Evaluation in Approximate Global Illumination Algorithms

About the research centre or Inria department

The Inria Sophia Antipolis - Méditerranée center counts 37 research teams and 9 support departments. The center’s staff (about 600 people including 400 Inria employees) is composed of scientists of different nationalities (250 foreigners of 50 nationalities), engineers, technicians and administrators. 1/3 of the staff are civil servants, the others are contractual. The majority of the research teams at the center are located in Sophia Antipolis and Nice in the Alpes-Maritimes. Six teams are based in Montpellier and a team is hosted by the computer science department of the University of Bologna in Italy. The Center is a member of the University and Institution Community (ComUE) “Université Côte d’Azur (UCA)”.

Context

There are currently several very effective global illumination algorithms that manage to simulate the majority of significant visual phenomena (e.g., Georgiev et al.), however they are far from real time. On the other end of the spectrum, there are real-time global illumination solutions (e.g., McGuire et al.) that usually achieve very approximate solutions, but at interactive or real-time framerates, and often with remarkable visual quality. These solutions are typically built on light probes or virtual point lights, that can be seen as a sampling of path space.

We will first analyze error in the different steps of these approximate algorithms, possibly modelling the error with statistical tools that handle uncertainty (Smith). This will require careful analysis starting with simple configurations, moving up to more complex cases. We will investigate the effect of discretization, both spatial and directional, and quantify the effect on the accumulated error, using statistical methods or alternatively data-driven learning-based methods.

Bibliography

- Georgiev et al., Light transport simulation with vertex connection and merging. ACM Trans. Graph., 31(6), 192-1.

Assignment

Research activities (bibliography, initial research exploration) for the topic above.

Main activities

See above.

Skills

Good knowledge of Computer Graphics, knowledge of Computer Vision desirable, good knowledge of C++ and OpenGL/GLSL and equivalent.

Benefits package

- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave
- Flexible working hours
- Sports facilities

Remuneration

From 2900 euros gross monthly (according to experience)