

Short description of evalglare, Version v0

evalglare determines and evaluates glare sources within a 180° fish-eye-picture, given in the RADIANCE picture format.

The picture should be rendered as angular fish eye (using the -vta option) using at least 180° for the horizontal and vertical view angle (-vv >=180, -vh>=180). Due to performance reasons of the version v0, the picture 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.

Luminance peaks can be extracted to separate glare sources by using the -y or -Y value option. Default value (-y) is 50000 cd/m², 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). The actual version does not restrict the range. This could lead in extreme bright scenes to values larger than 1, which should be interpreted as 100% disturbed persons. 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.

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

1. dgp, 2. average luminance of picture, 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

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*" submitted to Energy and Buildings, 2005

usage:

evalglare [-s] [-y] [-Y value] [-b factor] [-c checkfile] [-t xpos ypos angle] [-T xpos ypos angle] [-d] [-r angle] picfile

Options:

-s	enables smoothing function (default: disabled)
-d	enables detailed output (default: disabled)
-y	enables peak extraction (default: disabled)
-Y value (default: disabled)	enables peak extraction with value as threshold for extracted peaks
-c fname	writes a checkfile in the RADIANCE picture format
-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
-b factor	Threshold factor, if factor >500, it is used as constant threshold in cd/m ² , regardless if a task position is given or not if factor is <= 500 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 <= 500 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=4.
-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)

The evalglare program was developed by Jan Wienold at the Fraunhofer Institute for Solar Energy Systems in Freiburg, Germany. The author would like to thank C. Reetz for his generous help and his support of providing libraries for the program. The EU Commission supported this work as part of the EU project "Energy and Comfort Control for Building management systems" (ECCO-Build, Contract N°: ENK6-CT-2002-00656).