Evalglare – A new RADIANCE-based tool to evaluate daylight glare in office spaces

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Background

Within a European project (ECCO-build, contract no. ENK6-CT-2002-00656) user assessments are done in order to develop new glare ratings for daylight glare in offices. The first results of these tests clearly show, that the existing glare indices have only low correlations with the users' answers. The main reasons for that, is that the existing methods had been mainly developed for artificial lighting with some late adaptations for the daylight case. Another reason is, that only very few test persons for their development had been used.

For the development of the new rating (or index) more than 100 test persons are used at two different locations (Freiburg, Germany and Copenhagen, Denmark).

Main features

The program automatically detects glare sources within an +- 180° fish-eye scene. Three different threshold methods to detect "glare zones" are actually implemented:

1. Fixed luminance value.

2. A multiplier of the average luminance.

3. A multiplier of the average task luminance. The task area (location and solid angle) can be submitted by an option.

Nearby pixels exceeding the threshold are combined to a glare zone. A search radius (in steradian) can be submitted by an option.
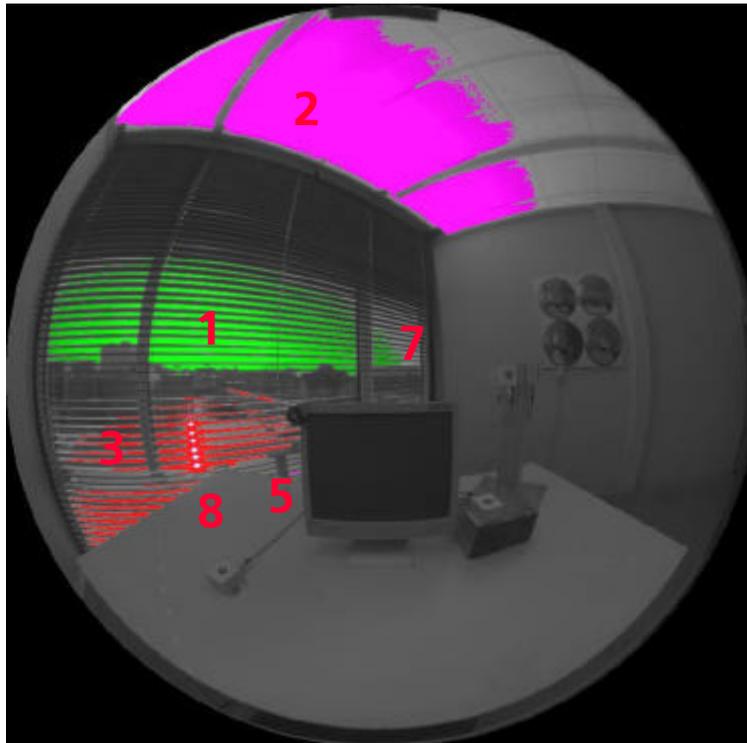
An optional smoothing function can be initiated. Pixels with lower luminance as the threshold are counted to the respective glare source, if they are located within one.

An optional extraction of "high peaks" within a glare source to an extra can be provided to the program.

A special feature is the optional provision of a check-picture. In this picture the detected glare sources are coloured (the rest is automatically in greyscale), without changing the luminance values. This option is very useful to proof the chosen options.

All detected glare sources can be written optionally to a text file.

Example

This example shows a picture of a luminance camera converted to the pic-format and evaluated by *evalglare*. The smoothing option is not used here, but extraction of the peaks (glare source no. 8).

Below the (optional) output of *evalglare* is shown. This output is still not final, since the development of the new index is still ongoing. The headings mean:
No : Number of glare source (gs)
pixels: Number of pixels of gs
L_s: Average luminance of gs
Omega_s: solid angle of gs
Posindex: position index
Lv: weighted average luminance
L_t: task luminance
E_vert: vertical illuminance

No	pixels	x-pos	y-pos	L_s	Omega_s	Posindx	L_v	L_t	E_vert
1	14472	216.564907	442.473736	13107.75979	0.209413	2.144232	7755.061928	3142.938458	9772.462088
2	46459	368.149613	664.07898	9525.377624	0.58812	16	7755.061928	3142.938458	9772.462088
3	5485	180.177804	305.483578	11745.91399	0.075856	1.000051	7755.061928	3142.938458	9772.462088
4	5	270.206071	291.401041	6269.334165	0.000076	1.000051	7755.061928	3142.938458	9772.462088
5	17	301.300419	291.001381	7674.734499	0.000264	1.000051	7755.061928	3142.938458	9772.462088
6	1	306	365	6197.875	0.000016	1.000051	7755.061928	3142.938458	9772.462088
7	315	395.792346	416.896021	6440.339508	0.005135	1.188712	7755.061928	3142.938458	9772.462088
8	163	196.383179	317.815929	573283.0132	0.002351	1.000051	7755.061928	3142.938458	9772.462088

Status and availability

Evalglare is still in a experimental status since the user tests are still ongoing and new data influence the new glare index.

A first version is planned to be available in mid 2005 for free download at ISE Webserver (www.ise.fraunhofer.de/radiance).