Detecting and Correcting Inconsistencies for Radiance Field Capture

(Masters 2 or Pre-Doc internship)

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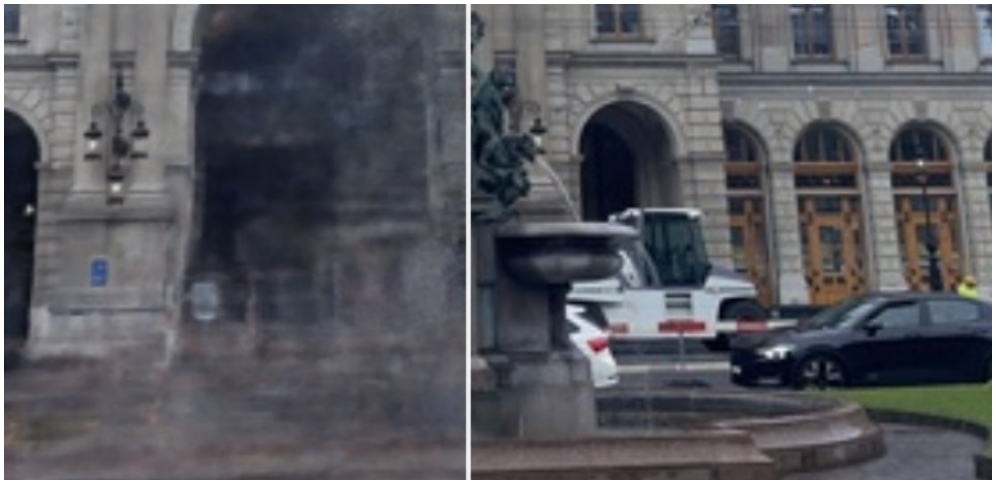

Figure 1: Moving objects in scenes can cause degraded visual quality (source: https://rwn17.github.io/nerf-on-the-go). The project aims to solve this in an on the fly scenario.

Context and goal

Radiance field reconstruction methods such as Neural Radiance Fields (NeRFs [Mildenhall et al. 2020] and 3D Gaussian Splatting (3DGS) [Kerbl et al. 2023] (developed at GRAPHDECO) have enabled high-quality scene capture and novel view synthesis, but they generally assume static environments. Dynamic or non-rigid changes, such as doors opening or objects being displaced during scanning, introduce severe artifacts, especially in real-time pipelines for on-the-fly reconstruction [Meuleman et al. 2025]. Addressing these violations of the static scene assumption is crucial for extending radiance-field methods to more realistic capture scenarios.

Approach

This project aims to develop an algorithm to automatically detect, rectify and (where possible) track inconsistencies caused by object movement between scans. Potential strategies include leveraging learned motion detection within neural features, integrating detection into the underlying tracking and feature-matching pipeline, or employing consensus rendering techniques [Violante et al. 2025] to harmonize multi-view predictions. Beyond correction, the system should also track and preserve multiple scene states, allowing representations that capture both the full temporal evoluation of scene configurations in a unified framework.

Work environment and requirements

The internship will take place at Inria Sophia Antipolis in the GRAPHDECO group (http://team.inria.fr/graphdeco) (the inventors of 3D Gaussian Splatting).

Candidates should be passionate about computer graphics and neural rendering methods, and have strong programming and mathematical skills. Knowledge in one or more of computer graphics, geometry processing and machine learning, experience in python, pytorch, cuda, C++, real-time rendering techniques, path-tracing (knowledge of mitsuba3 is a plus), OpenGL and GLSL on the graphics side are desirable.

How to apply

Applicants should either be Masters (5th year) students for an internship, or if applying for a pre-doc, they should already have a Masters degree in Computer Science, specialized in Computer Graphics and/or Computer Vision. Please email George.Drettakis@inria.fr with your CV, motivation letter and your transcripts for the last 2-3 years of study.

References

[Kerbl et al. 23] Kerbl, Bernhard, Georgios Kopanas, Thomas Leimkühler, and George Drettakis. "3D gaussian splatting for real-time radiance field rendering." *ACM Transactions on Graphics (ToG)* 42, no. 4 (2023): 1-14. https://repo-sam.inria.fr/fungraph/3d-gaussian-splatting/

[Meuleman et al 2025] Meuleman, A., Shah, I., Lanvin, A., Kerbl, B., & Drettakis, G. (2025). On-the-fly Reconstruction for Large-Scale Novel View Synthesis from Unposed Images. *ACM Transactions on Graphics (ToG)* 44, no. 4.

[Mildenhall et al 2020] Mildenhall, B., Srinivasan, P. P., Tancik, M., Barron, J. T., Ramamoorthi, R., & Ng, R. (2020). NeRF: Representing Scenes as Neural Radiance Fields for View Synthesis. ECCV .

[Violante et al. 2025] Violante, N., Meuleman, A., Gauthier, A., Durand, F., Groueix, T., & Drettakis, G. (2025). Splat and Replace: 3D Reconstruction with Repetitive Elements. *SIGGRAPH Conference Papers*.