# Continuous Levels of Detail for Light Field Networks

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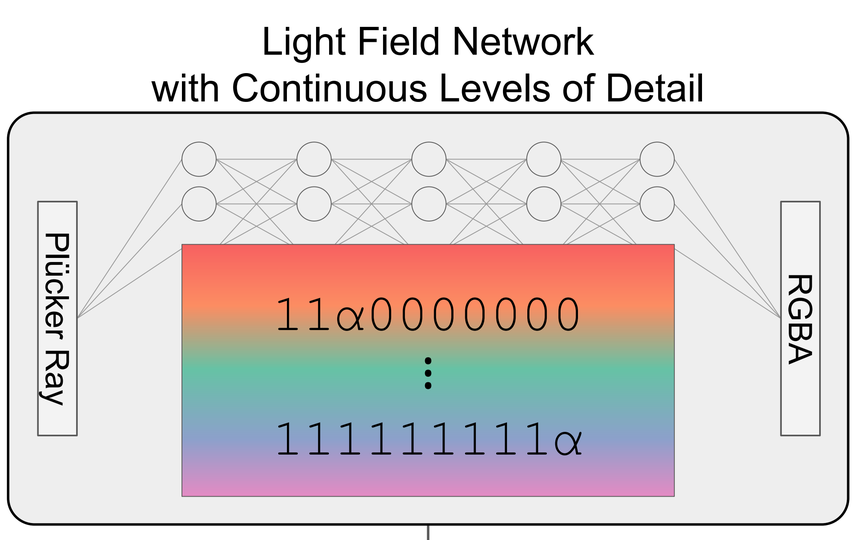
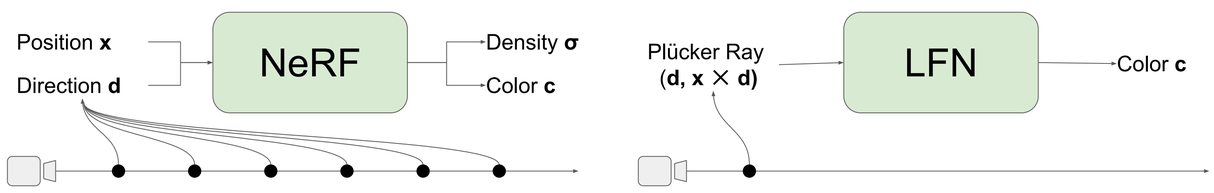
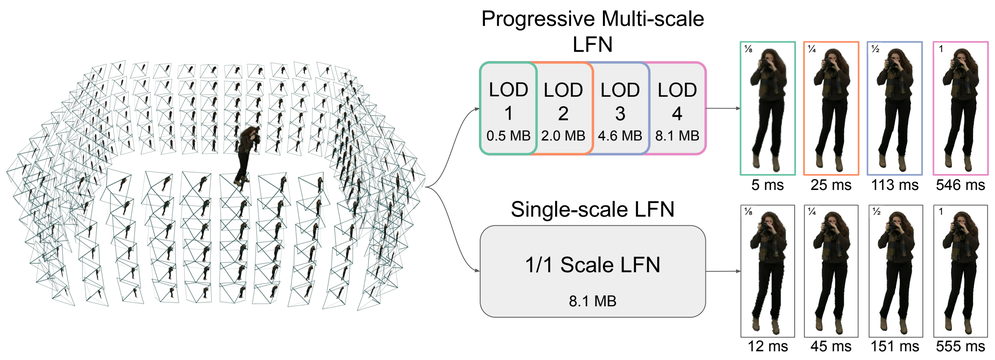



## Introduction

- Neural fields enable a compact photo-realistic representation of 3D scenes by encoding them into neural networks.
- Light Field Networks (LFNs), proposed by Sitzmann et al. in 2021, can represent 3D objects and render them in real-time without volume rendering by directly predicting the color for each ray or pixel.



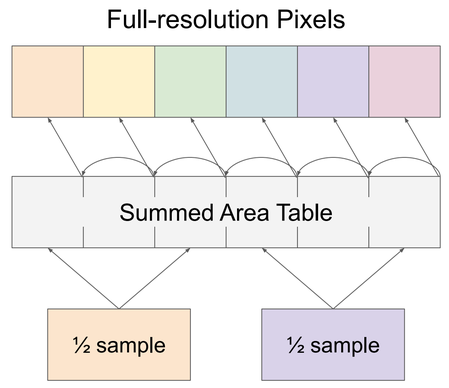

- For computer graphics applications, levels of detail (LODs) provide anti-aliasing and more efficient rendering of objects at different scales.
- In prior work, discrete LODs enable LFNs to be progressively streamed and to render at four scales: 1, ½, ¼, and ⅛.



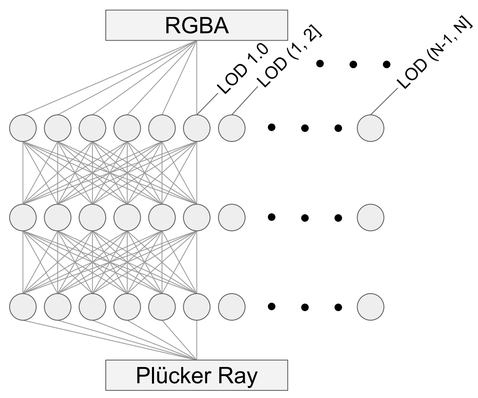

Progressive Multi-Scale Light Field Networks (3DV 2022)

## Method

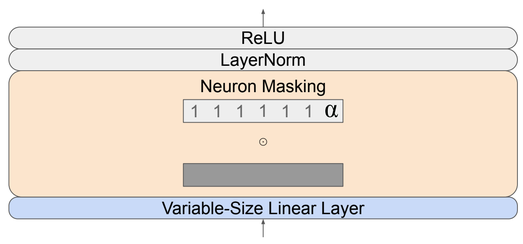
We propose to combine the following techniques to achieve continuous levels of detail:



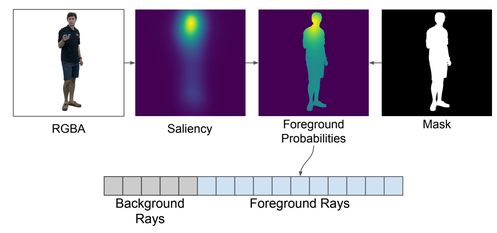

Summed-area tables allow for arbitrary scale and position sampling at training time.




Variable-size layers enable arbitrary size execution with hundreds of performance levels.

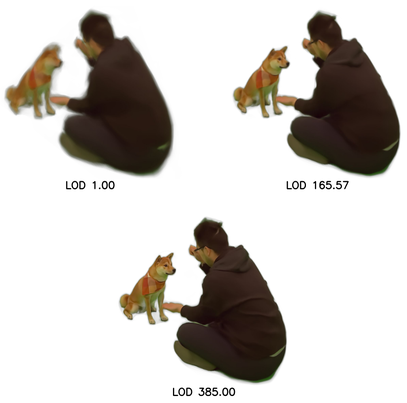



Neuron masking is used to continuously interpolate between neural network sizes.

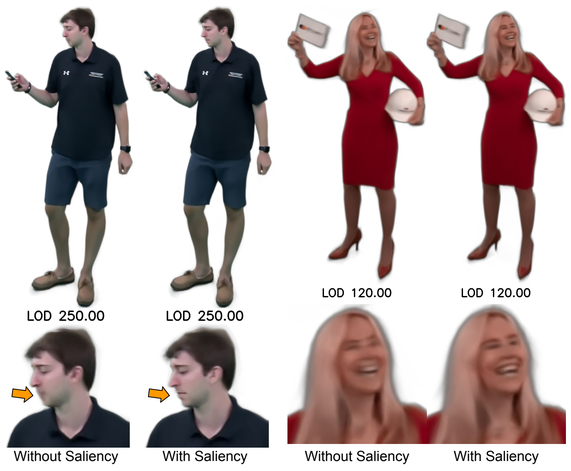



Saliency-based importance sampling helps salient regions resolve at earlier LODs.

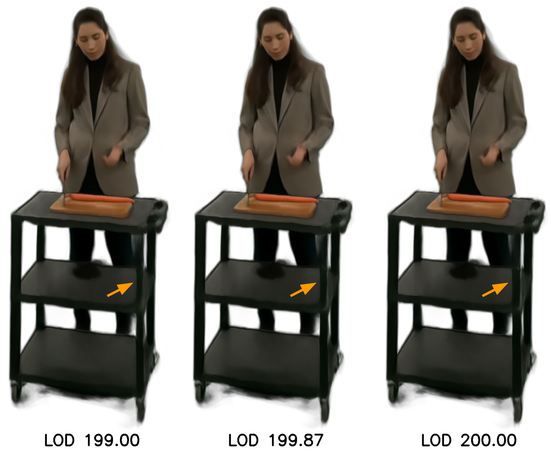
## Experimental Results



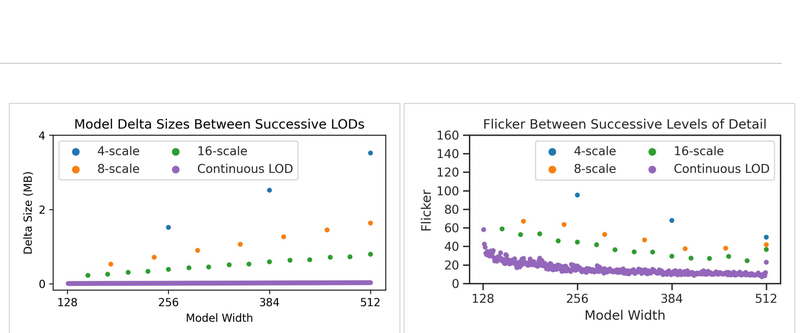

We can now render at any arbitrary LOD.



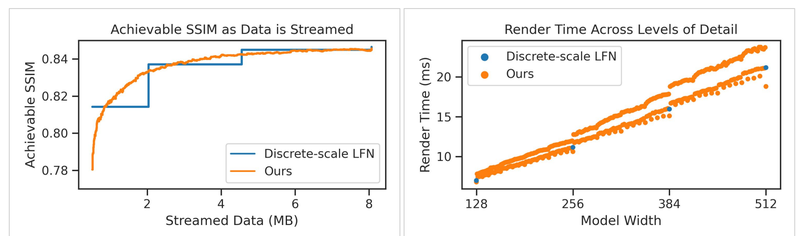

Face details resolve at lower LODs with saliency-based sampling.




Details emerge gradually with fractional LODs.




We observe smaller model delta sizes and less flickering during transitions.




We observe smoother scaling between available data, performance, and quality.

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