainer Hunt, 1987 The Reproduction of Colour Fountain Press Edition 4, illustrated

References

Robert William Gainer Hunt, 1987 The Reproduction of Colour Fountain Press Edition 4, illustrated

Examples

```
PreucilPercentHueError(c(24,72,44))
```

RGB2CMY *Convert sRGB coordinates to CMY*

Description

RGB2CMY Converts sRGB coordinates to CMY.

Usage

```
RGB2CMY(RGBmatrix)
```

Arguments

RGBmatrix	sRGB coordinates

Value

CMY coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
RGB2CMY(c(0.310897, 0.306510, 74.613450))
```

`rgb2dklV` *convert RGB to DKL*

Description

`rgb2dklV` Converts sRGB coordinates to DKL, spherical coords, sames as Graph-Based Visual Saliency. `rgb2dklCart` Converts sRGB coordinates to DKL, cartesian coords.

Usage

```
rgb2dklV(RGB)
```

Arguments

`RGB`	sRGB coordinates

Value

DKL coordinates

Author(s)

Jose Gama

Source

Package psychopy for Python

Graph-Based Visual Saliency (MATLAB source code) Jonathan Harel California Institute of Technology

References

Package psychopy for Python

Graph-Based Visual Saliency (MATLAB source code) Jonathan Harel California Institute of Technology

Examples

```
rgb2dklCart(c(54,75,121))
```

RGB2HSL *Convert RGB coordinates to HSL*

Description

RGB2HSL Converts RGB coordinates to HSL.

Usage

```
RGB2HSL(RGBmatrix)
```

Arguments

RGBmatrix	RGB coordinates

Value

HSL coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
RGB<-c(124,63,78)
RGB2HSL(RGB)
```

RGB2HSV *Convert RGB coordinates to HSV*

Description

RGB2HSV Converts RGB coordinates to HSV.

Usage

```
RGB2HSV(RGBmatrix)
```

Arguments

RGBmatrix	RGB coordinates

Value

HSV coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
RGB<-c(124,63,78)
RGB2HSV(RGB)
```

RGB2hue *Convert sRGB coordinates to hue*

Description

RGB2hue Converts sRGB coordinates to hue.

Usage

```
RGB2hue(RGBmatrix)
```

Arguments

RGBmatrix	sRGB coordinates

Value

hue

Author(s)

Jose Gama

Examples

```
RGB2hue(c(0.310897, 0.306510, 74.613450))
```

RGB2LEF *Convert RGB coordinates to LEF*

Description

RGB2LEF Converts RGB coordinates to LEF.

Usage

```
RGB2LEF(RGBmatrix)
```

Arguments

RGBmatrix	RGB coordinates

Value

LEF coordinates

Author(s)

Jose Gama

Source

Kang, Henry R, 2006 Computational color technology Spie Press Bellingham

References

Kang, Henry R, 2006 Computational color technology Spie Press Bellingham

Examples

```
RGB<-c(124,63,78)
RGB2LEF(RGB)
```

RGB2LMS *Convert RGB coordinates to LMS*

Description

RGB2LMS Converts RGB coordinates to LMS.

Usage

```
RGB2LMS(RGBmatrix)
```

Arguments

RGBmatrix	RGB coordinates

Value

LMS coordinates

Author(s)

Jose Gama

Source

Francoise Vienot, Hans Brettel,John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

References

Francoise Vienot, Hans Brettel,John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

Examples

```
RGB<-c(124,63,78)
RGB2LMS(RGB)
```

RGB2LSLM *Convert RGB coordinates to LSLM*

Description

RGB2LSLM Converts RGB coordinates to LSLM.

Usage

```
RGB2LSLM(RGBmatrix)
```

Arguments

RGBmatrix	RGB coordinates

Value

LSLM coordinates

Author(s)

Jose Gama

Source

Francoise Vienot, Hans Brettel,John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

References

Francoise Vienot, Hans Brettel,John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

Examples

```
RGB<-c(124,63,78)
RGB2LSLM(RGB)
```

RGB2PhotoYCC *Convert RGB coordinates to PhotoYCC*

Description

RGB2PhotoYCC Converts RGB coordinates to PhotoYCC.

Usage

```
RGB2PhotoYCC(RGBmatrix)
```

Arguments

RGBmatrix	RGB coordinates

Value

PhotoYCC coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
RGB<-c(124,63,78)
RGB2PhotoYCC(RGB)
```

RGB2XYZ *Convert sRGB coordinates to XYZ*

Description

RGB2XYZ Converts sRGB coordinates to XYZ.

Usage

```
RGB2XYZ(RGBmatrix, illuminant = "D65", observer = 2, RefWhite
                = get("XYZperfectreflectingdiffuser", envir = environment()),
                RGBModel = "sRGB", RefWhiteRGB = get("whitepointsRGB",
                envir =environment()), gamma = NA,
                RefWhiteIllum = get("XYZperfectreflectingdiffuser",
                envir = environment()), CAT = "Bradford",
                CATarray = get("ChromaticAdaptation", envir = environment()))
```

Arguments

RGBmatrix	sRGB coordinates
illuminant	illuminant
observer	observer
RefWhite	White Reference
RGBModel	RGB Model
RefWhiteRGB	White Reference RGB
gamma	gamma
RefWhiteIllum	White Reference illuminant
CAT	Chromatic Adaptation algorithm
CATarray	Chromatic Adaptation data

Value

CIE XYZ coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
RGB2XYZ(c(0.310897, 0.306510, 74.613450))
```

RGB2YCbCr *Convert RGB coordinates to YCbCr*

Description

RGB2YCbCr Converts RGB coordinates to YCbCr.

Usage

```
RGB2YCbCr(RGBmatrix)
```

Arguments

RGBmatrix	RGB coordinates

Value

YCbCr coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
RGB<-c(124,63,78)
RGB2YCbCr(RGB)
```

RGB2YIQ *Convert RGB coordinates to YIQ*

Description

RGB2YIQ Converts RGB coordinates to YIQ.

Usage

```
RGB2YIQ(RGBmatrix)
```

Arguments

RGBmatrix	RGB coordinates

Value

YIQ coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
RGB<-c(124,63,78)
RGB2YIQ(RGB)
```

RGB2YPbPr *Convert RGB coordinates to YPbPr*

Description

RGB2YPbPr Converts RGB coordinates to YPbPr.

Usage

```
RGB2YPbPr(RGBmatrix)
```

Arguments

RGBmatrix	RGB coordinates

Value

YPbPr coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
RGB<-c(124,63,78)
RGB2YPbPr(RGB)
```

RGB2YUV *Convert RGB coordinates to YUV*

Description

RGB2YUV Converts RGB coordinates to YUV.

Usage

```
RGB2YUV(RGBmatrix)
```

Arguments

RGBmatrix	RGB coordinates

Value

YUV coordinates

Author(s)

Jose Gama

Examples

```
RGB<-c(124,63,78)
RGB2YUV(RGB)
```

RxRyRz2XYZ *convert from three filter measurements (reflectance factors) to XYZ*

Description

RxRyRz2XYZ convert from three filter measurements (reflectance factors) to XYZ.

Usage

```
RxRyRz2XYZ(RxRyRzmatrix=NA,illuminant='C', observer=2,
RefWhite=get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

RxRyRzmatrix	reflectance factors coordinates
illuminant	illuminant
observer	observer
RefWhite	White Reference

Value

CIE XYZ coordinates

Author(s)

Jose Gama

Examples

```
RxRyRz2XYZ(c(7.90393, 8.391198, 9.721126))
```

`saturationCIECAM02` *saturation CIECAM 2002*

Description

`saturationCIECAM02` saturation CIECAM 2002.

Usage

```
saturationCIECAM02(M, Q)
```

Arguments

`M`	colorfulness
`Q`	brightness

Value

saturation

Author(s)

Jose Gama

Source

Color by Wikipedians http://www.easyrgb.com/

References

Color by Wikipedians http://www.easyrgb.com/

saturationCIELABEvaLubbe *CIELAB saturation (Eva Lubbe)*

Description

saturationCIELABEvaLubbe CIELAB saturation (chroma normalized by lightness).

Usage

```
saturationCIELABEvaLubbe(L,a,b)
```

Arguments

L	CIELAB L
a	CIELAB a
b	CIELAB b

Value

saturation

Author(s)

Jose Gama

Source

Color by Wikipedians http://www.easyrgb.com/

References

Color by Wikipedians http://www.easyrgb.com/

Examples

```
saturationCIELABEvaLubbe(34.78467, 28.15159, 3.024663)
```

saturationCIELUV *CIELUV/CIELAB saturation*

Description

saturationCIELUV CIELUV/CIELAB saturation.

Usage

```
saturationCIELUV(u, v, un, vn)
```

Arguments

u	CIELAB u
v	CIELAB v
un	CIELAB u neutral
vn	CIELAB v neutral

Value

saturation

Author(s)

Jose Gama

Source

Color by Wikipedians http://www.easyrgb.com/

References

Color by Wikipedians http://www.easyrgb.com/

SmithPokorny2degConeFundamentals1975 *Smith & Pokorny (1975) 2-deg cone fundamentals*

Description

SmithPokorny2degConeFundamentals1975 Smith & Pokorny (1975) 2-deg cone fundamentals based on the CIE Judd-Vos 2-deg CMFs.

Usage

```
SmithPokorny2degConeFundamentals1975
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

L2 L-cone spectral sensitivity, L2(lambda)

M2 M-cone spectral sensitivity, M2(lambda)

S2 S-cone spectral sensitivity, S2(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(SmithPokorny2degConeFundamentals1975)
SmithPokorny2degConeFundamentals1975
```

---

spectra2CCT *Correlated Color Temperature (CCT) from spectra*

Description

`spectra2CCT` Correlated Color Temperature (CCT) from spectra.

Usage

```
spectra2CCT(SPD=NA, isoTempLinesTable=NA,
CIETable = get("ciexyz31", envir = environment()), TCS = get("TCSdata",
envir = environment()))
```

Arguments

`SPD`	light source spd
`isoTempLinesTable`	Iso temperature lines table
`CIETable`	reference data values
`TCS`	spectral reflectance data of 14 color test samples for CRI

Value

Correlated Color Temperature (CCT)

Author(s)

Jose Gama

Source

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf

References

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf

Examples

```
# illuminant A
SPD = illuminants[1:51*2-1,c('wlnm','A')] # every 10 nm
CCT <- spectra2CCT(SPD)
CCT
```

---

spectra2CRIGAIFSCI *CRI, GAI and FSCI from spectra*

Description

`spectra2CRIGAIFSCI` Color Rendering Index (CRI), Gamut Area Index (GAI) and full spectrum index (FSCI) from spectra.

Usage

```
spectra2CRIGAIFSCI(SPD=NA, isoTempLinesTable=NA, CCT=NA,
CIETable = get("ciexyz31", envir = environment()), TCS = get("TCSdata",
envir = environment()))
```

Arguments

`SPD`	light source spd
`isoTempLinesTable`	Iso temperature lines table
`CCT`	Correlated Color Temperature (CCT)
`CIETable`	reference data values
`TCS`	spectral reflectance data of 14 color test samples for CRI

Value

CRI, GAI and FSCI

Author(s)

Jose Gama

Source

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf

References

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf

Examples

```
# illuminant A
## Not run:
SPD = illuminants[1:51*2-1,c('wlnm','A')] # every 10 nm
isoTempLinesTable <- createIsoTempLinesTable(SPD)
CCT <- spectra2CCT(SPD)
spectra2CRIGAIFSCI(SPD, isoTempLinesTable, CCT)
spectra2CRIGAIFSCI(SPD, isoTempLinesTable)
spectra2CRIGAIFSCI(SPD)

## End(Not run)
```

---

spectra2ISObrightness *Diffuse blue reflectance factor (ISO brightness)*

Description

spectra2ISObrightness Diffuse blue reflectance factor (ISO brightness), R457, ISO 2470.

Usage

```
spectra2ISObrightness(spectraIn=NA, wlIn=NA,
RSDmatrix=get("ISObrightnessReflectometerRSD", envir = environment()))
```

Arguments

spectraIn	spectral data
wlIn	wavelength range
RSDmatrix	ISO brightness data

Value

LCHuv coordinates

Author(s)

Jose Gama

Source

ISO board, 2009 ISO 2470-1 : 2009 PAPER, BOARD AND PULPS MEASUREMENT OF DIFFUSE BLUE REFLECTANCE FACTOR PART 1 INDOOR DAYLIGHT CONDITIONS (ISO BRIGHTNESS)

References

ISO board, 2009 ISO 2470-1 : 2009 PAPER, BOARD AND PULPS MEASUREMENT OF DIFFUSE BLUE REFLECTANCE FACTOR PART 1 INDOOR DAYLIGHT CONDITIONS (ISO BRIGHTNESS)

Examples

```
spectra2ISObrightness(MaterialReferenceData[,c( 'BlueSky')],
MaterialReferenceData[,c('wavelength' )])
```

---

spectra2lux *Illuminance (Lux) from spectra*

Description

`spectra2lux` Illuminance (Lux) from spectra.

Usage

```
spectra2lux(spectraIn=NA, ciexyzIn=NA,wlIn=NA, wlInterval=NA)
```

Arguments

`spectraIn`	light source spd
`ciexyzIn`	reference data values
`wlIn`	range of output wavelengths
`wlInterval`	arbitrary wavelength interval to be applied to all series through interpolation

Value

Correlated Color Temperature (CCT)

Author(s)

Jose Gama

Source

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf

References

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf

Examples

```
spectra2lux(MaterialReferenceData[,c('wavelength','BlueSky')])
```

---

spectra2XYZ *convert spectral data to tristimulus values*

Description

spectra2XYZ convert spectral data to tristimulus values.

Usage

```
spectra2XYZ(spectraIn=NA, illuminantIn=NA, ciexyzIn=NA,wlIn=NA, wlInterval=NA)
```

Arguments

spectraIn	spectral data
illuminantIn	illuminant
ciexyzIn	range of illuminant wavelengths
wlIn	range of spectral wavelengths
wlInterval	arbitrary wavelength interval to be applied to all series through interpolation

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Andrew S. Glassner, 1995 Principles of digital image synthesis: Vol. 1 Kaufmann

References

Andrew S. Glassner, 1995 Principles of digital image synthesis: Vol. 1 Kaufmann

Examples

```
spectra2XYZ(MaterialReferenceData[,c('wavelength','BlueSky')])
```

---

sprague *Interpolates an n by w matrix of spectra, sprague*

Description

sprague Interpolates an n by w matrix of spectra, sprague.

Usage

```
sprague(spectra, f)
```

Arguments

spectra	spectral data
f	range of wavelenghts

Value

Interpolated spectral data

Author(s)

Jose Gama

Source

Stephen Westland, 2014 http://www.mathworks.com/matlabcentral/fileexchange/40640-computational-colour-s
content/sprague.m

References

Stephen Westland, 2014 http://www.mathworks.com/matlabcentral/fileexchange/40640-computational-colour-s
content/sprague.m

StearnsStearnscorrection *Stearns and Stearns correction*

Description

StearnsStearnscorrection Stearns and Stearns correction.

Usage

```
StearnsStearnscorrection(P)
```

Arguments

P	XYZ coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Stephen Westland and Caterina Ripamonti, 2004 Computational Colour Science using MATLAB John Wiley & Sons Ltd, pp.35

References

Stephen Westland and Caterina Ripamonti, 2004 Computational Colour Science using MATLAB John Wiley & Sons Ltd, pp.35

Stensby68.Whiteness *Stensby Whiteness*

Description

Stensby68.Whiteness formula was developed by Mr. P. Stensby (formerly employee of J.R. Geigy AG in US.)

Usage

```
Stensby68.Whiteness(LabHunterMatrix)
```

Arguments

`LabHunterMatrix`
: Lab Hunter values for illuminant C

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
Stensby68.Whiteness(c(0.310897, 0.306510, 74.613450))
```

`StockmanMacLeodJohnson10degConeFundamentals1993`

Stockman & Sharpe (2000) 10-deg cone fundamentals

Description

`StockmanMacLeodJohnson10degConeFundamentals1993` Stockman, MacLeod & Johnson (1993) 2-deg cone fundamentals based on the CIE 10-deg CMFs (adjusted to 2-deg).

Usage

```
StockmanMacLeodJohnson10degConeFundamentals1993
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

L10 L-cone spectral sensitivity, L10(lambda)

M10 M-cone spectral sensitivity, M10(lambda)

S10 S-cone spectral sensitivity, S10(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(StockmanMacLeodJohnson10degConeFundamentals1993)
StockmanMacLeodJohnson10degConeFundamentals1993
```

StockmanMacLeodJohnson2degCIEadjConeFundamentals1993

Stockman, MacLeod & Johnson (1993) 2-deg cone fundamentals

Description

`StockmanMacLeodJohnson2degCIEadjConeFundamentals1993` Stockman, MacLeod & Johnson (1993) 2-deg cone fundamentals based on the CIE 10-deg CMFs (adjusted to 2-deg).

Usage

```
StockmanMacLeodJohnson2degCIEadjConeFundamentals1993
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

L2 L-cone spectral sensitivity, L2(lambda)

M2 M-cone spectral sensitivity, M2(lambda)

S2 S-cone spectral sensitivity, S2(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(StockmanMacLeodJohnson2degCIEadjConeFundamentals1993)
StockmanMacLeodJohnson2degCIEadjConeFundamentals1993
```

StockmanMacLeodJohnson2degStilesBurchConeFundamentals1993

Stockman, MacLeod & Johnson (1993) 2-deg fundamentals

Description

`StockmanMacLeodJohnson2degStilesBurchConeFundamentals1993` Stockman, MacLeod & Johnson (1993) 2-deg fundamentals based on the Stiles & Burch 2-deg CMFs.

Usage

```
StockmanMacLeodJohnson2degStilesBurchConeFundamentals1993
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

L2 L-cone spectral sensitivity, L2(lambda)

M2 M-cone spectral sensitivity, M2(lambda)

S2 S-cone spectral sensitivity, S2(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(StockmanMacLeodJohnson2degStilesBurchConeFundamentals1993)
StockmanMacLeodJohnson2degStilesBurchConeFundamentals1993
```

`StockmanSharpe10degCMFS2000` *Stockman & Sharpe (2000) 10-deg cone fundamentals*

Description

`StockmanSharpe10degCMFS2000` Stockman & Sharpe (2000) 10-deg cone fundamentals based on the Stiles & Burch 10-deg CMFs linear 5nm.

Usage

```
StockmanSharpe10degCMFS2000
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

L10 L-cone spectral sensitivity, L10(lambda)

M10 M-cone spectral sensitivity, M10(lambda)

S10 S-cone spectral sensitivity, S10(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(StockmanSharpe10degCMFS2000)
StockmanSharpe10degCMFS2000
```

`StockmanSharpe2degCMFadj2000`
Stockman & Sharpe (2000) 2-deg cone fundamentals

Description

`StockmanSharpe2degCMFadj2000` Stockman & Sharpe (2000) 2-deg cone fundamentals based on the Stiles & Burch 10-deg CMFs (adjusted to 2-deg) linear 5nm.

Usage

```
StockmanSharpe2degCMFadj2000
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

L2 L-cone spectral sensitivity, L2(lambda)

M2 M-cone spectral sensitivity, M2(lambda)

S2 S-cone spectral sensitivity, S2(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(StockmanSharpe2degCMFadj2000)
StockmanSharpe2degCMFadj2000
```

SystemISCCNBS *ISCC-NBS System*

Description

SystemISCCNBS is a table with the ISCC-NBS System data.

Usage

```
SystemISCCNBS
```

Format

This data frame contains the following data:

HueInterval interval of hues in the hue chart defining the elementary block

Hmin minimum ASTM D1535 Hue for the elementary block

Hmax maximum ASTM D1535 Hue for the elementary block

Vmin minimum Value for the elementary block

Vmax maximum Value for the elementary block

Cmin minimum Chroma for the elementary block

Cmax maximum Chroma for the elementary block. Cmax=Inf for some elementary blocks.

Number color number of the elementary block, from 1 to 267

Author(s)

Glenn Davis

References

Color : Universal Language and Dictionary of Names ISCC-NBS Method of Designating Colors and a Dictionary of Color Names Kelly, Kenneth Low Judd, Deane Brewster NBS Special Publication 440 December 1976 Section 13: Color Name Charts, pp. 16-31

Examples

```
data(SystemISCCNBS)
SystemISCCNBS
```

Taube60.Whiteness *Taube Whiteness*

Description

Taube60.Whiteness developed by Mr. Taube (formerly an employee of BASF AG, Germany). It was presented in 1960 and has found it's application mainly in the plastic sector.

Usage

```
Taube60.Whiteness(XYZmatrix, illuminant = "D65", observer = 2, RefWhite
                  = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

XYZmatrix	CIE tristimulus values for illuminant C
illuminant	illuminant
observer	observer
RefWhite	White reference

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
Taube60.Whiteness(XYZ)
```

TCSdata *The spectral reflectance data of 14 color test samples for CRI*

Description

TCSdata is a table with the spectral reflectance data of 14 color test samples for CRI.

Usage

```
TCSdata
```

Format

This data frame contains the following data:

wavelength wavelength (nm)

TCS1 spectral reflectance data for sample 1

TCS2 spectral reflectance data for sample 2

TCS3 spectral reflectance data for sample 3

TCS4 spectral reflectance data for sample 4

TCS5 spectral reflectance data for sample 5

TCS6 spectral reflectance data for sample 6

TCS7 spectral reflectance data for sample 7

TCS8 spectral reflectance data for sample 8

TCS9 spectral reflectance data for sample 9

TCS10 spectral reflectance data for sample 10

TCS11 spectral reflectance data for sample 11

TCS12 spectral reflectance data for sample 12

TCS13 spectral reflectance data for sample 13

TCS14 spectral reflectance data for sample 14

Author(s)

Jose Gama

Source

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf

References

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf

Examples

```
data(TCSdata)
TCSdata
```

`tristimulusMunsell` *434 Munsell colors with tristimulus and CMFs for a few illuminants*

Description

`tristimulusMunsell` is a table with 434 Munsell colors with tristimulus and Color matching functions for illuminants A, C D and S.

Usage

```
tristimulusMunsell
```

Format

This data frame contains the following data:

Munsell Munsell color notation

X.A tristimulus X for illuminant A

Y.A tristimulus Y for illuminant A

Z.A tristimulus Z for illuminant A

x.A CMF x for illuminant A

y.A CMF y for illuminant A

X.C tristimulus X for illuminant C

Y.C tristimulus Y for illuminant C

Z.C tristimulus Z for illuminant C

x.C CMF x for illuminant C

y.C CMF y for illuminant C

X.D tristimulus X for illuminant D

Y.D tristimulus Y for illuminant D

Z.D tristimulus Z for illuminant D

x.D CMF x for illuminant D

y.D CMF y for illuminant D

X.S tristimulus for X illuminant S

Y.S tristimulus for Y illuminant S

Z.S tristimulus for Z illuminant S

x.S CMF x for illuminant S

y.S CMF y for illuminant S

X Munsell painting number

Author(s)

Jose Gama

Source

K. L. Kelley, K. S. Gibson, and D. Nickerson, 1943 "Tristimulus specification of the Munsell Book of Color from spectrophotometric measurements," J. Opt. Soc. Am. 33, 355–376

References

K. L. Kelley, K. S. Gibson, and D. Nickerson, 1943 "Tristimulus specification of the Munsell Book of Color from spectrophotometric measurements," J. Opt. Soc. Am. 33, 355–376

Examples

```
data(tristimulusMunsell)
tristimulusMunsell
```

VosEstevezWalraven2degConeFundamentals1990

Vos, Estévez & Walraven (1990) 2-deg cone fundamentals

Description

`VosEstevezWalraven2degConeFundamentals1990` Vos, Estévez & Walraven (1990) 2-deg fundamentals based on the Stiles & Burch 2-deg CMFs.

Usage

```
VosEstevezWalraven2degConeFundamentals1990
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

L2 L-cone spectral sensitivity, L2(lambda)

M2 M-cone spectral sensitivity, M2(lambda)

S2 S-cone spectral sensitivity, S2(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(VosEstevezWalraven2degConeFundamentals1990)
VosEstevezWalraven2degConeFundamentals1990
```

VosWalraven2degConeFundamentals1971

Vos & Walraven(1971) 2-deg cone fundamentals

Description

`VosWalraven2degConeFundamentals1971` Vos & Walraven(1971) 2-deg cone fundamentals based on the CIE Judd-Vos 2-deg CMFs.

Usage

```
VosWalraven2degConeFundamentals1971
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

L2 L-cone spectral sensitivity, L2(lambda)

M2 M-cone spectral sensitivity, M2(lambda)

S2 S-cone spectral sensitivity, S2(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(VosWalraven2degConeFundamentals1971)
VosWalraven2degConeFundamentals1971
```

`WestlandBlacknessIndex`

Westland, et al. blackness index

Description

`WestlandBlacknessIndex` (Westland, et al., 2006) blackness index.

Usage

```
WestlandBlacknessIndex(CIELabMatrix)
```

Arguments

`CIELabMatrix`	CIELab coordinates

Value

blackness index

Author(s)

Jose Gama

Source

Westland, S.; Cheung, T. L. V.; Lozman, O. R., 2006. A metric for predicting perceptual blackness. 14th Color Imaging Conference Final Program and Proceedings, 14-17.

References

Westland, S.; Cheung, T. L. V.; Lozman, O. R., 2006. A metric for predicting perceptual blackness. 14th Color Imaging Conference Final Program and Proceedings, 14-17.

Examples

```
CIELab<-c(34.78467, 28.15159, 3.024663)
WestlandBlacknessIndex(CIELab)
```

`whitepointsilluminants` *White points of standard illuminants*

Description

`whitepointsilluminants` is a table with White points of standard illuminants.

Usage

```
whitepointsilluminants
```

Format

This data frame contains the following data:

illuminant illuminant

description description

x2 x2

y2 y2

x10 x10

y10 y10

CCT CCT

Author(s)

Jose Gama

Source

Wikipedia, 2014 White points of standard illuminants https://en.wikipedia.org/wiki/Standard_illuminant

References

Wikipedia, 2014 White points of standard illuminants https://en.wikipedia.org/wiki/Standard_illuminant

Examples

```
data(whitepointsilluminants)
whitepointsilluminants
```

`whitepointsRGB` *Primaries for RGB color spaces*

Description

`whitepointsRGB` is a table with primaries for RGB color spaces.

Usage

```
whitepointsRGB
```

Format

This data frame contains the following data:

xRed Primary red x

yRed Primary red y

xGreen Primary green x

yGreen Primary green y

xBlue Primary blue x

yBlue Primary blue y

whitepointilluminant illuminant

gamma gamma

description Color space name

Author(s)

Jose Gama

Source

Wikipedia, 2014 RGB color space https://en.wikipedia.org/wiki/RGB_color_space

References

Wikipedia, 2014 RGB color space https://en.wikipedia.org/wiki/RGB_color_space

Examples

```
data(whitepointsRGB)
whitepointsRGB
```

wlnm2XYZ *Approximates wavelength to CIE tristimulus XYZ*

Description

wlnm2XYZ Approximates wavelength to CIE tristimulus XYZ, by interpolation.

wlnm2xyz Approximates wavelength to CIE xyz, by interpolation.

Usage

```
wlnm2XYZ(wavelength)
```

Arguments

wavelength	wavelength

Value

CIE XYZ

Author(s)

Jose Gama

Examples

```
wlnm2XYZ(555)
```

xFit_1931 *Approximations from wavelengths to XYZ by Wyman et al*

Description

xFit_1931 Approximations from wavelengths to XYZ by Wyman et al.

Usage

```
xFit_1931(wave)
```

Arguments

wave	wavelenght data

Value

XYZ X, Y or Z coordinate

Author(s)

Jose Gama

Source

Chris Wyman Peter-Pike Sloan Peter Shirley, 2013 Simple Analytic Approximations to the CIE XYZ Color Matching Functions Journal of Computer Graphics Techniques Vol. 2, No. 2

References

Chris Wyman Peter-Pike Sloan Peter Shirley, 2013 Simple Analytic Approximations to the CIE XYZ Color Matching Functions Journal of Computer Graphics Techniques Vol. 2, No. 2

Examples

```
xFit_1931(555)
yFit_1931(555)
zFit_1931(555)
```

---

xy2CCT.HernandezAndres

convert from chromaticity coordinates to correlated color temperature (Hernandez Andres)

Description

`xy2CCT.HernandezAndres` convert from chromaticity coordinates to correlated color temperature (approximation) by Hernandez Andres.

Usage

```
xy2CCT.HernandezAndres(x,y)
```

Arguments

x	x coordinates
y	y coordinates

Value

CCT (Hernandez Andres)

Author(s)

Jose Gama

Source

Hernandez-Andres, et al. 1999 "Calculating correlated color temperatures across the entire gamut of daylight and skylight chromaticities" https://en.wikipedia.org/wiki/Color_temperature

References

Hernandez-Andres, et al. 1999 "Calculating correlated color temperatures across the entire gamut of daylight and skylight chromaticities" https://en.wikipedia.org/wiki/Color_temperatures

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
xy2CCT.HernandezAndres(xyY[1],xyY[2])
```

---

xy2CCT.McCamy *convert from chromaticity coordinates to correlated color temperature*

Description

`xy2CCT.McCamy` convert from chromaticity coordinates to correlated color temperature (approximation).

Usage

```
xy2CCT.McCamy(x,y)
```

Arguments

x	x coordinates
y	y coordinates

Value

CCT McCamy

Author(s)

Jose Gama

Source

C. S. McCamy, 1992 "Correlated color temperature as an explicit function of chromaticity coordinates" Color Research & Application Volume 17, Issue 2, pages 142–144

References

C. S. McCamy, 1992 "Correlated color temperature as an explicit function of chromaticity coordinates" Color Research & Application Volume 17, Issue 2, pages 142–144

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
xy2CCT.McCamy(xyY[1],xyY[2])
```

`xyChromaticitiesVos1978`

x, y coordinates transformed to Judd (1951) x', y' system

Description

`xyChromaticitiesVos1978` x, y coordinates transformed to Judd (1951) x', y' system.

Usage

```
xyChromaticitiesVos1978(x,y)
```

Arguments

x	x coordinate
y	y coordinate

Value

x', y' coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
xyChromaticitiesVos1978(xyY[1],xyY[2])
```

xyY2XYZ *Convert CIE CMF to XYZ*

Description

xyY2XYZ Converts CIE CMF to XYZ.

Usage

```
xyY2XYZ(xyYmatrix)
```

Arguments

xyYmatrix	CIE CMFs

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

References

Logicol S.r.l., 2014 EasyRGB color search engine http://www.easyrgb.com/

Examples

```
xyY2XYZ(c(0.310897, 0.306510, 74.613450))
```

XYZ2BVR *convert from XYZ coordinates to BVR*

Description

XYZ2BVR convert from XYZ coordinates to BVR.

Usage

```
XYZ2BVR(XYZmatrix)
```

Arguments

`XYZmatrix`	XYZ coordinates

Value

BVR coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
XYZ2BVR(XYZ)
```

`XYZ2CCT.Robertson` *convert from chromaticity coordinates to correlated color temperature (Robertson)*

Description

`XYZ2CCT.Robertson` convert from chromaticity coordinates to correlated color temperature (approximation) by Robertson.

Usage

```
XYZ2CCT.Robertson(X, Y, Z)
```

Arguments

`X`	X coordinates
`Y`	Y coordinates
`Z`	Z coordinates

Value

CCT (Robertson)

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ2CCT.Robertson( 0.11465380, 0.08391198, 0.08222077 )
```

XYZ2HunterLab *convert from XYZ coordinates to Hunter Lab coordinates*

Description

XYZ2HunterLab convert from XYZ coordinates to Hunter Lab coordinates.

Usage

```
XYZ2HunterLab(XYZmatrix,illuminant='D65',observer=2,
RefWhite=get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

XYZmatrix	XYZ coordinates
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

Hunter Lab coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
XYZ2HunterLab(XYZ)
```

XYZ2Lab *convert from XYZ coordinates to CIE Lab coordinates*

Description

XYZ2Lab convert from XYZ coordinates to CIE Lab coordinates.

Usage

```
XYZ2Lab(XYZmatrix,illuminant='D65',observer=2,
    RefWhite=get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

XYZmatrix	XYZ coordinates
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

CIE Lab coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
CIELMatrix<-XYZ2Lab(XYZ*100)
```

XYZ2LMS *Convert XYZ coordinates to LMS*

Description

XYZ2LMS Converts XYZ coordinates to LMS.

Usage

```
XYZ2LMS(XYZmatrix)
```

Arguments

XYZmatrix	XYZ coordinates

Value

LMS coordinates

Author(s)

Jose Gama

Source

Francoise Vienot, Hans Brettel,John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

References

Francoise Vienot, Hans Brettel,John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

Examples

```
XYZ<-c(21.43162, -3.20673, 120.6259)
XYZ2LMS(XYZ)
```

XYZ2Luv *convert from XYZ coordinates to CIE Luv coordinates*

Description

XYZ2Luv convert from XYZ coordinates to CIE Luv coordinates.

Usage

```
XYZ2Luv(XYZmatrix,illuminant='D65',observer=2,
RefWhite=get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

XYZmatrix	XYZ coordinates
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

CIE Luv coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
CIELuvMatrix<-XYZ2Luv(XYZ*100)
```

XYZ2RGB *convert from XYZ coordinates to CIE RGB coordinates*

Description

XYZ2RGB convert from XYZ coordinates to CIE RGB coordinates.

Usage

```
XYZ2RGB(XYZmatrix, illuminant = "D65", observer = 2, RefWhite
                 = get("XYZperfectreflectingdiffuser", envir = environment()),
                 RGBModel = "sRGB", RefWhiteRGB = get("whitepointsRGB",
                 envir = environment()), gamma = NA,
                 RefWhiteIllum = get("XYZperfectreflectingdiffuser",
                 envir = environment()), CAT = "Bradford",
                 CATarray = get("ChromaticAdaptation", envir = environment()))
```

Arguments

XYZmatrix	XYZ coordinates
illuminant	illuminant
observer	observer
RefWhite	Reference White
RGBModel	RGB model
RefWhiteRGB	white points for RGB model
gamma	gamma
RefWhiteIllum	Reference perfect reflecting diffuser
CAT	CAT
CATarray	Chromatic Adaptation

Value

CIE RGB coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
XYZ2RGB(XYZ)
```

XYZ2RxRyRz *convert from XYZ to three filter measurements (reflectance factors)*

Description

XYZ2RxRyRz convert from XYZ to three filter measurements (reflectance factors).

Usage

```
XYZ2RxRyRz(XYZmatrix=NA,illuminant='C', observer=2,
RefWhite=get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

XYZmatrix	XYZ matrix
illuminant	illuminant
observer	observer
RefWhite	White Reference

Value

CIE XYZ coordinates

Author(s)

Jose Gama

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
XYZ2RxRyRz(XYZ)
```

XYZ2xyY *convert from XYZ coordinates to xyY coordinates*

Description

XYZ2xyY convert from XYZ coordinates to xyY coordinates.

Usage

```
XYZ2xyY(XYZmatrix,illuminant='D65',observer=2,
RefWhite=get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

XYZmatrix	XYZ coordinates
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

xyY coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
XYZ2xyY(XYZ)
```

XYZ2Yuv *convert from XYZ coordinates to Yuv coordinates*

Description

XYZ2Yuv convert from XYZ coordinates to Yuv coordinates.

Usage

```
XYZ2Yuv(XYZmatrix)
```

Arguments

XYZmatrix	XYZ coordinates

Value

Yuv coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
XYZ2Yuv(XYZ)
```

XYZMoonSpencer1945 *Approximations from wavelengths to XYZ by Moon & Spencer*

Description

XYZMoonSpencer1945 Approximations from wavelengths to XYZ by Moon & Spencer.

Usage

```
XYZMoonSpencer1945(wavelen)
```

Arguments

wavelen	wavelenght data

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Chris Wyman Peter-Pike Sloan Peter Shirley, 2013 Simple Analytic Approximations to the CIE XYZ Color Matching Functions Journal of Computer Graphics Techniques Vol. 2, No. 2

References

Chris Wyman Peter-Pike Sloan Peter Shirley, 2013 Simple Analytic Approximations to the CIE XYZ Color Matching Functions Journal of Computer Graphics Techniques Vol. 2, No. 2

Examples

```
XYZMoonSpencer1945(555)
```

XYZperfectreflectingdiffuser
Perfect reflecting diffuser data

Description

XYZperfectreflectingdiffuser table with perfect reflecting diffuser data.

Format

This data frame contains the following columns:

Illuminant Illuminant

X2 CIE tristimulus X 2 deg observer

Y2 CIE tristimulus Y 2 deg observer

Z2 CIE tristimulus Z 2 deg observer

X10 CIE tristimulus X 10 deg observer

Y10 CIE tristimulus Y 10 deg observer

Z10 CIE tristimulus Z 10 deg observer

Author(s)

Jose Gama

Source

Wyszecki, G. and Stiles, W.S., 1982 Color Science: Concepts and Methods, Quantitative data and formulae. John Wiley & Sons.

References

Wyszecki, G. and Stiles, W.S., 1982 Color Science: Concepts and Methods, Quantitative data and formulae. John Wiley & Sons.

Examples

```
data(XYZperfectreflectingdiffuser)
str(XYZperfectreflectingdiffuser)
```

XYZTannenbaum1974 *Approximations from wavelengths to XYZ by Tannenbaum 1974*

Description

XYZTannenbaum1974 Approximations from wavelengths to XYZ by Tannenbaum 1974.

Usage

```
XYZTannenbaum1974(wavelen)
```

Arguments

wavelen	wavelenght data

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Chris Wyman Peter-Pike Sloan Peter Shirley, 2013 Simple Analytic Approximations to the CIE XYZ Color Matching Functions Journal of Computer Graphics Techniques Vol. 2, No. 2

References

Chris Wyman Peter-Pike Sloan Peter Shirley, 2013 Simple Analytic Approximations to the CIE XYZ Color Matching Functions Journal of Computer Graphics Techniques Vol. 2, No. 2

Examples

```
XYZTannenbaum1974(555)
```

XYZtoRGB *convert from XYZ coordinates to RGB*

Description

XYZtoRGB convert from XYZ coordinates to RGB.

Usage

```
XYZtoRGB(xc, yc, zc, ColorSystem = c(0.67, 0.33, 0.21, 0.71,
                0.14, 0.08, 0.31, 0.316))
```

Arguments

xc	XYZ X coordinates
yc	XYZ Y coordinates
zc	XYZ Z coordinates
ColorSystem	RGB Color System data

Value

RGB coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZtoRGB(0.11465380, 0.08391198, 0.08222077)
```

Y2MunsellV *CIE XYZ "Y" to Munsell value*

Description

Y2MunsellV CIE XYZ "Y" to Munsell value.

Usage

```
Y2MunsellV(Y)
```

Arguments

Y	Y data

Value

Munsell value

Author(s)

Jose Gama

Source

ASTM, 2008 ASTM Standard D1535-08

References

ASTM, 2008 ASTM Standard D1535-08

Examples

```
Y2MunsellV(5)
```

Y2MunsellVtable1D1535 *CIE XYZ "Y" to Munsell value formula, based on the ASTM Standard D1535-08*

Description

Y2MunsellVtable1D1535 NLSQ regression for obtaining similar results to table 1 from ASTM Standard D1535-08.

Usage

```
Y2MunsellVtable1D1535(Y)
```

Arguments

Y	Y data

Value

Munsell value

Author(s)

Jose Gama

Source

ASTM, 2008 ASTM Standard D1535-08

References

ASTM, 2008 ASTM Standard D1535-08

Examples

```
Y2MunsellVtable1D1535(5)
```

YCbCr2RGB *Convert YCbCr coordinates to RGB*

Description

YCbCr2RGB Converts YCbCr coordinates to RGB.

Usage

```
YCbCr2RGB(YPbPrmatrix)
```

Arguments

YPbPrmatrix	YPbPr coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
YCbCr2RGB(c(18165.831, -625.617, 6558.790))
```

`YIQ2RGB` *Convert YIQ coordinates to RGB*

Description

`YIQ2RGB` Converts YIQ coordinates to RGB.

Usage

```
YIQ2RGB(YIQmatrix)
```

Arguments

`YIQmatrix`	YIQ coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
YIQ2RGB(c(82.949, 31.51965, 17.58261))
```

YPbPr2RGB *Convert YCbCr coordinates to RGB*

Description

YPbPr2RGB Converts YCbCr coordinates to RGB.

Usage

```
YPbPr2RGB(YPbPrmatrix)
```

Arguments

YPbPrmatrix	YPbPr coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
YPbPr2RGB(c(82.949000, -2.792896, 29.280320))
```

Yuv2Luv *Convert Yuv coordinates to Luv*

Description

Yuv2Luv Converts Yuv coordinates to Luv.

Usage

```
Yuv2Luv(Yu.v.matrix, illuminant = "D65", observer = 2,
           RefWhite = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

Yu.v.matrix	Yuv matrix
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

Luv coordinates

Author(s)

Jose Gama

Examples

```
Yuv <- c(0.08391198, 0.2830965, 0.4661789)
Yuv2Luv(Yuv)
```

YUV2RGB *Convert YUV coordinates to RGB*

Description

YUV2RGB Converts YUV coordinates to RGB.

Usage

```
YUV2RGB(YUVmatrix)
```

Arguments

YUVmatrix	YUV coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Examples

```
YUV2RGB(c(164.898, -5.584651, 58.53939))
```

Yuv2xy *convert from Yuv coordinates to xy coordinates*

Description

Yuv2xy convert from Yuv coordinates to xy coordinates.

Usage

```
Yuv2xy(Yu.v.matrix)
```

Arguments

Yu.v.matrix	Yuv coordinates

Value

xy coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
Yuv <- c(0.08391198, 0.2830965, 0.4661789)
Yuv2xy(Yuv)
```

Yuv2XYZ *convert from Yuv coordinates to XYZ coordinates*

Description

Yuv2XYZ convert from Yuv coordinates to XYZ coordinates.

Usage

```
Yuv2XYZ(Yu.v.matrix)
```

Arguments

Yu.v.matrix	Yuv coordinates

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
Yuv <- c(0.08391198, 0.2830965, 0.4661789)
Yuv2XYZ(Yuv)
```

Yxy2CIE1960UCS *convert from Yxy coordinates to CIE 1960 UCS*

Description

Yxy2CIE1960UCS convert from Yxy coordinates to CIE 1960 UCS.

Usage

```
Yxy2CIE1960UCS(Yxymatrix)
```

Arguments

Yxymatrix	Yxy coordinates

Value

CIE 1960 UCS

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
Yxy2CIE1960UCS(xyY[c(3,1,2)])
```

Yxy2Yuv *convert from Yxy coordinates to Yuv coordinates*

Description

Yxy2Yuv convert from Yxy coordinates to Yuv coordinates.

Usage

```
Yxy2Yuv(Yxymatrix)
```

Arguments

Yxymatrix	Yxy coordinates

Value

Yuv coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
Yxy2Yuv(xyY[c(3,1,2)])
```

Index