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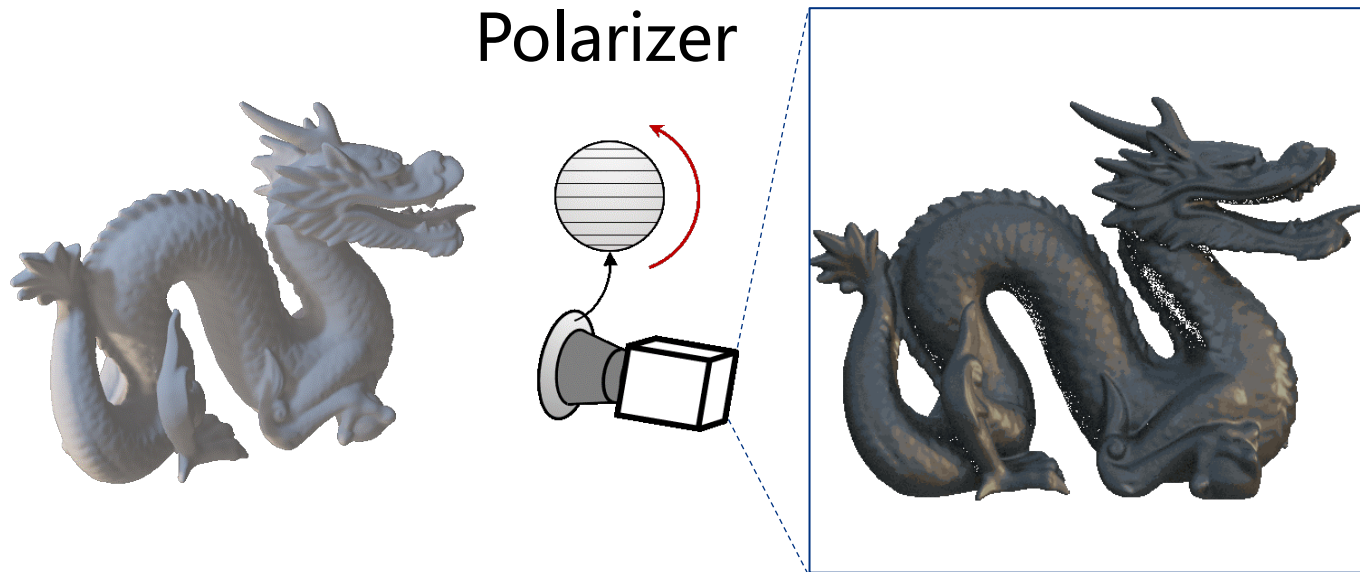
SfPUeL: Shape from Polarization under Unknown Environment Light

Youwei Lyu¹ Heng Guo¹ Kailong Zhang¹ Si Li¹ Boxin Shi²

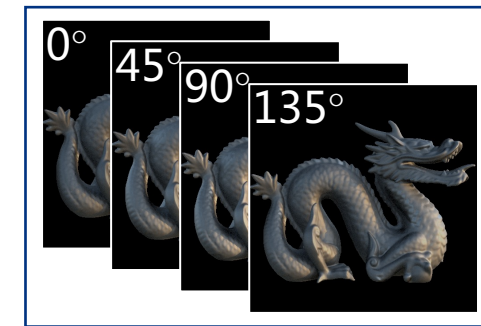
December 2024 @ NeurIPS 2024

Presenter: Youwei Lyu

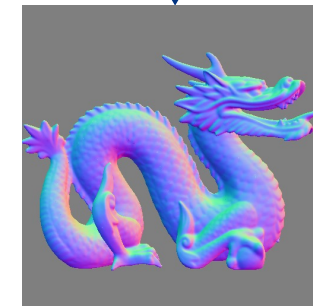
Shape from Polarization (SfP) Setup



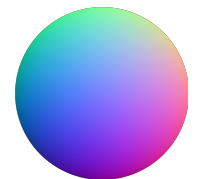
Polarization images



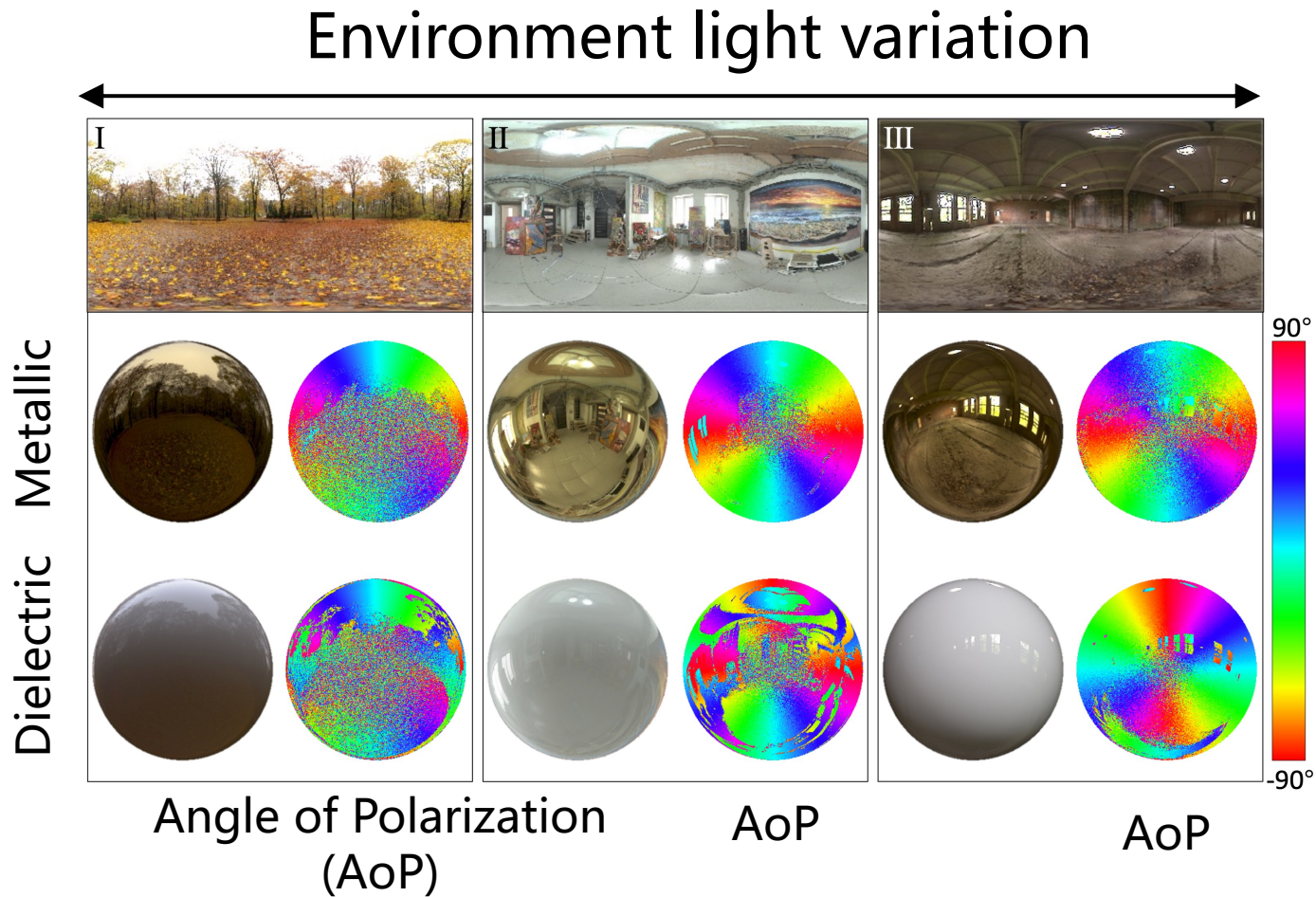
SfP



Normal map



Challenges of SfP



Sunny sky



Contributions

- Propose SfPUEL, a transformer-based framework to solve shape from polarization under general unknown environment light via global context feature extraction ;
- Jointly utilize polarimetric cues and the representative pretrained priors from PS to solve SfP for the first time;
- Solve SfP together with metallic and dielectric material segmentation, which further boosts surface normal prediction.

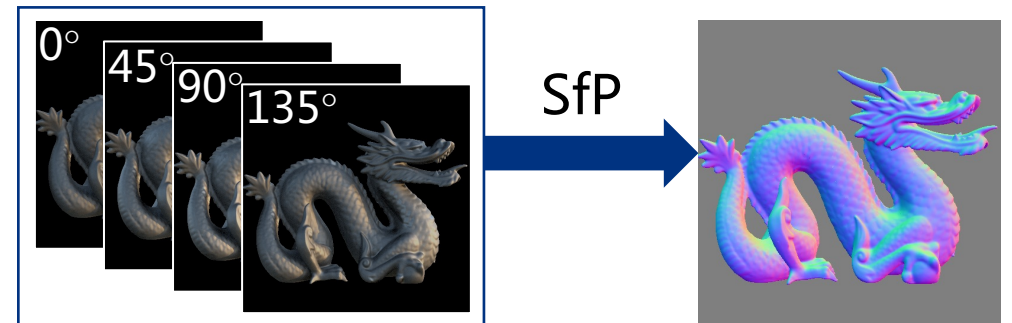
Integrate Pretrained PS Priors to SfP

Photometric Stereo (PS)

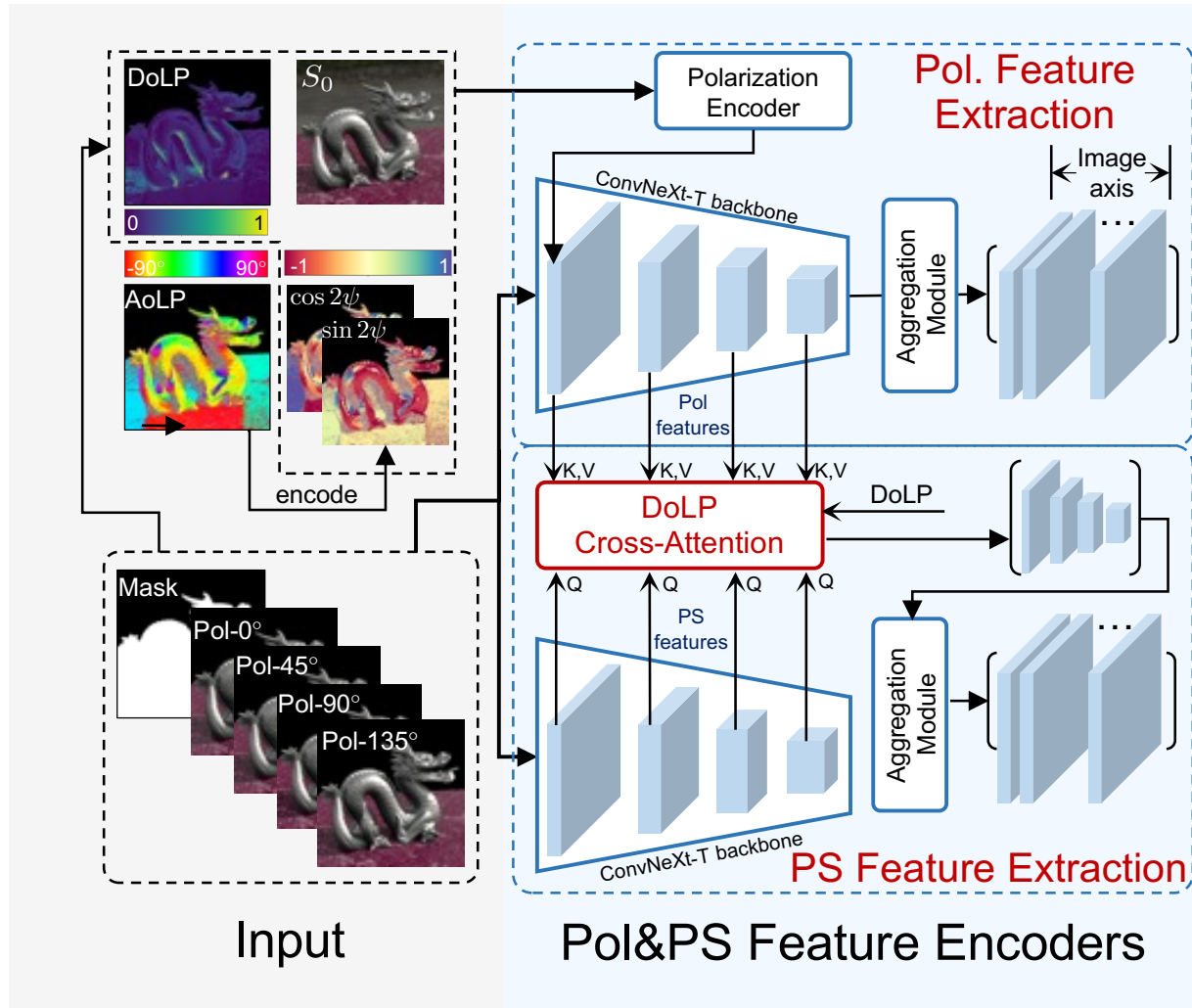
Shape from Polarization (SfP)

Consistency of PS & SfP

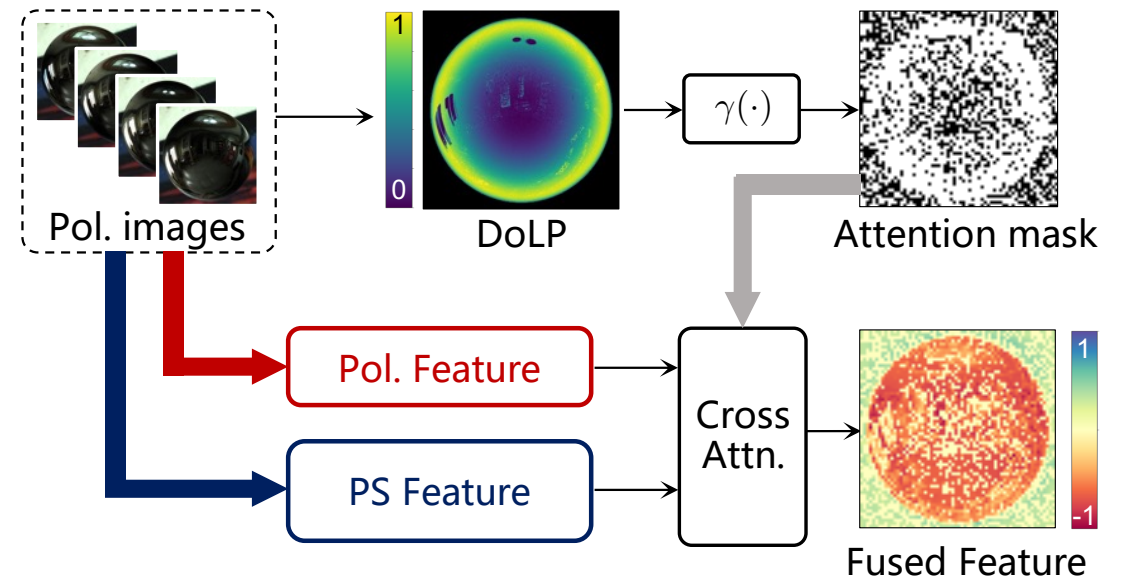
Estimate normal by radiance variations
at the same pixel position



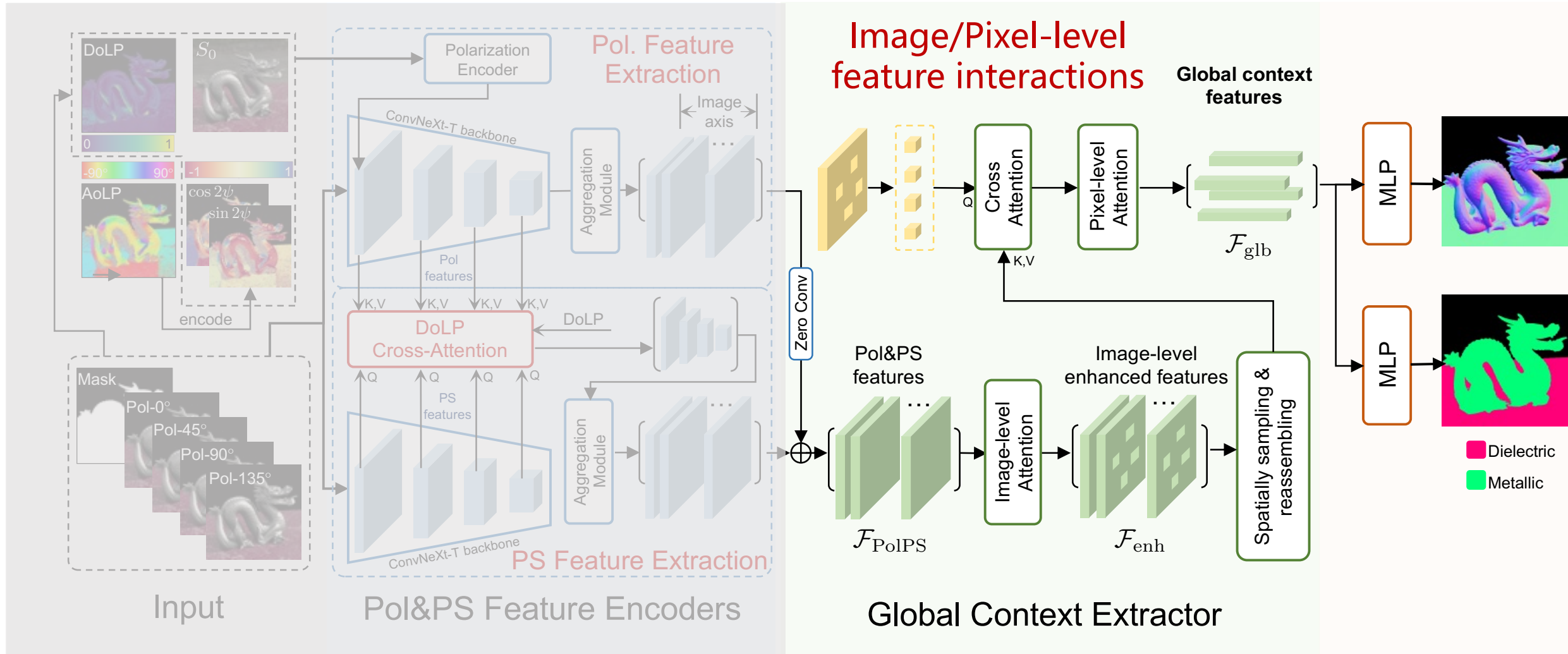
Network Architecture



Integrate Pretrained PS Priors to SfP

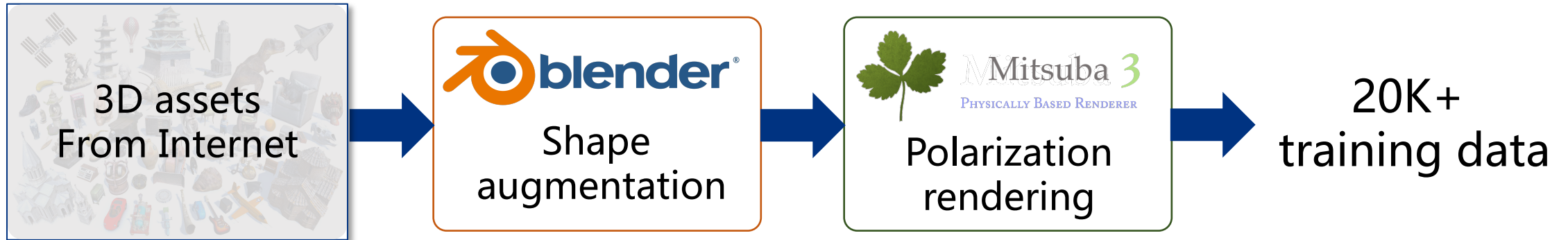


Network Architecture

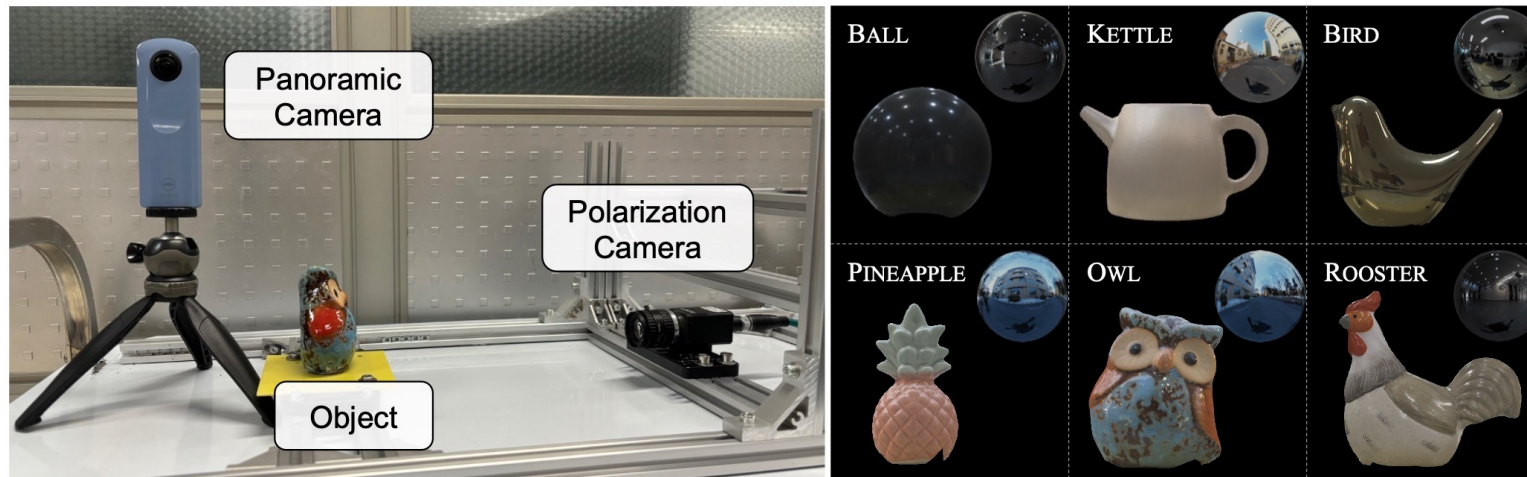


Data Creation

Data Synthesis Pipeline

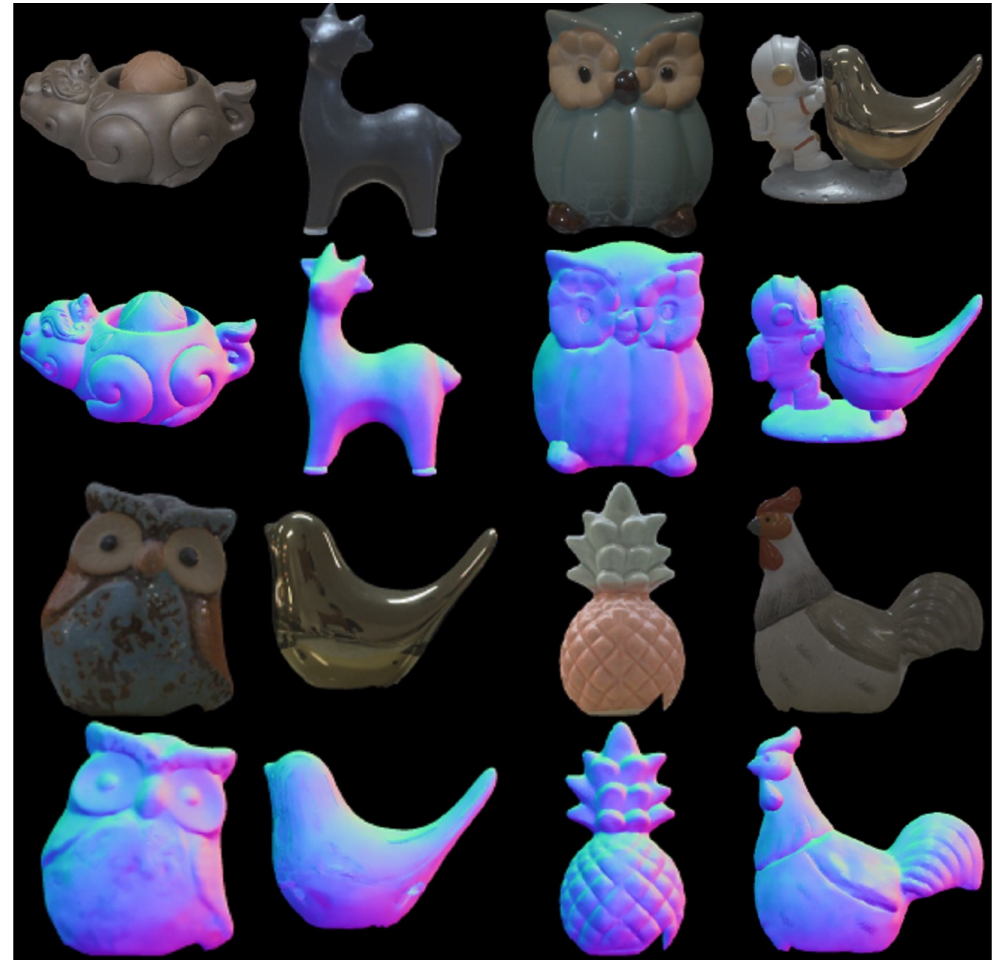
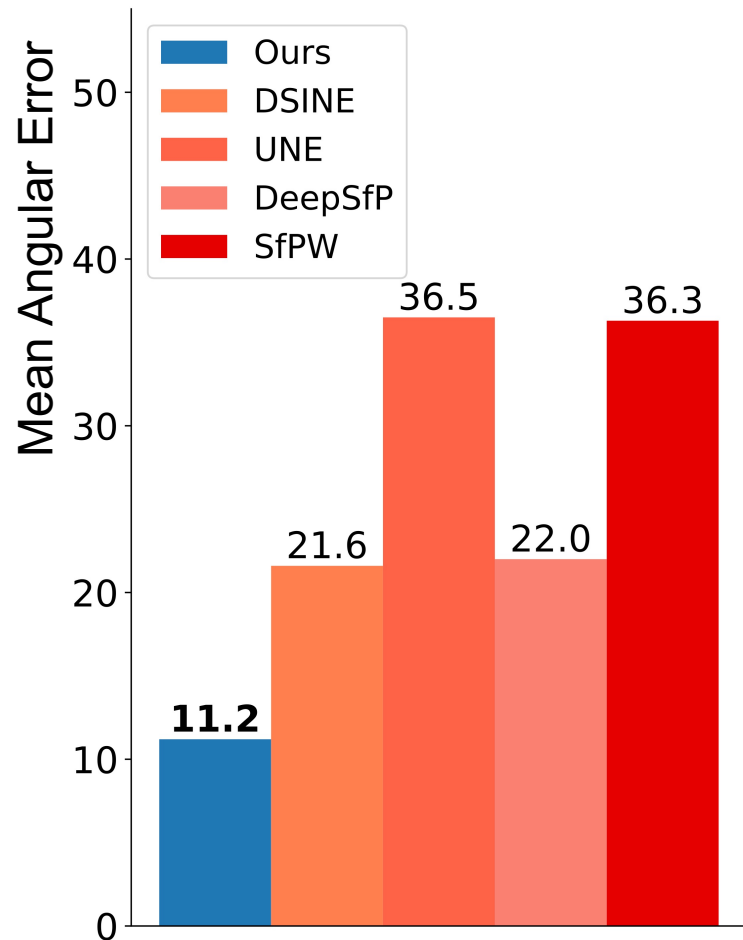


Real Data Collecting

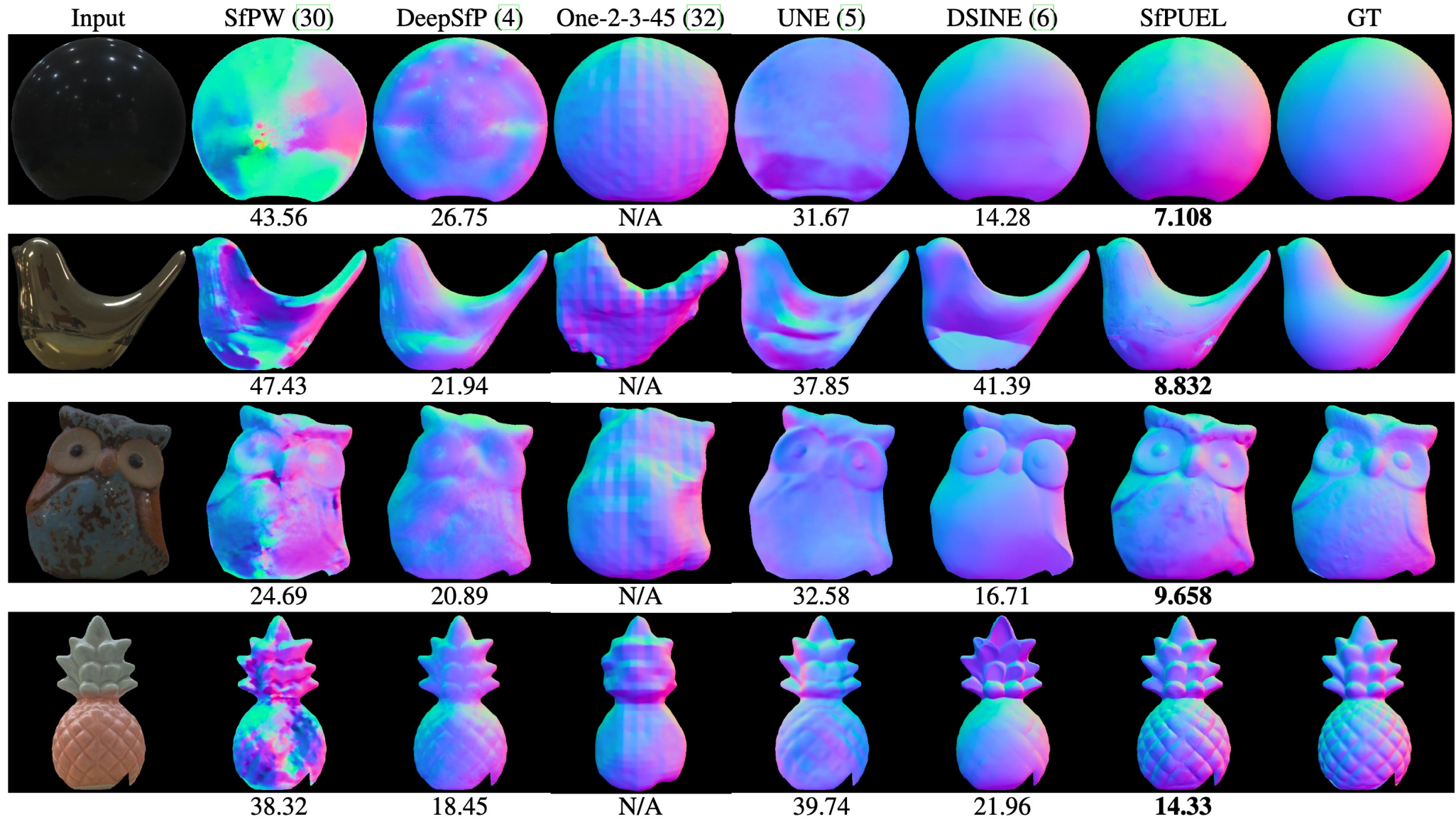


Results

Results on our real-world dataset



Results





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Thank You !



Paper & Code & Dataset

<https://github.com/YouweiLyu/SfPUeL>