Camera Trace Erasing

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What is camera trace?

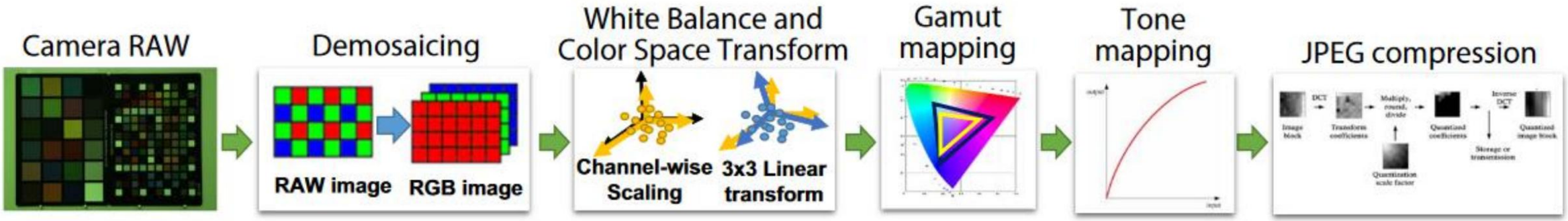
Noise produced by camera sensor

due to the different response characteristics to light

then, manipulated by the in-camera processing pipeline [1]

implicitly encodes the type information of camera into the imaging results

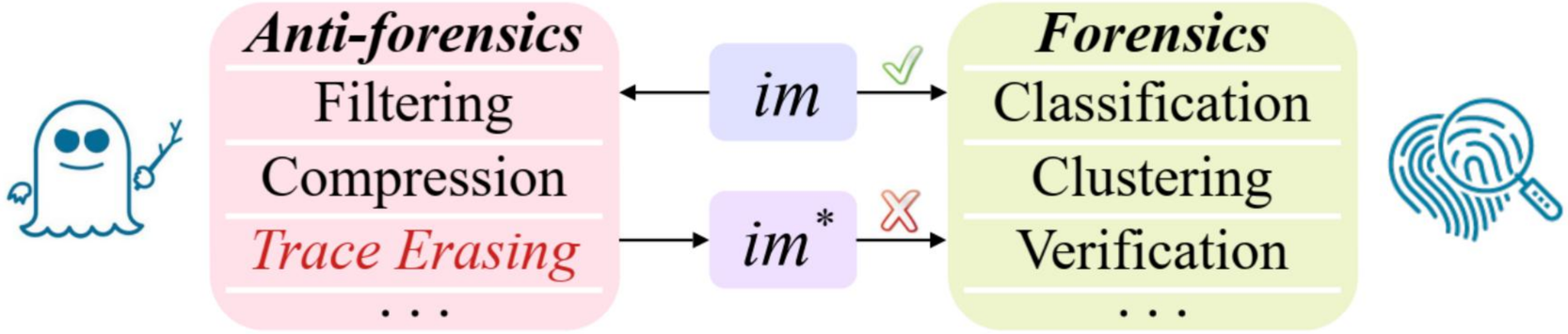
by-product: magnitude is small → trace



In-camera processing pipeline from RAW to RGB space

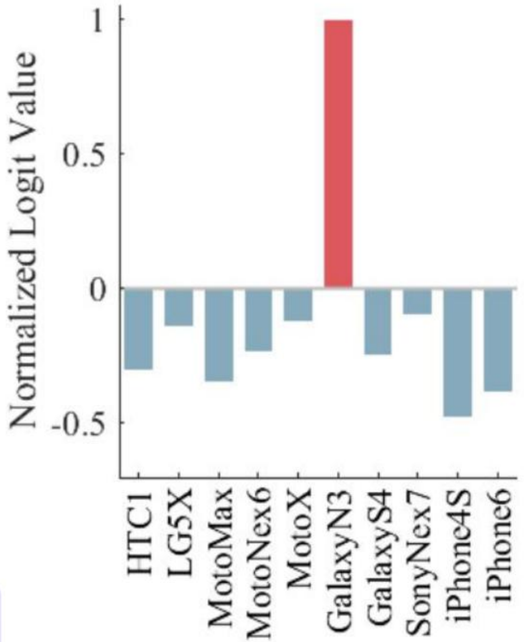
[1] S. Nam, *et al*. A Holistic Approach to Cross-Channel Image Noise Modeling and its Application to Image Denoising. In *CVPR* 2016.

Camera trace erasing – an adversarial case

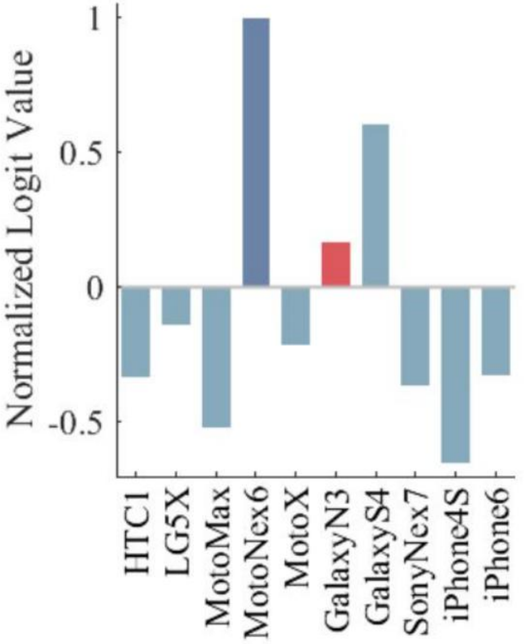


to verify the security of trace-based forensic methods

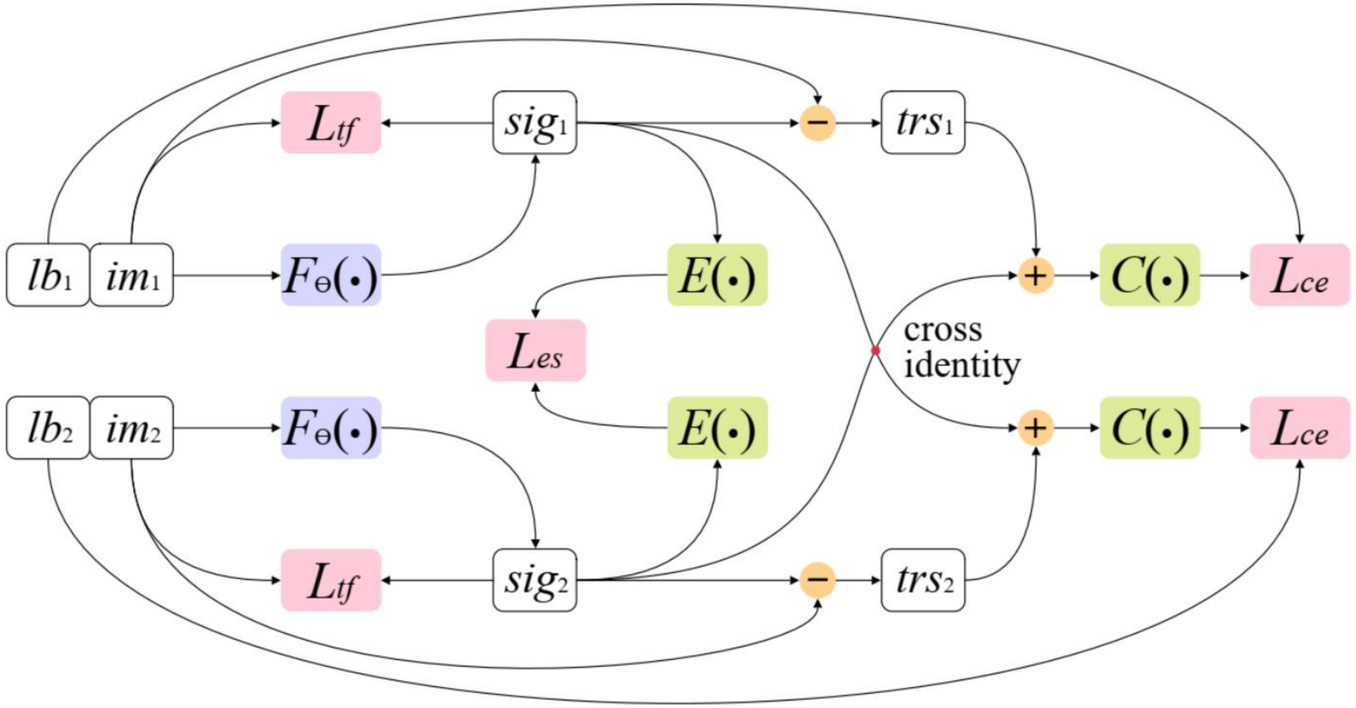
(a) Original im



(d) Ours im^*



Method – Siamese Trace Erasing



im/lb : captured image and origin

$F_\Theta(\cdot)$: trace erasing method

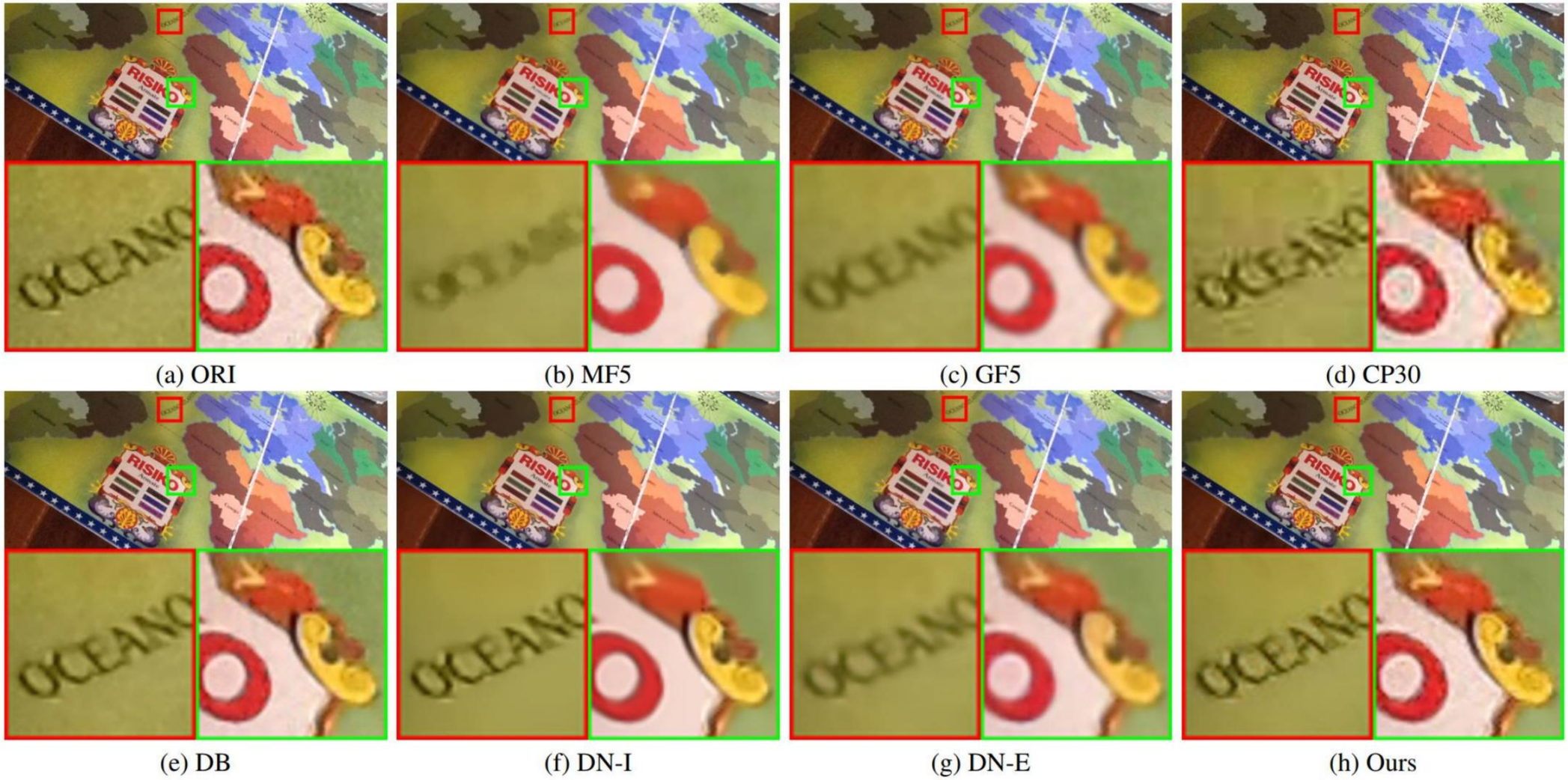
$E(\cdot)$: embedding function

$C(\cdot)$: origin identification method

Blue: trainable model, **Green**: fixed oracle, and **Red**: loss functions.

L_{es}: embedded similarity, L_{tf}: truncated fidelity, L_{ce}: cross-entropy

Experiments – classification / clustering / verification



(a) ORI (b) MF5 (c) GF5 (d) CP30

(e) DB (f) DN-I (g) DN-E (h) Ours

Analysis on camera trace

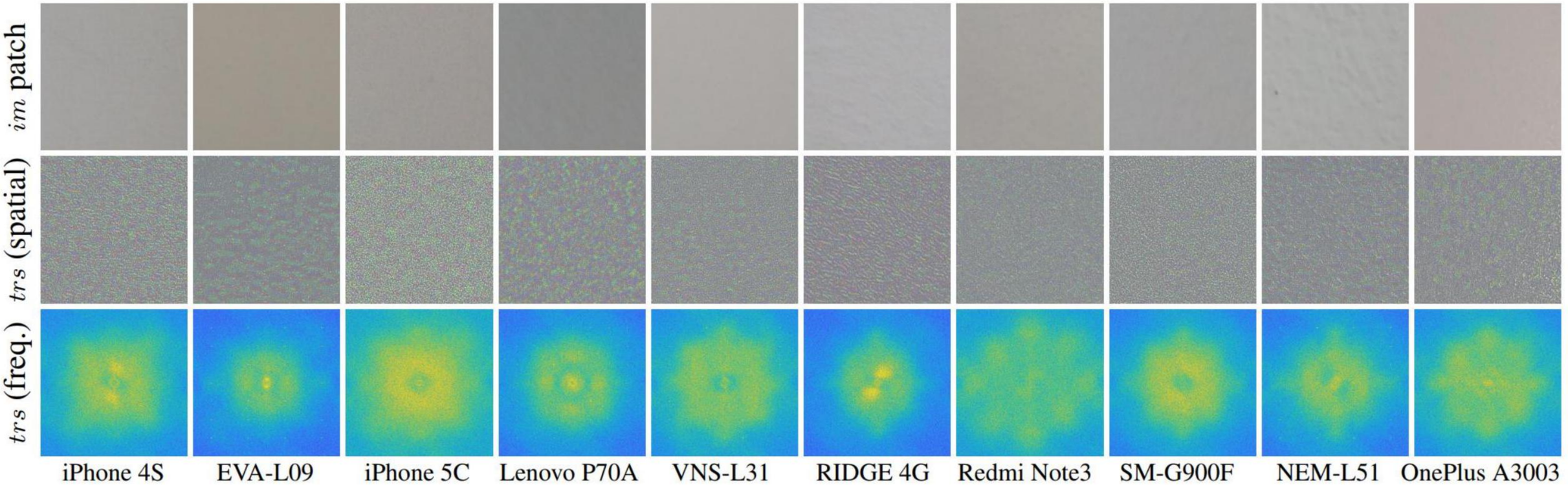


Figure 7. Visualization of camera trace extracted by SiamTE in spatial and frequency domains. Image patches in smooth areas are cropped from VISION with a size of 500×500. Brightness and contrast of camera trace in spatial domain are adjusted for a better visual experience.

Analysis on camera trace

Figure 8. Visualization of camera trace extracted by SiamTE in a single image from KCMI-550. From left to right: original image, extracted camera trace, patches in spatial and frequency domains.

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Thanks for your listening!

Code & Dataset

VIDAR
Visual Information Discovery And Recovery
Computer Vision Lab

NEL-BITA
National Engineering Laboratory for Brain-Inspired Intelligence Technology and Application