

## Modul:Color contrast

---

### Vorlage:Lua

This module is used primarily by

- [Vorlage:TI](#)
- [Vorlage:TI / Vorlage:TI](#)
- [Vorlage:TI](#)
- [Vorlage:TI](#)
- [Vorlage:TI](#)
- [Vorlage:TI](#)

It is also used for tracking within

- [Module:Navbox](#)
- [Module:Userbox](#)
- [Module:Episode list](#)

and for documentation in

- [Module:College color](#)

The formulas used are [stated in WCAG 2.x specifications](#). **WCAG** is the main guideline for creating accessible interfaces on the web.

## Usage

---

To use this module, you may use one of the above listed templates or invoke the module directly

- To compute relative luminescence:  
`{{ColorToLum|color}}` or `{{#invoke:Color contrast|lum|color}}`
  - To compute a contrast ratio between two colors:  
`{{Color contrast ratio|color1|color2|error=?}}` or `{{#invoke:Color contrast|ratio|color1|color2|error=?}}`
  - To determine which of two colors (color2a and color2b) has the greater contrast ratio with a particular color (color1):  
`{{Greater color contrast ratio|color1|color2a|color2b}}` or `{{#invoke:Color contrast|greatercontrast|color1|color2a|color2b}}`
  - To compute the contrast ratio between the background and text colors specified in a css style string:  
`{{#invoke:Color contrast|styleratio|css style statement string|default background color|default text color}}`
-



```
--
-- This module implements
-- {{Color contrast ratio}}
-- {{Greater color contrast ratio}}
-- {{ColorToLum}}
-- {{RGBColorToLum}}
--
local p = {}
local HTMLcolor = mw.loadData( 'Module:Color contrast/colors' )

local function sRGB (v)
    if (v <= 0.03928) then
        v = v / 12.92
    else
        v = math.pow((v+0.055)/1.055, 2.4)
    end
    return v
end

local function rgbdec2lum(R, G, B)
    if ( 0 <= R and R < 256 and 0 <= G and G < 256 and 0 <= B and B < 256 ) then
        return 0.2126 * sRGB(R/255) + 0.7152 * sRGB(G/255) + 0.0722 * sRGB(B/255)
    else
        return ''
    end
end

local function hsl2lum(h, s, l)
    if ( 0 <= h and h < 360 and 0 <= s and s <= 1 and 0 <= l and l <= 1 ) then
        local c = (1 - math.abs(2*l - 1))*s
        local x = c*(1 - math.abs( math.fmod(h/60, 2) - 1) )
        local m = l - c/2

        local r, g, b = m, m, m
        if( 0 <= h and h < 60 ) then
            r = r + c
            g = g + x
        elseif( 60 <= h and h < 120 ) then
            r = r + x
            g = g + c
        elseif( 120 <= h and h < 180 ) then
            g = g + c
            b = b + x
        elseif( 180 <= h and h < 240 ) then
            g = g + x
            b = b + c
        elseif( 240 <= h and h < 300 ) then
            r = r + x
            b = b + c
        elseif( 300 <= h and h < 360 ) then
            r = r + c
            b = b + x
        end
        return rgbdec2lum(255*r, 255*g, 255*b)
    else
        return ''
    end
end

local function color2lum(c)
    if (c == nil) then
```

```
        return ''
    end

    -- html '#' entity
    c = c:gsub("&#35;", "#")

    -- whitespace
    c = c:match( '^%s*(.)[%s;]*$' )

    -- unstrip nowiki strip markers
    c = mw.text.unstripNoWiki(c)

    -- lowercase
    c = c:lower()

    -- first try to look it up
    local L = HTMLcolor[c]
    if (L ~= nil) then
        return L
    end

    -- convert from hsl
    if mw.usttring.match(c, '^hsl%([%s]*[0-9][0-9%.]*[%s]*,[%s]*[0-9][0-9%.]*%9
        local h, s, l = mw.usttring.match(c, '^hsl%([%s]*([0-9][0-9%.]*)[%s]*
        return hsl2lum(tonumber(h), tonumber(s)/100, tonumber(l)/100)
    end

    -- convert from rgb
    if mw.usttring.match(c, '^rgb%([%s]*[0-9][0-9]*[%s]*,[%s]*[0-9][0-9]*[%s]*
        local R, G, B = mw.usttring.match(c, '^rgb%([%s]*([0-9][0-9]*)[%s]*
        return rgbdec2lum(tonumber(R), tonumber(G), tonumber(B))
    end

    -- convert from rgb percent
    if mw.usttring.match(c, '^rgb%([%s]*[0-9][0-9%.]*%[%s]*,[%s]*[0-9][0-9%.]*
        local R, G, B = mw.usttring.match(c, '^rgb%([%s]*([0-9][0-9%.]*)%[%s]*
        return rgbdec2lum(255*tonumber(R)/100, 255*tonumber(G)/100, 255*
    end

    -- remove leading # (if there is one) and whitespace
    c = mw.usttring.match(c, '^[%s#]*([a-f0-9]*)[%s]*$')

    -- split into rgb
    local cs = mw.text.split(c or '', '')
    if( #cs == 6 ) then
        local R = 16*tonumber('0x' .. cs[1]) + tonumber('0x' .. cs[2])
        local G = 16*tonumber('0x' .. cs[3]) + tonumber('0x' .. cs[4])
        local B = 16*tonumber('0x' .. cs[5]) + tonumber('0x' .. cs[6])

        return rgbdec2lum(R, G, B)
    elseif ( #cs == 3 ) then
        local R = 16*tonumber('0x' .. cs[1]) + tonumber('0x' .. cs[1])
        local G = 16*tonumber('0x' .. cs[2]) + tonumber('0x' .. cs[2])
        local B = 16*tonumber('0x' .. cs[3]) + tonumber('0x' .. cs[3])

        return rgbdec2lum(R, G, B)
    end

    -- failure, return blank
    return ''
end

-- This exports the function for use in other modules.
-- The colour is passed as a string.
```



```
function p._lum(color)
    return color2lum(color)
end

function p._greatercontrast(args)
    local bias = tonumber(args['bias'] or '0') or 0
    local css = (args['css'] and args['css'] ~= '') and true or false
    local v1 = color2lum(args[1] or '')
    local c2 = args[2] or '#FFFFFF'
    local v2 = color2lum(c2)
    local c3 = args[3] or '#000000'
    local v3 = color2lum(c3)
    local ratio1 = -1;
    local ratio2 = -1;
    if (type(v1) == 'number' and type(v2) == 'number') then
        ratio1 = (v2 + 0.05)/(v1 + 0.05)
        ratio1 = (ratio1 < 1) and 1/ratio1 or ratio1
    end
    if (type(v1) == 'number' and type(v3) == 'number') then
        ratio2 = (v3 + 0.05)/(v1 + 0.05)
        ratio2 = (ratio2 < 1) and 1/ratio2 or ratio2
    end

    if css then
        local c1 = args[1] or ''
        if mw.ustring.match(c1, '^[-A-Za-z0-9][-A-Za-z0-9][-A-Za-z0-9]$') or
            mw.ustring.match(c1, '^[-A-Za-z0-9][-A-Za-z0-9][-A-Za-z0-9]')
            c1 = '#' .. c1
        end
        if mw.ustring.match(c2, '^[-A-Za-z0-9][-A-Za-z0-9][-A-Za-z0-9]$') or
            mw.ustring.match(c2, '^[-A-Za-z0-9][-A-Za-z0-9][-A-Za-z0-9]')
            c2 = '#' .. c2
        end
        if mw.ustring.match(v3, '^[-A-Za-z0-9][-A-Za-z0-9][-A-Za-z0-9]$') or
            mw.ustring.match(v3, '^[-A-Za-z0-9][-A-Za-z0-9][-A-Za-z0-9]')
            c3 = '#' .. c3
        end
        return 'background-color:' .. c1 .. '; color:' .. ((ratio1 > 0) and
    end

    return (ratio1 > 0) and (ratio2 > 0) and ((ratio1 + bias > ratio2) and c2
end

function p._ratio(args)
    local v1 = color2lum(args[1])
    local v2 = color2lum(args[2])
    if (type(v1) == 'number' and type(v2) == 'number') then
        -- v1 should be the brighter of the two.
        if v2 > v1 then
            v1, v2 = v2, v1
        end
        return (v1 + 0.05)/(v2 + 0.05)
    else
        return args['error'] or '?'
    end
end

function p._styleratio(args)
    local style = (args[1] or ''):lower()
    local bg, fg = 'white', 'black'
    local lum_bg, lum_fg = 1, 0

    if args[2] then
        local lum = color2lum(args[2])
```

```
        if lum ~= '' then bg, lum_bg = args[2], lum end
    end
    if args[3] then
        local lum = color2lum(args[3])
        if lum ~= '' then fg, lum_fg = args[3], lum end
    end

    local slist = mw.text.split(mw.ustring.gsub(mw.ustring.gsub(style or '',
for k = 1,#slist do
    local s = slist[k]
    local k,v = s:match( '^[%s]*([^:]-):([^:]-)[%s;]*$' )
    k = k or ''
    v = v or ''
    if (k:match('^[%s]*(background)[%s]*$') or k:match('^[%s]*(backgr
        local lum = color2lum(v)
        if( lum ~= '' ) then bg, lum_bg = v, lum end
    elseif (k:match('^[%s]*(color)[%s]*$')) then
        local lum = color2lum(v)
        if( lum ~= '' ) then bg, lum_fg = v, lum end
    end
end
if lum_bg > lum_fg then
    return (lum_bg + 0.05)/(lum_fg + 0.05)
else
    return (lum_fg + 0.05)/(lum_bg + 0.05)
end
end

--[[
Use {{#invoke:Color contrast|somecolor}} directly or
{{#invoke:Color contrast}} from a wrapper template.

Parameters:
-- |1=          - required; A color to check.
--]]
function p.lum(frame)
    local color = frame.args[1] or frame:getParent().args[1]
    return p._lum(color)
end

function p.ratio(frame)
    local args = frame.args[1] and frame.args or frame:getParent().args
    return p._ratio(args)
end

function p.styleratio(frame)
    local args = frame.args[1] and frame.args or frame:getParent().args
    return p._styleratio(args)
end

function p.greatercontrast(frame)
    local args = frame.args[1] and frame.args or frame:getParent().args
    return p._greatercontrast(args)
end

return p
```