ARIA
APPLIED RESEARCH IN ACTION

Automating Rotoscoping in Videos with NeRF Priors

Are NeRFs the new greenscreen?

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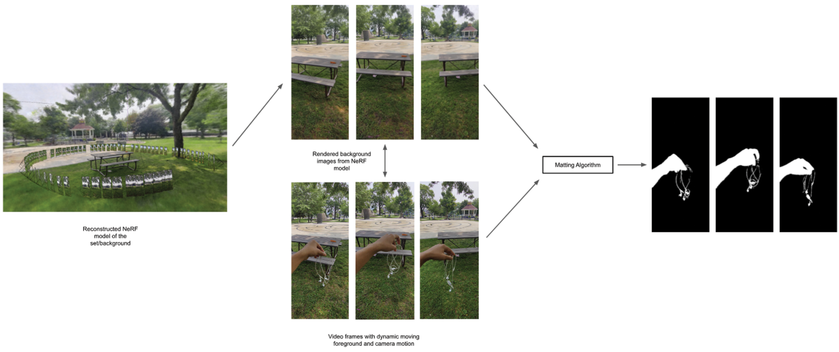

PROJECT SUMMARY

Rotoscoping is a vital technique in visual effects, allowing seamless integration of live-action and CGI elements. It involves tedious manual labor where artists trace elements (actors, props, etc.) frame-by-frame, creating clean foreground-background separation. Automatic rotoscoping has been studied in academia under a synonymous problem called image matting, where given an image the goal is to estimate the foreground and background color, along with the blending alpha value at each pixel such that the matting equation is satisfied:

Observed Color = α(Foreground) + (1 − α)(Background)

This is an under-constrained problem with three equations and seven unknowns. To tackle this, existing techniques utilize additional priors in the form of trimaps [1], background images [2], and even language [3], often producing remarkable results. However, their use in visual effects is limited due to the inherent variations and artistic effects in movie shots like defocus blur, motion blur, rapid camera motion, ultra-high resolutions of the imagery along with the need for really fine-grained matting.

In this work, we explore the possibility of using Neural Radiance Fields (NeRFs) [4] as a viable prior for matting to mitigate some of the challenges specific to visual effects shots.

REFERENCES

[1] Forte, Marco, and François Pitié. "$ F $, $ B $, Alpha Matting." arXiv preprint arXiv:2003.07711 (2020).
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[3] Li, Jizhizi, Jing Zhang, and Dacheng Tao. "Referring image matting." Proceedings of the IEEE/CVF conference on computer vision and pattern recognition. 2023.
[4] Mildenhall, B., Srinivasan, P. P., Tancik, M., Barron, J. T., Ramamoorthi, R., & Ng, R. (2021). Nerf: Representing scenes as neural radiance fields for view synthesis. Communications of the ACM, 65(1), 99-106.

DNEG

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