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Heuristic driven inverse reflector design

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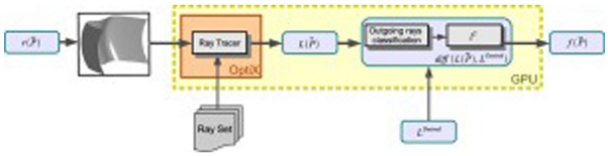

This paper presents a global optimization algorithm specifically tailored for inverse reflector design problems. In such problems, the goal is to obtain a reflector shape that produces a light distribution as close as possible to a user-provided one. The optimization is an iterative process where each step evaluates the difference between the current reflector illumination and the desired one. We propose a tree-based stochastic method that drives the optimization process, using some heuristic rules, to reach a minimum below a user-provided threshold that satisfies the requirements. When we are close to the solution, we resort to the Hooke and Jeeves method, to reach the minimum faster. Extending our previous work Mas et al. (2010), we show that our method reaches a solution in fewer steps than most other classic optimization methods, and also avoids many local minima. The method has been tested on a real case study based on European road lighting safety regulations.

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