Progressively Optimized Local Radiance Fields for Robust View Synthesis Supplementary Material

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https://localrf.github.io/

Codebases. We use the following code releases for our implementation and evaluations:

- NeRF++ [9]: https://github.com/Kai-46/nerfplusplus
- Mega-NeRF [8]: https://github.com/cmusatyalab/mega-nerf
- Mip-NeRF360 [1]: https://github.com/google-research/multinerf
- SCNeRF [3]: https://github.com/POSTECH-CVLab/SCNeRF
- BARF [4]: https://github.com/chenhsuanlin/bundle-adjusting-NeRF
- Nerfacto [6]: https://github.com/nerfstudio-project/nerfstudio/
- TensoRF [2]: https://github.com/apchenstu/TensoRF
- COLMAP [7]: https://github.com/colmap/colmap.git

Sampling details. When rendering a ray, we get half of the samples uniformly in depth in $[0.05, 1.05[$ and half uniformly in inverse depth in $[1.05, 1000[$. We use TensoRF [2]'s automatic number of sample determination and divide the results by two for faster training when radiance fields are centered around the camera poses. We set the last sample's opacity to 1 to mitigate artifacts in regions with less coverage in the input trajectory.

Link to video stabilization. By smoothing the camera path, we achieve much smoother stabilization than 2D methods such as FuSta [5] as shown in the y-t slice and animation in Figure 1.

Figure 1. **Stabilization comparison.** By smoothing the camera path, we achieve more aggressive stabilization than 2D methods: our y-t slice is more consistent and our video is smoother. Please use Adobe Reader to see the animation by clicking the figure.

Algorithm 1: Our optimization scheme.

$j \leftarrow 1$; /* The first radiance fields index */
$p \leftarrow 1$;
$q \leftarrow 5$; /* Start with the first five frames */
$[R|t]_{p..q} \leftarrow \mathbb{1}$; /* Initialize poses as identity */
$\theta_j \leftarrow$ `initializeRF` () ; /* Initialize the first local radiance field */
while $q < P$ **do**
  while $t_q < 1$ & $q < P$ **do**
    $q \leftarrow q + 1$;
    $[R|t]_q \leftarrow [R|t]_{q-1}$; /* Append a pose at the end of the trajectory */
    `optimize` $([R|t]_{p..q}, \theta_j)$; /* Optimize poses and radiance field */
  end
  `optimize` $([R|t]_{p..q}, \theta_j)$; /* Refine poses and radiance field */
  if $q < P$ **then**
    $j \leftarrow j + 1$;
    $\theta_j \leftarrow$ `initializeRF` () ; /* Create a new local radiance field */
    $\mathbf{t}_j \leftarrow t_q$; /* Centered around the last pose */
    $p \leftarrow q - 30$; /* Stop considering the first frames */
  end
end

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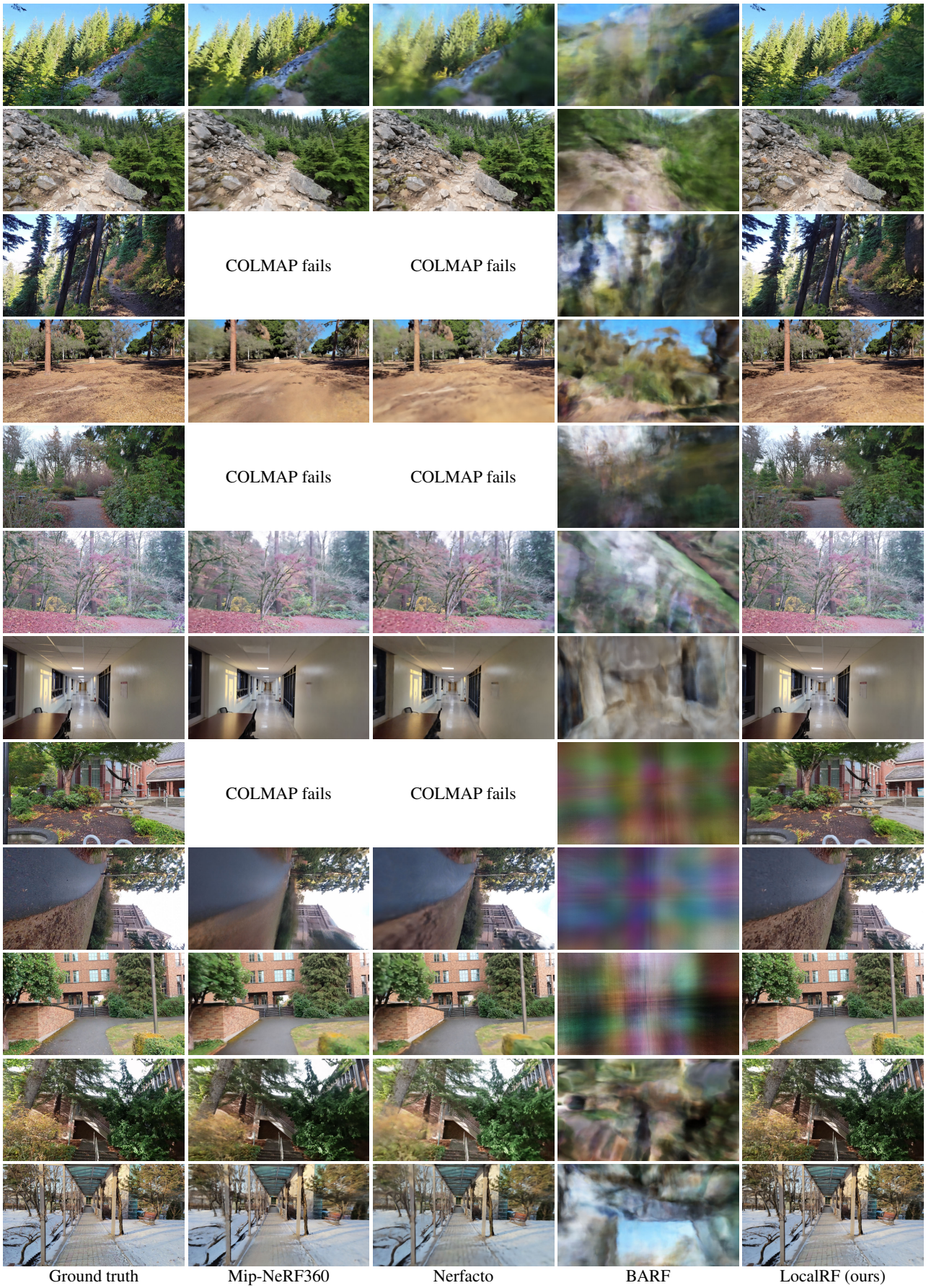

Figure 2. **Novel view synthesis results on the STATIC HIKES dataset.**