

## Version 1.0, September 2012

### Release notes (Important changes from 0.9):

- Piping of input pictures into evalglare possible.
- All view types (except parallel view) are allowed.
- Extended check of "valid" view options integrated.
- The threshold factor of -b is changed from 500 to 100.
- Peak extraction is default now (-y). For deactivation use -x .
- Calculation of vertical illuminance only (-V)
- Calculate disability glare (for age factor of 1, according to CIE equation)
- Cut-Out field of view according to Guth (Guth, Light and Comfort, Industrial Medicine and Surgery, November 1958): (-G type, type=1: total field of view, type=2: field of view seen by both eyes)
- Correction of low light scenes (is applied automatically).
- Age correction (Option: -a age).
- Add direction vector in detailed output for each glare source

### Short description of evalglare, Version v0.9, July 2008

evalglare determines and evaluates glare sources within a 180° fish-eye-image, given in the RADIANCE image format (.pic or .hdr).

The image should be rendered as fish eye (e.g. using the -vta or -vth option) using 180° for the horizontal and vertical view angle (-vv =180, -vh=180). Due to performance reasons of the evalglare code, the image should be smaller than 800x800 pixels.

In the first step, the program uses a given threshold to determine all glare sources. Three different threshold methods are implemented. The recommended method is to define a task area by -t or -T option. In this (task) area the average luminance is calculated. Each pixel, exceeding this value multiplied by the -b factor [default=5] is treated as a potential glare source. The other two methods are described below [see -b].

In the second step the program tries to merge glare source pixels to one glare source, when they are placed nearby each other. This merging is performed in-between a search area, given by an opening angle (-r, default =0.2 in radiant).

If a check file is written (-c fname), the detected glare sources will be colored to different colors where the rest of the image is set to gray. The luminance values of all pixels are kept to the initial value. The color is chosen by chance, no significance is given by the color.

Luminance peaks can be extracted to separate glare sources by using the -y or -Y value option (default since version v0.9c). Default value (-y) is 50000 cd/m<sup>2</sup>, can be changed by using -Y value.

A smoothing option (-s) counts initial non-glare source pixels to glare sources, when they are surrounded by a glare source.

The program calculates the daylight glare probability (DGP) as well as other glare indexes (dgi, ugr, vcp, cgi) to the standard output. The DGP describes the fraction of disturbed persons, caused by glare from daylight (range 0...1). Values lower than 0.2 are out of the range of the user acceptance tests, where the program is based on and should be interpreted carefully.

In the case of non-180° images, an external measured illuminance value can be provided by using the -i or -I option. The use of the -I option enables the filling up of images, which are horizontally cut.

If the option -d is used, all found glare sources and their position, size and luminance values are printed to the standard output, too. The last line gives following values:

1. dgp, 2. average luminance of image, 3. vertical eye illuminance, 4. background luminance, 5. direct vertical eye illuminance, 6. dgi, 7. ugr, 8. vcp, 9. cgi, 10. average luminance of all glare sources, 11. sum of solid angles of all glare sources 12. Veiling luminance (disability glare) 13. x-direction of glare source 14. y-direction of glare source 15. z-direction of glare source

The program is based on the studies from J. Christoffersen and J. Wienold (see "Evaluation methods and development of a new glare prediction model for daylight environments with the use of CCD cameras and RADIANCE", Energy and Buildings, 2006).

More details can be also found in following dissertation: J. Wienold, "Daylight glare in offices", Fraunhofer IRB, 2010. URL for download:

<http://publica.fraunhofer.de/eprints/urn:nbn:de:0011-n-1414579.pdf>

usage:

```
evalglare [-s] [-y] [-Y value] [-a age] [-b factor] [-c checkfile] [-t xpos ypos angle] [-T xpos ypos angle]
          [-d] [-r angle] [-i Ev] [-I Ev yfill_max y_fill_min ] [-v] [-V] [-g type] [-G type] [-vf viewfile]
          [-vtt ] [-vv vertangle] [-vh horzangle] hdrfile
```

or

```
hdr|evalglare [-s] [-y] [-Y value] [-a age] [-b factor] [-c checkfile] [-t xpos ypos angle]
              [-T xpos ypos angle] [-d] [-r angle] [-i Ev] [-I Ev yfill_max y_fill_min ] [-v] [-V] ] [-g type]
              [-G type] [-vf viewfile]
              [-vtt ] [-vv vertangle] [-vh horzangle]
```

Options:

-a age	Initiate age correction for dgp. age $\geq 20$ .
-b factor	Threshold factor, if factor $> 100$ , it is used as constant threshold in $\text{cd}/\text{m}^2$ , regardless if a task position is given or not if factor is $\leq 100$ and a task position is given, this factor multiplied by the average task luminance will be used as threshold for detecting the glare sources if factor is $\leq 100$ and no task position is given, this factor multiplied by the average luminance in the entire picture will be used as threshold for detecting the glare sources, default value=5.
-c fname	writes a checkfile in the RADIANCE picture format
-d	enables detailed output (default: disabled)
-g type	cut field of view according to Guth, write checkfile specified by -c and exit without any glare evaluation. type=1: total field of view type=2: field of view seen by both eyes
-G type	cut field of view according to Guth, perform glare evaluation. type=1: total field of view type=2: field of view seen by both eyes

- i Ev                   The vertical illuminance is measured externally. This value will be used for calculating the dgp.
  
- l Ev y\_max y\_min    The vertical illuminance is measured externally. This value will be used for calculating the dgp. Below y\_min and above y\_max, the picture is filled up by the last known value. This option should be used, when the provided picture is cut horizontally.
  
- r angle             search radius (angle in radiant) between pixels, where evalglare tries to merge glare source pixels to the same glare source (default value: 0.2 radiant)
  
- s                    enables smoothing function (default: disabled)
- t xpos ypos angle   definition of task position in x and y coordinates, and its opening angle in radiant
  
- T xpos ypos angle   same as -t, except that the task area is colored bluish in the checkfile
- v                    show version of evalglare and exit
- V                    Just calculate the vertical illuminance and exit
- x                    disable peak extraction
- y                    enables peak extraction (default: enabled)
- Y value             enables peak extraction with value as threshold for extracted peaks

In case, the view settings within the image are missing or are not valid (e.g. after the use of pcompos or pcomb), the view options can be set by command line options. As soon as view options are set within the command line, view options within the image are ignored. The view options are implemented according to the RADIANCE definition (please read man page of rpict for details):

- vtt                   Set view type to t. (for fish-eye views, please use -vta or -vth preferably)
- vf viewfile           Get view parameters from file.
- vv val                Set the view vertical size to val.
- vh val                Set the view horizontal size to val.

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