Generalized Imaging Augmentation via LInear Optimization of Neurons (LION)

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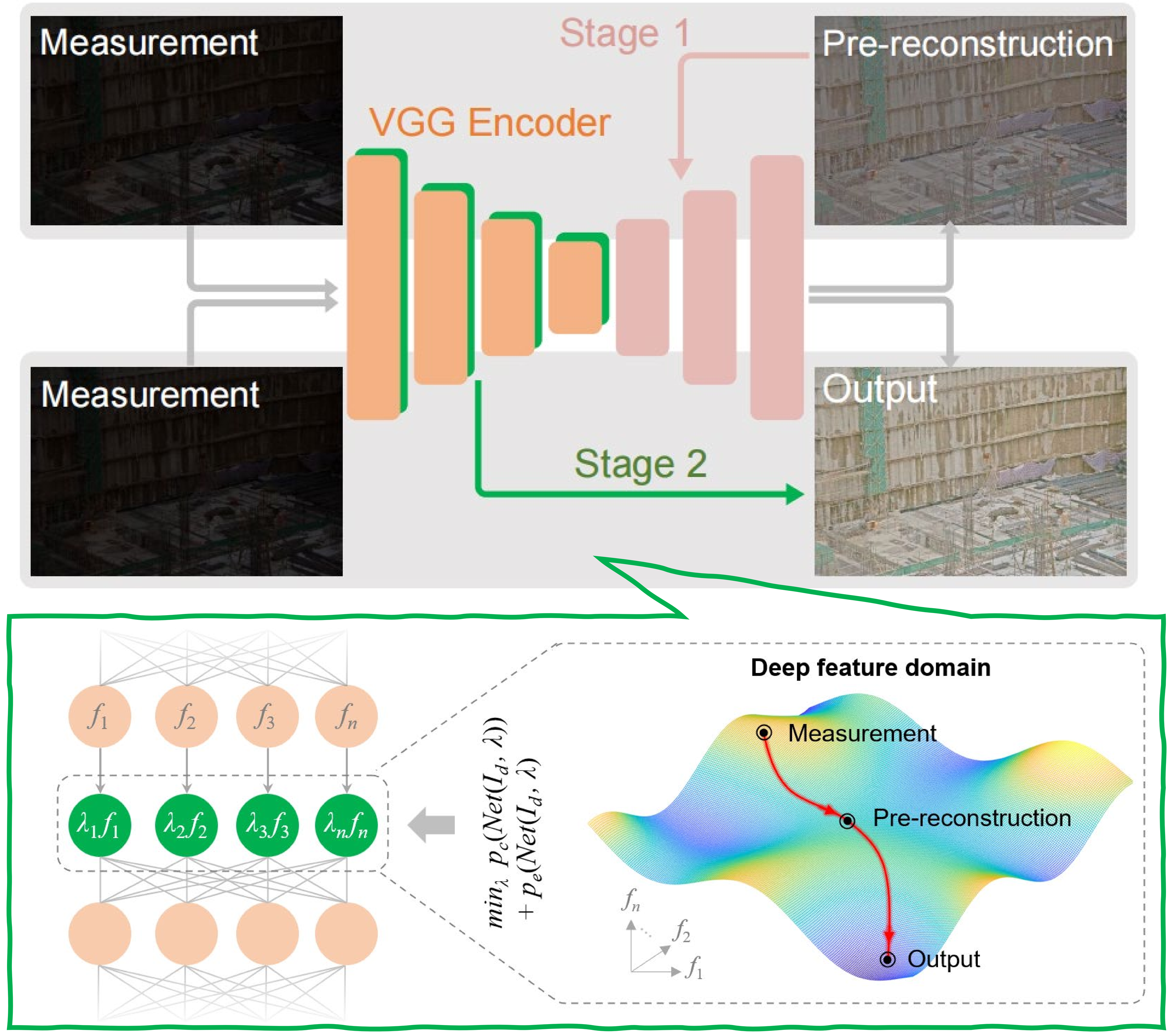
Motivation

- **Optimizing combination weights of fixed deep features brings strict constraints that maintain image structure even using aggressive enhancing regularizations**
- **Application** for both learning and non-learning computational imaging techniques

Principle

Two-stage optimization



Stage 1: fitting decoder to output pre-reconstruction (for non-learning methods)

$$min_\theta \left\| Net_\theta(I_d, \boldsymbol{\lambda} = \mathbf{1}) - I_p \right\|^2$$

Stage 2: weighting deep features

$$min_{\boldsymbol{\lambda}} p_c\left(Net(I_d, \boldsymbol{\lambda})\right) + p_e\left(Net(I_d, \boldsymbol{\lambda})\right)$$

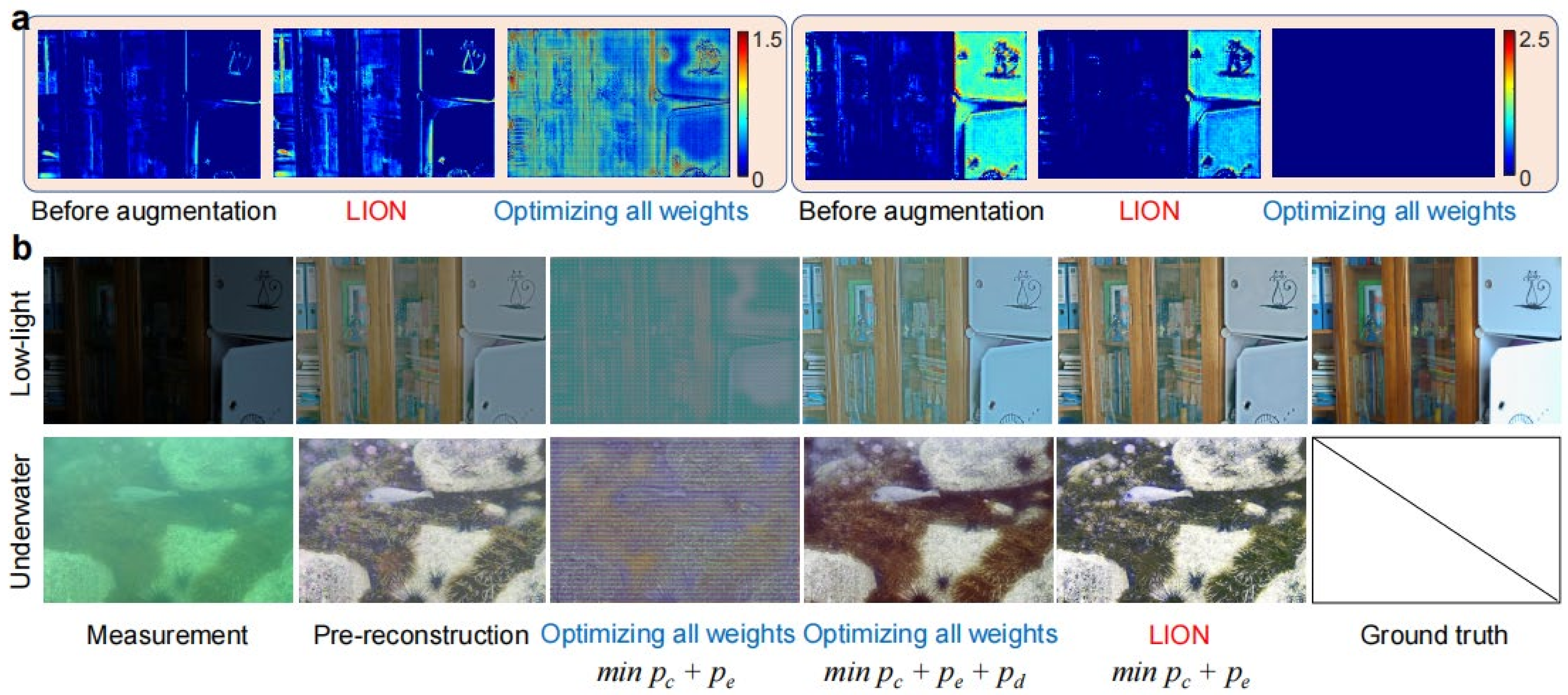
Color and texture enhancing term

$$p_c(z) = exp\left(-\left(s(z) + c(z) + u(z)\right)\right)$$

$$p_e(z) = exp(-\nabla z)$$

Experiments

LION outperforms optimizing all weights



LION for various applications