Colorizing Monochromatic Radiance Fields
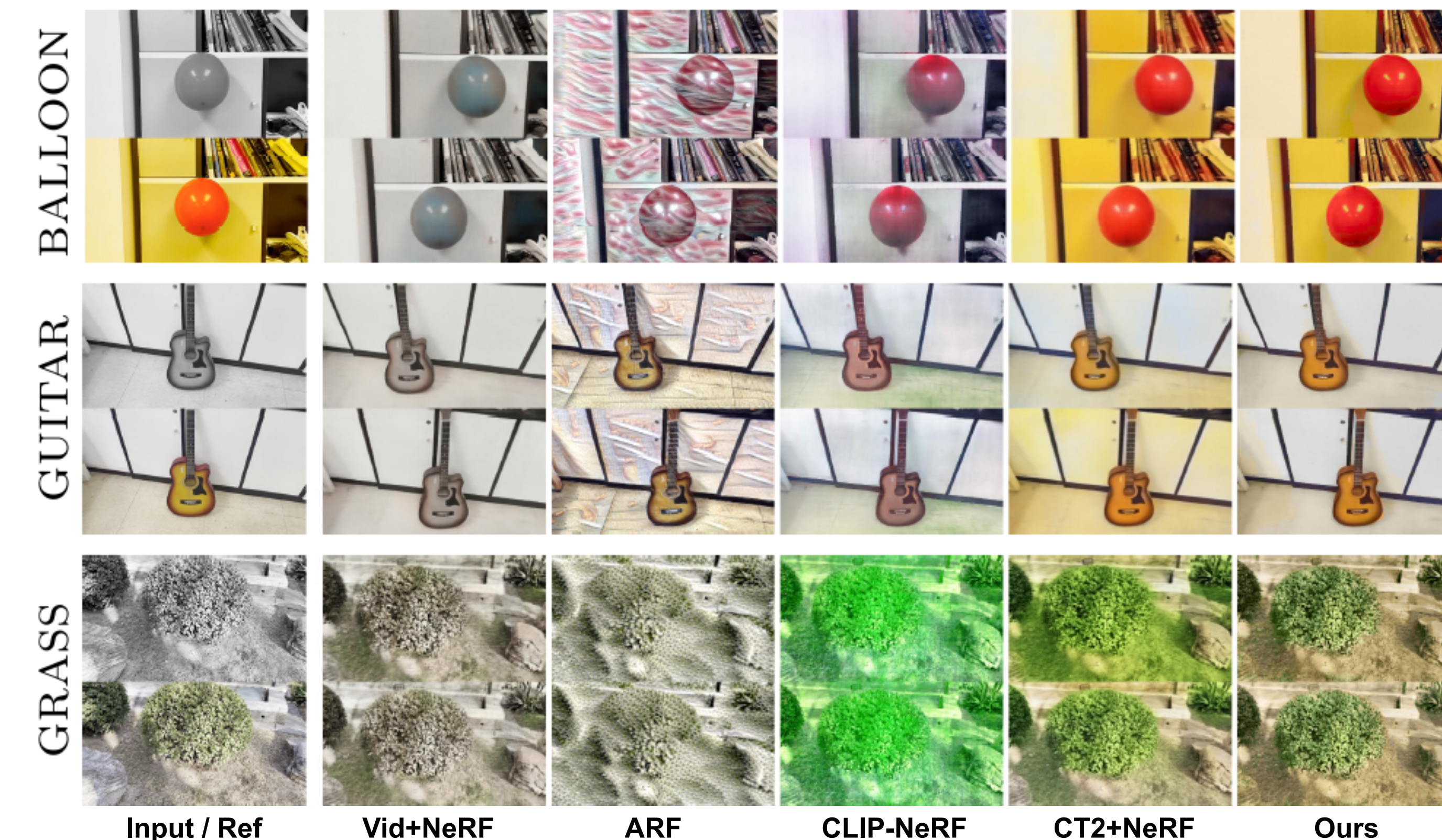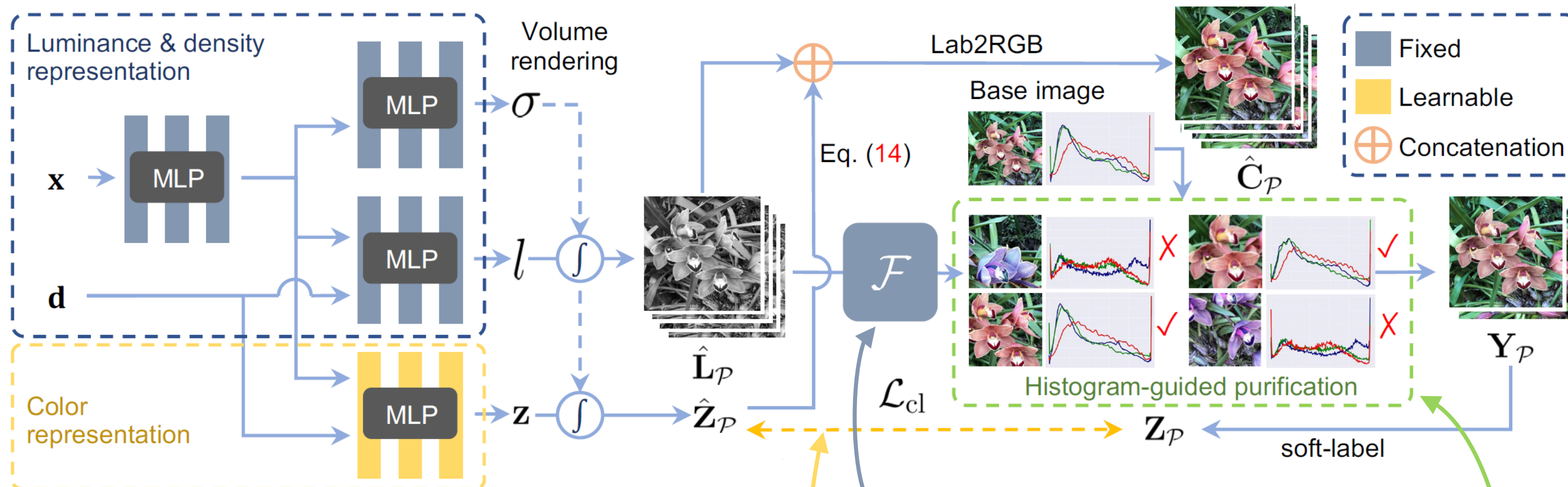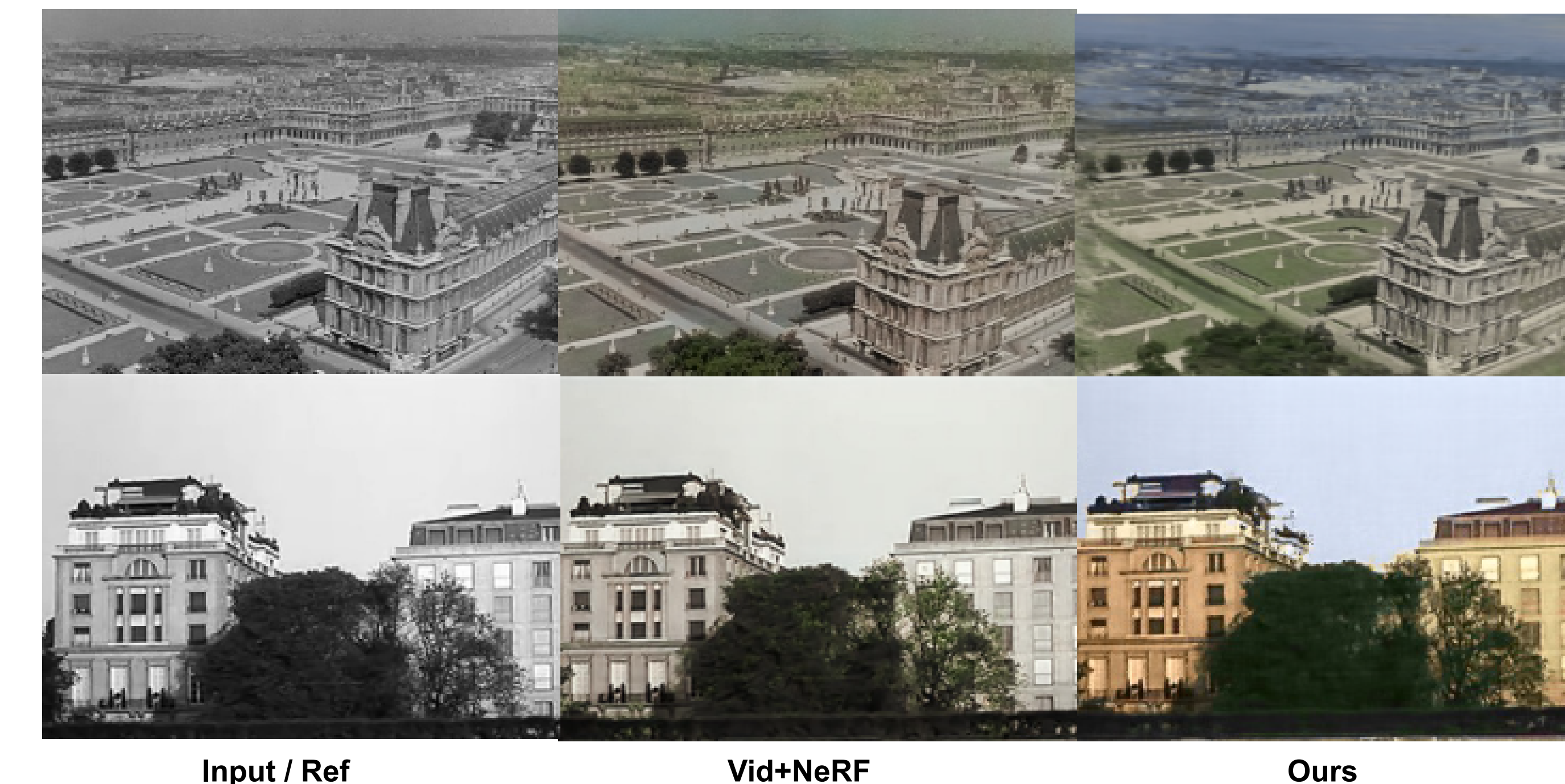
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Project page

Luminance & density representation

MLP

σ

Volume rendering

l ∫

Color representation

MLP

$\mathbf{z}$ ∫

$\hat{\mathbf{L}}_{\mathcal{P}}$

$\hat{\mathbf{Z}}_{\mathcal{P}}$

Eq. (14)

Lab2RGB

Base image

$\hat{\mathbf{C}}_{\mathcal{P}}$

Fixed
Learnable
Concatenation

$\mathcal{F}$

$\mathcal{L}_{cl}$

Histogram-guided purification

$\mathbf{Y}_{\mathcal{P}}$

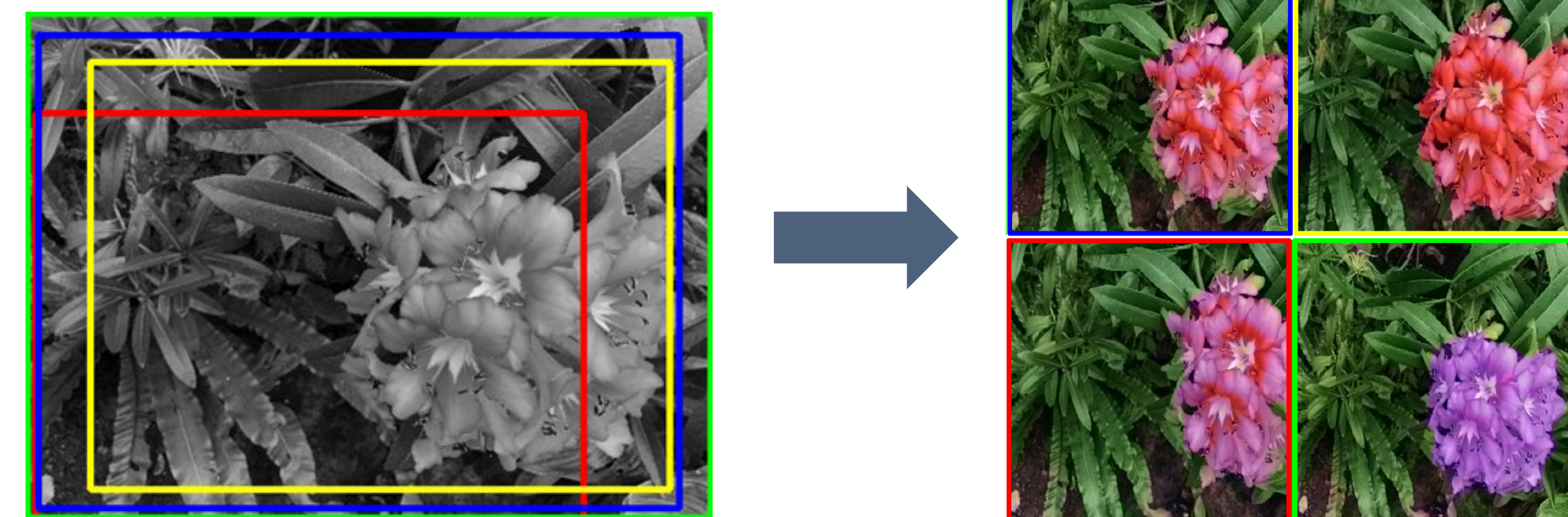$\mathbf{Z}_{\mathcal{P}}$

soft-label

Motivation

NeRF cannot produce colorful 3D representations of the world from set of monochromatic 2D images.

➤ **Plausibility**: colorization with multi-view consistency;
➤ **Vividness**: colorization with high saturation.

Colorization Inconsistency

Query-based colorization

Utilize color info from off-the-shelf models.

➤ Querying the colorization model with the rendered luminance image patches;
➤ Dynamically injecting color knowledge into the predicted representation during training

Histogram-guided purification

Purify outliers using histogram similarity comparison.

Classification-based color injection

Predict color using a cross-entropy objective.

BALLOON

GUITAR

GRASS

Input / Ref | Vid+NeRF | ARF | CLIP-NeRF | CT2+NeRF | Ours

Colorizing old movies

Input / Ref | Vid+NeRF | Ours