Casual Indoor HDR Radiance Capture from Omnidirectional Images

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INTRODUCTION

● Capturing radiance of a scene crucial for AR/VR apps
● Need special equipment to capture HDR images and takes lot of time
● Predict HDR light probes at novel locations from casually captured LDR panoramas.

PREPROCESS

● Capture LDR panoramas using Rico ThetaZ
● Generate masks and remove subject
● Estimate camera poses using OpenSFM

TRAIN

● Estimate HDR panoramas using LDR2HDR module
● Train PanoHDR-NeRF module to predict HDR panoramas at novel viewpoints

INFER

● For a novel camera viewpoint, infer HDR light probes

RESULTS - Virtual Test Object Relit Shows Dynamic Range

● Comparison with other baselines and methods.
● NeRF++ cant predict HDR Radiance. NeRF-LDR2HDR has flickering artifacts.

LDR2HDR MODULE

● LNet architecture trained on Laval Indoor Dataset
● Domain Gap cause diff. sensor for train and captured data
● Finetuned on 78 HDR captured panoramas
● Relight a small scene with HDR lightprobes and take MSE loss on rendered image

Pano_HDR-NeRF

● Scene as a HDR Radiance Field. Predict radiance and density
● Decompose into foreground and background
● Spherical sampling for omnidirectional images

● NeRF loss between predicted log radiance \( \hat{E} \) and GT log radiance \( E \) for set of all rays poses \( \mathcal{R}(P) \).

Training in log space is more stable.