

Automatic Photo Adjustment Using Deep Neural Networks



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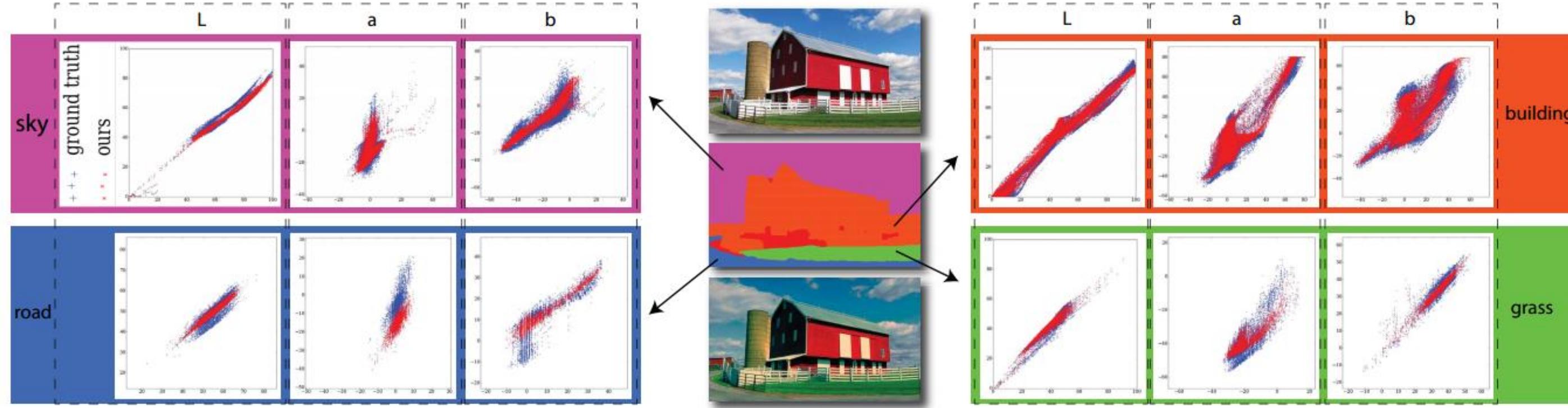
¹UIUC, ²CMU, ³Microsoft Research, ⁴Adobe Research, ⁵HKU

Microsoft Research Adobe



Problem

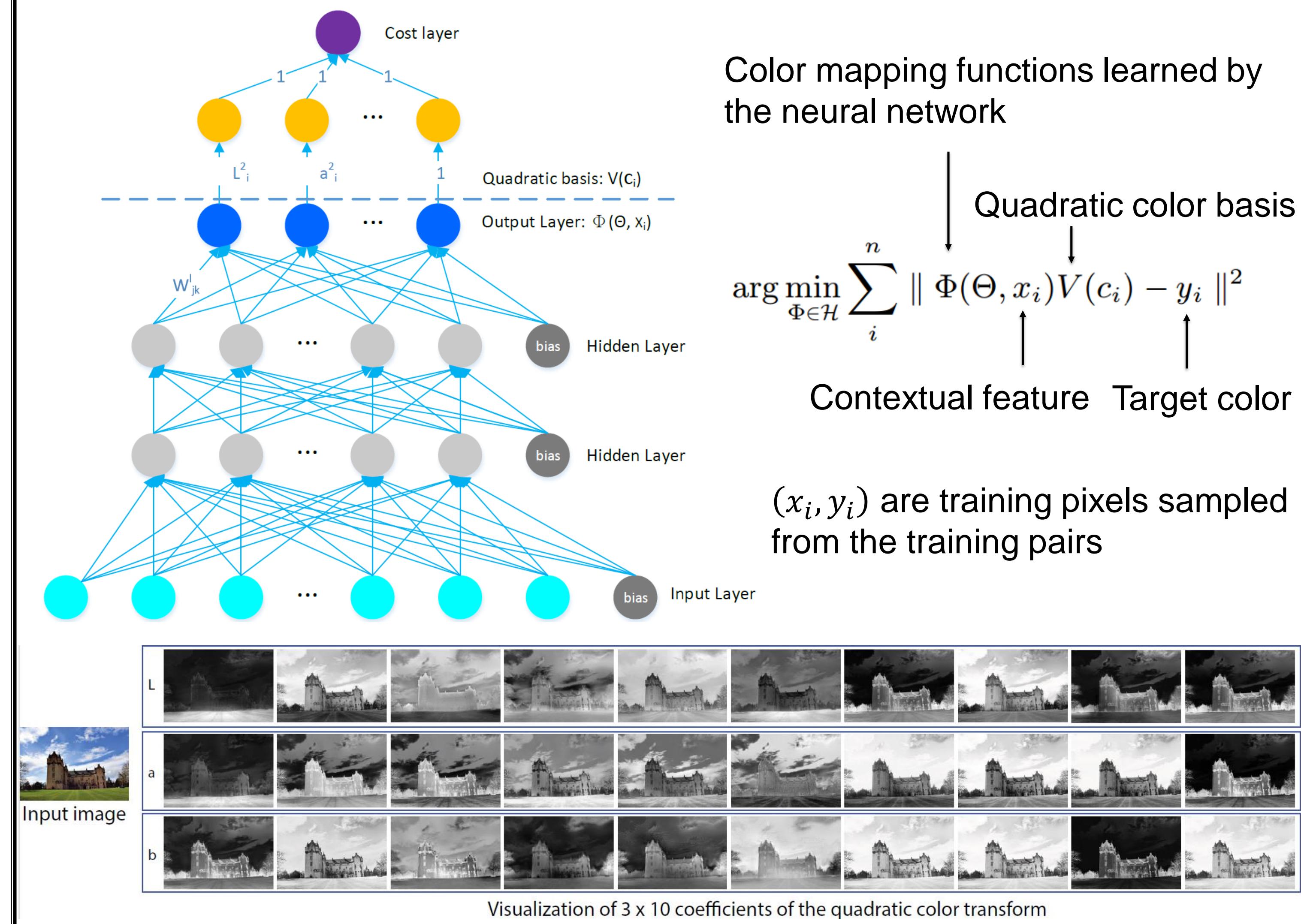
1. Photo retouching is labor and knowledge intensive
 - High-quality photo enhancement is usually hand-crafted.
 - We want automate the photo adjustment process.
2. An enhancement style = a highly nonlinear mapping
 - It is nontrivial to learn a computational model capable of representing such a complicated relationship accurately.
 - Large-scale training data is likely to be necessary.



3. An artistic enhancement is typically semantics-aware



A Deep Neural Network Model



Contextual Feature

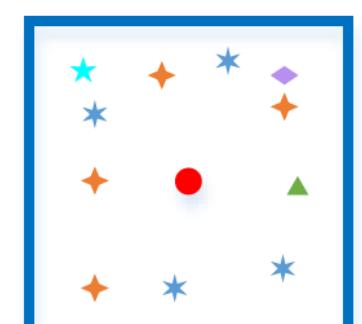
Constructing the Semantic Map



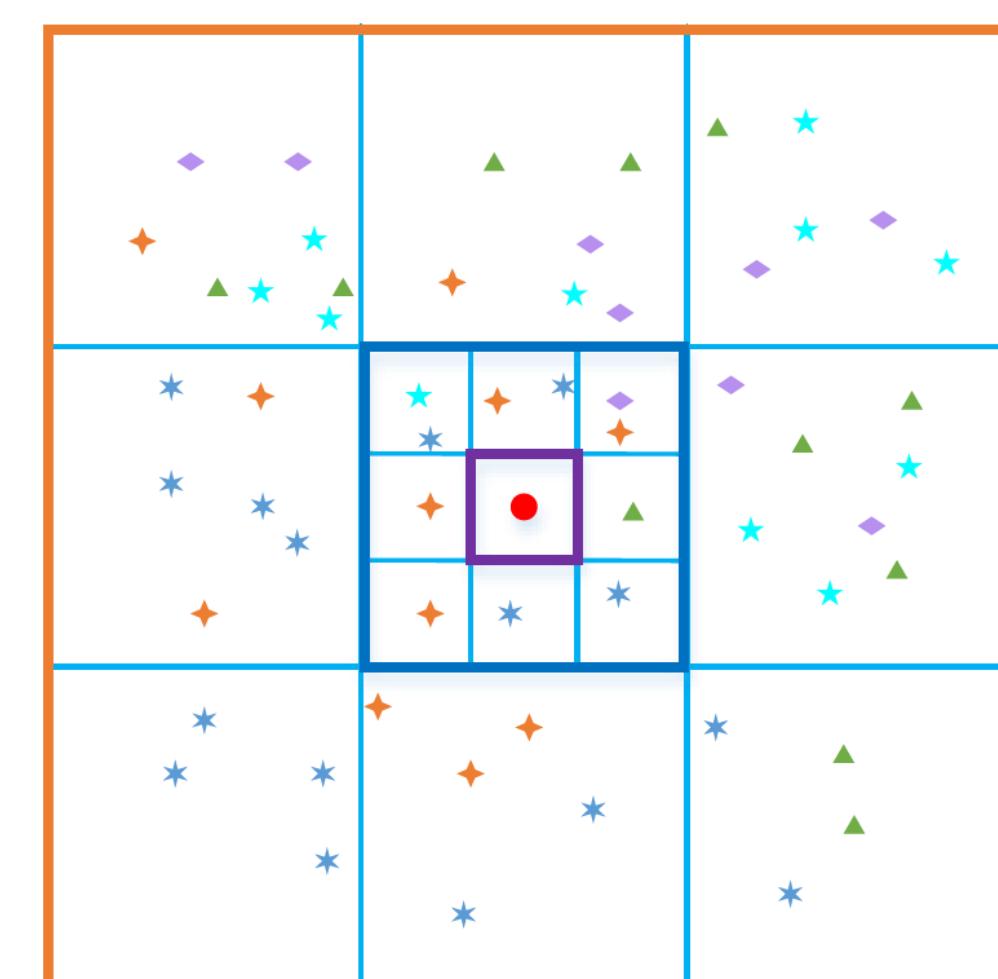
Extracting multi-level features

- Pixelwise features: high resolution pixel-level image variations

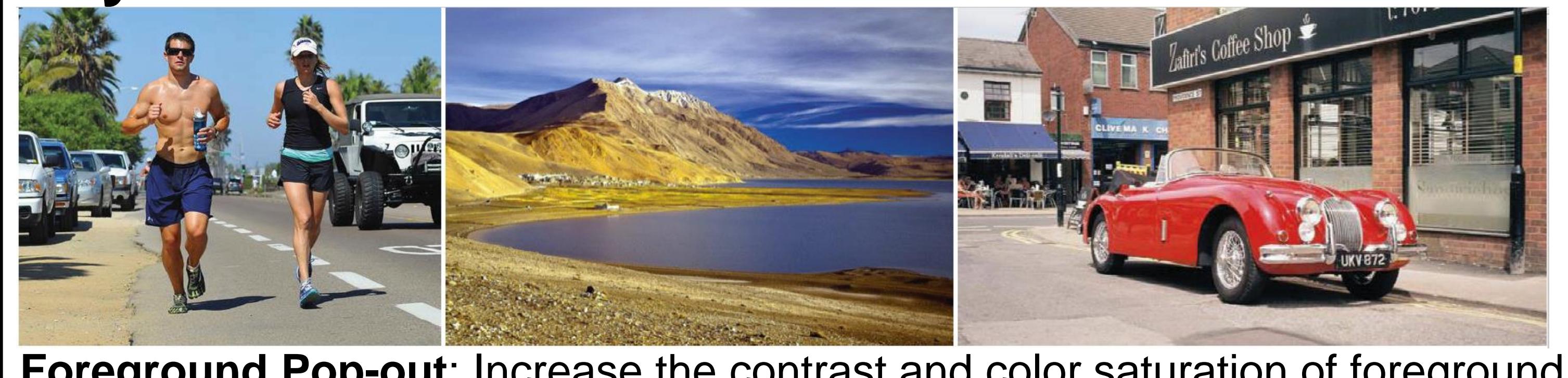
- Global Features: global attributes and overall impressions



- Contextual Features: Semantics, content-awareness



Stylistic Local Effects



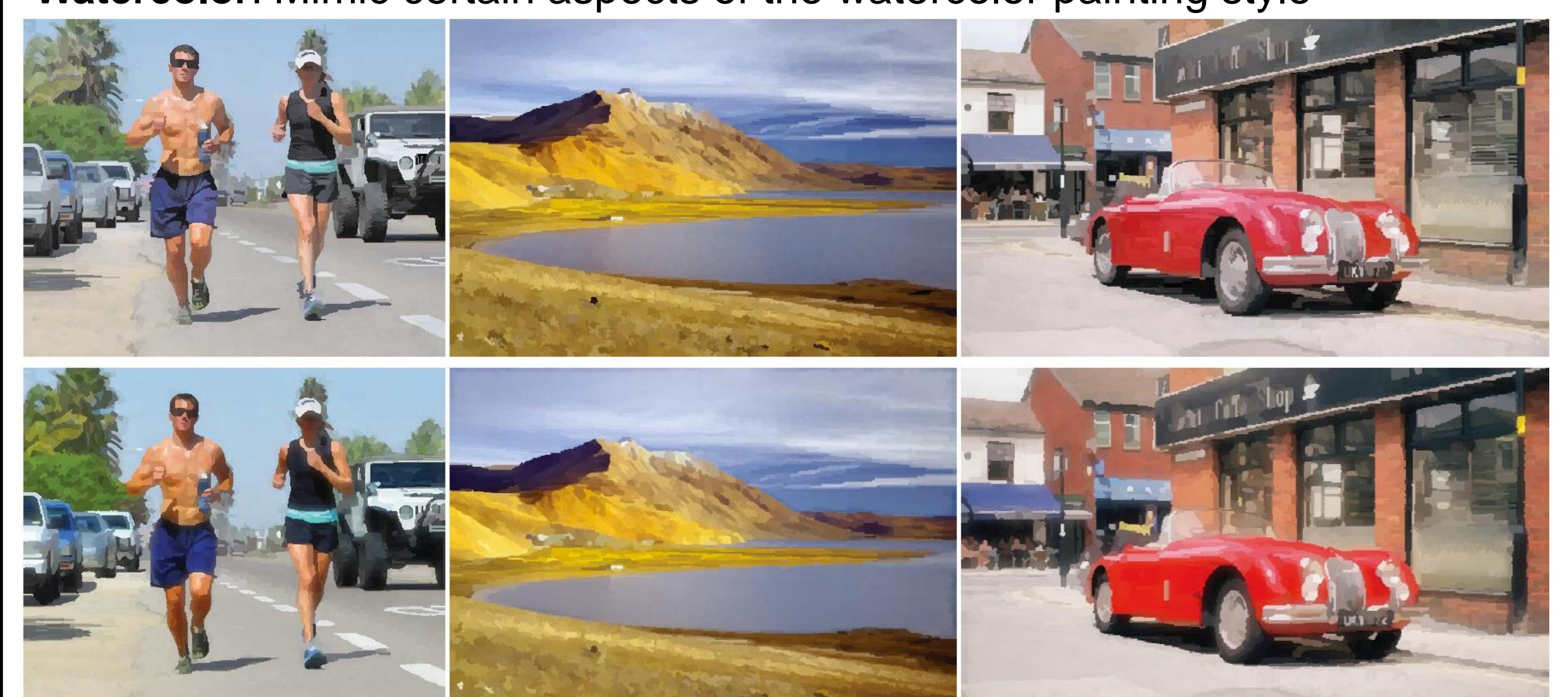
Foreground Pop-out: Increase the contrast and color saturation of foreground salient objects/regions decrease the color saturation of the background



Local Xpro: Generalize the cross processing effect in a local manner



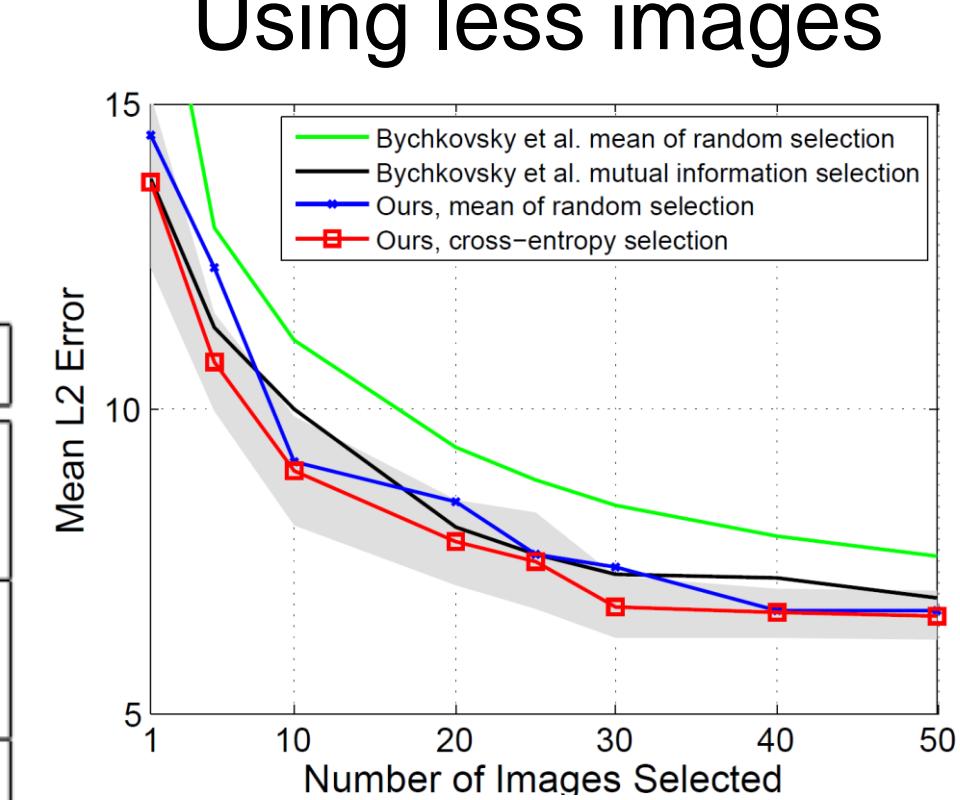
Watercolor: Mimic certain aspects of the watercolor painting style



Learning Global Adjustments

Comparison on MIT5K: L2 errors

Method	2500(L)	Ran. 250(L,a,b)	H.50(L,a,b)
[Bychkovsky et al. 2011]	5.82	N/A	N/A
[Hwang et al. 2012]	N/A	15.01	12.03
Our method	5.68	9.85	8.36



User study

