

CopyRNeRF: Protecting the Copyright of Neural Radiance Fields

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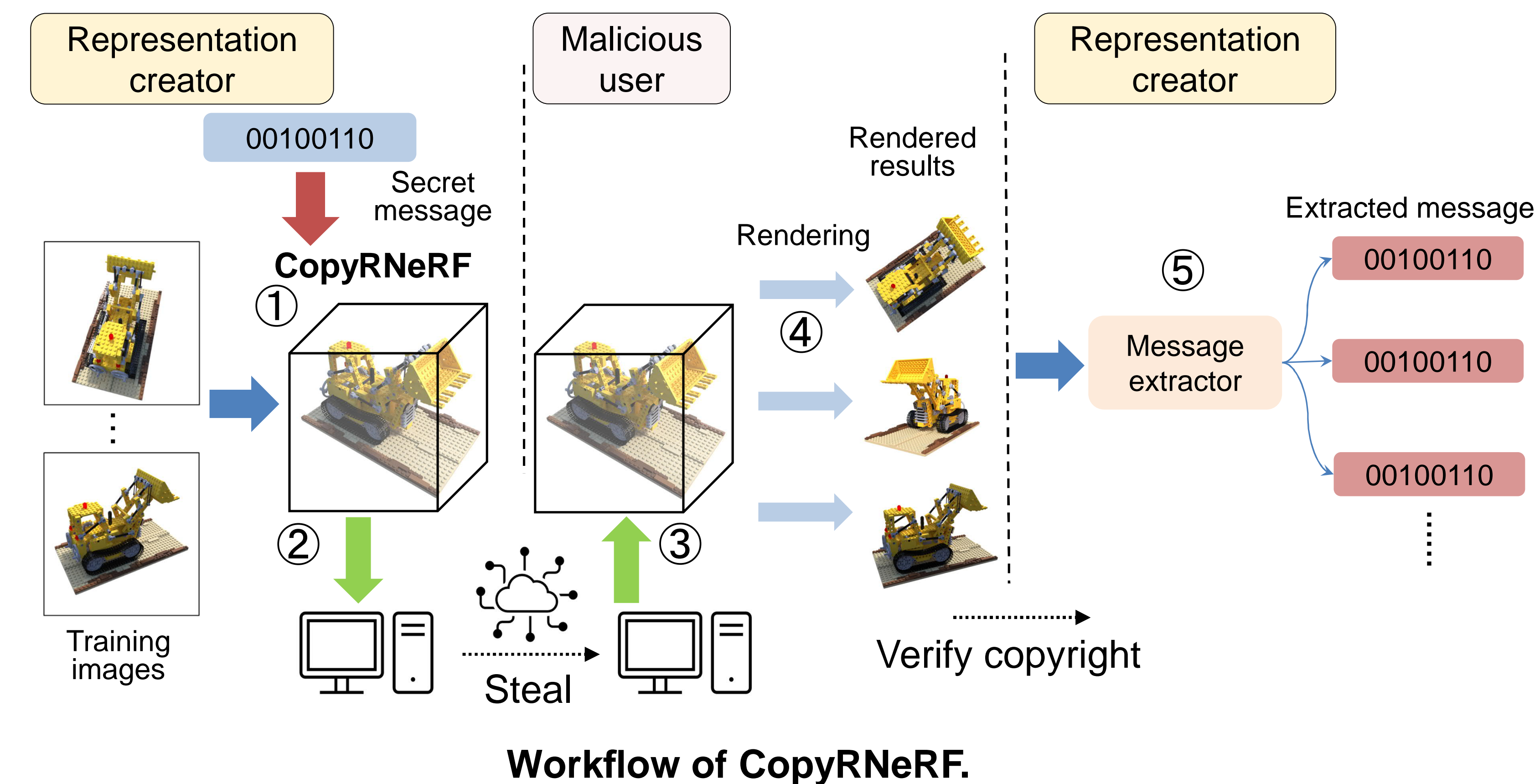
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Project page

ICCV23
PARIS

- Protecting the copyright of NeRF models
- Embedding copyright information into NeRF
- Extracting copyright information from rendered images from any views

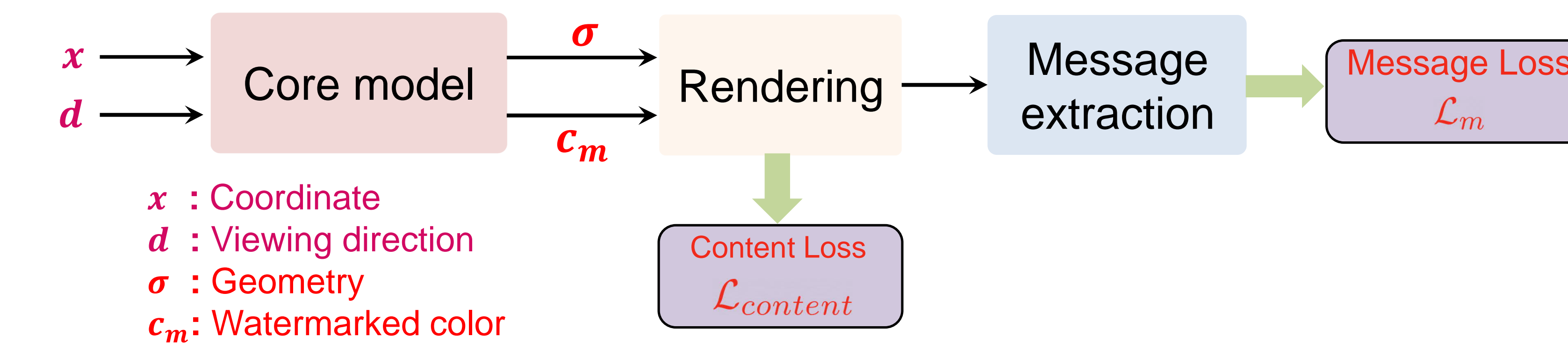


Workflow

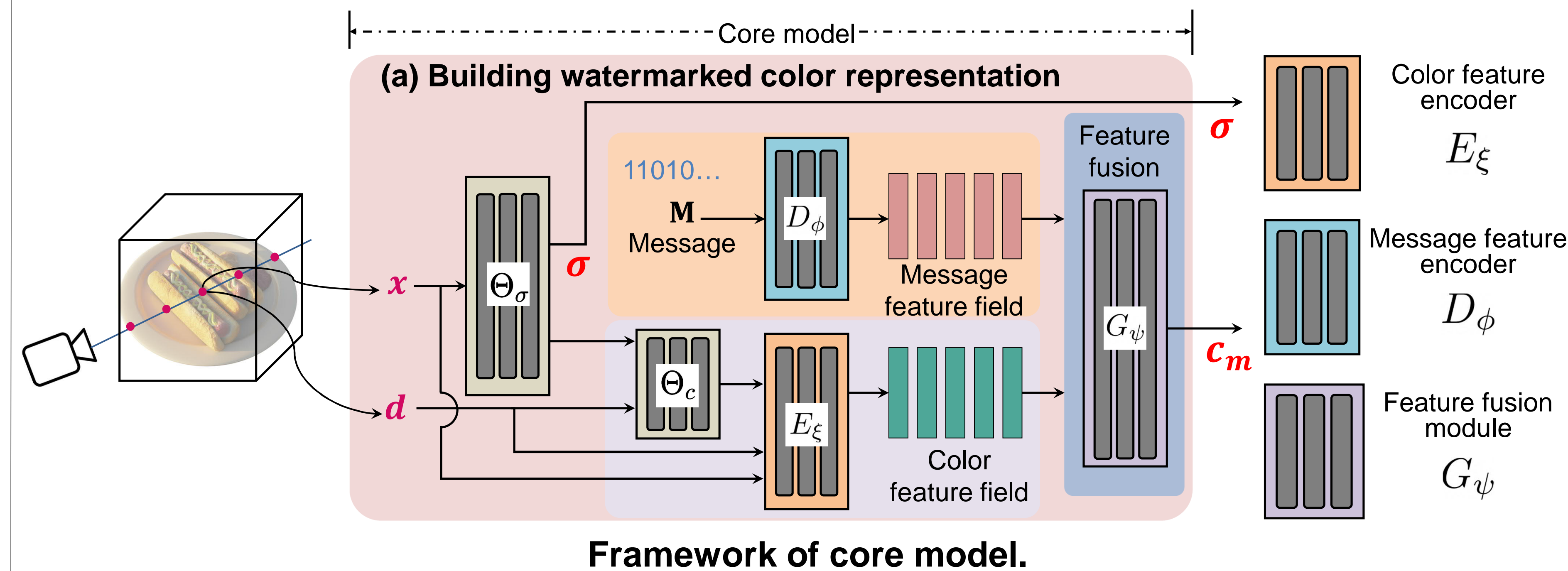
- The creator applies CopyRNeRF to generate a core model from a set of 2D images, and selects a message to embed within the model.
- The creator shares the model.
- The model is stolen by malicious users.
- Malicious users render the model with different local rendering approaches.
- The model creator can use the message extractor to reveal the message from the rendered results to verify the copyright.

Method

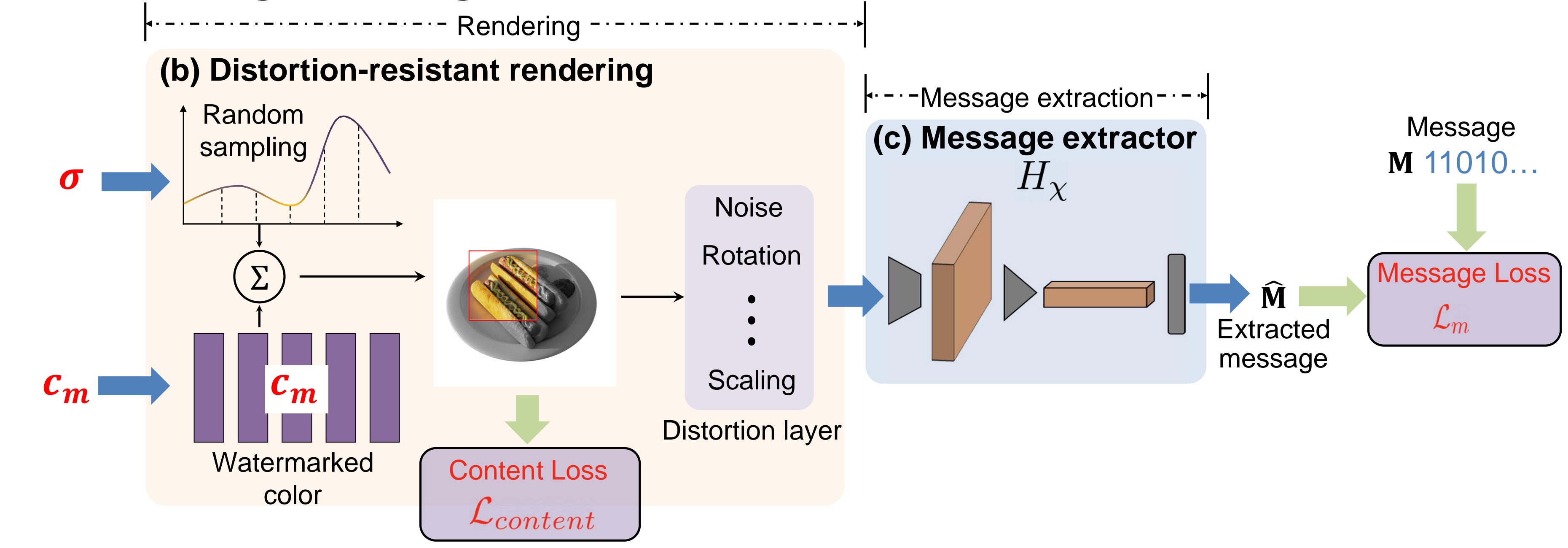
Overview



Core model

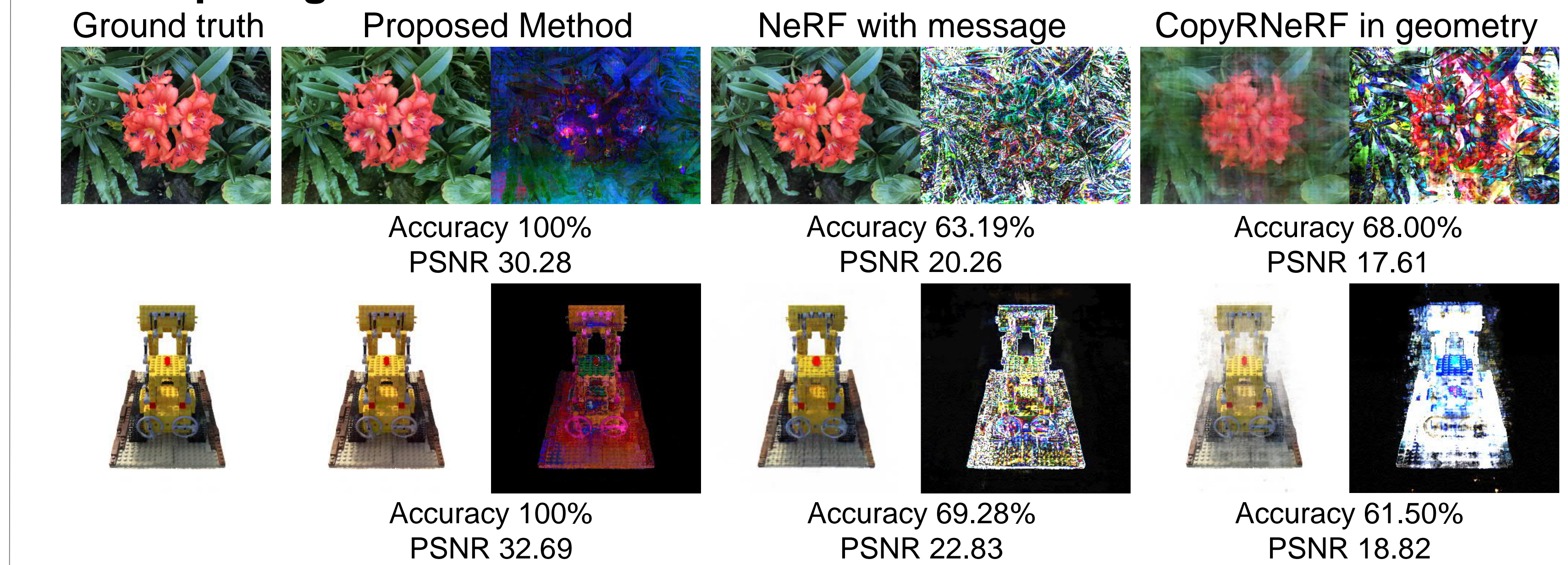


Rendering & Message extraction



Results

Comparing with several baselines



Results of 8-bit messages.

Bit Accuracy vs. Message Length

Bit accuracies with different lengths.

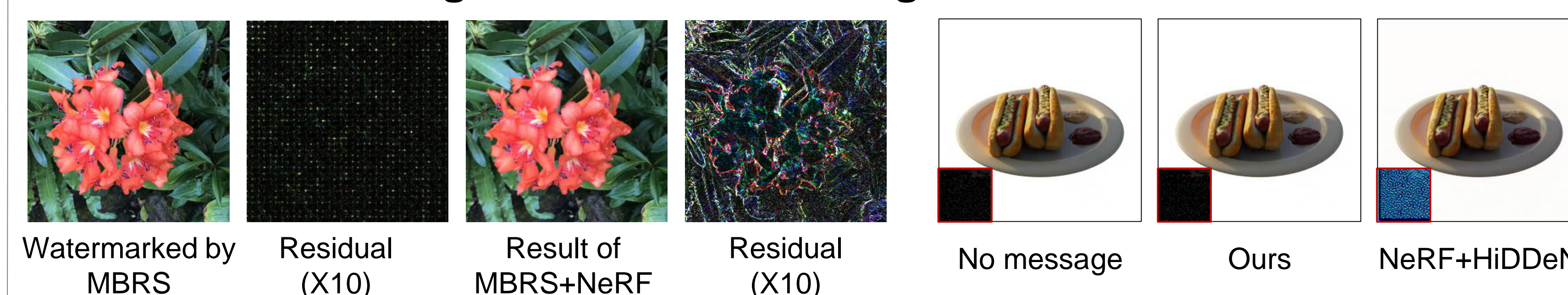
	4 bits	8 bits	16 bits	32 bits	48 bits
Proposed CopyRNeRF	100%	100%	91.16%	78.08%	60.06%
HiDeN [45]+NeRF [23]	50.31%	50.25%	50.19%	50.11%	50.04%
MBRS [14]+NeRF [23]	53.25%	51.38%	50.53%	49.80%	50.14%
NeRF [23] with message	72.50%	63.19%	52.22%	50.00%	51.04%
CopyRNeRF in geometry	76.75%	68.00%	60.16%	54.86%	53.36%

Bit Accuracy vs. Reconstruction Quality

Bit accuracies and reconstruction qualities (16 bits).

	Bit Acc↑	PSNR↑	SSIM↑	LPIPS↓
Proposed CopyRNeRF	91.16%	26.29	0.910	0.038
HiDeN [50]+NeRF [23]	50.19%	26.53	0.917	0.035
MBRS [14]+NeRF [23]	50.53%	28.79	0.925	0.022
NeRF with message	52.22%	22.33	0.773	0.108
CopyRNeRF in geometry	60.16%	20.24	0.771	0.095

Pre-watermarking & Post-watermarking



Failure of MBRS + NeRF.

Comparisons for watermarking after rendering.