Blind Image Quality Assessment using Semi-supervised Rectifier Networks

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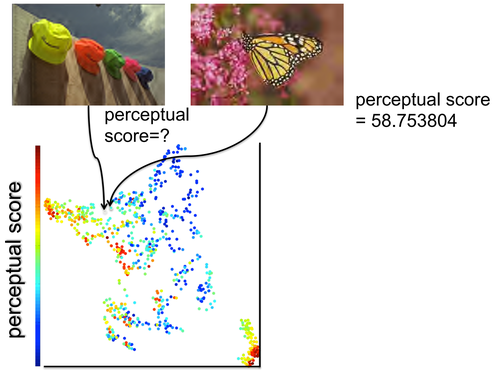
Blind image quality assessment

- distorted image -> perceptual score (ground-truth unknown)
- State of art approach: kernel regression



Challenges

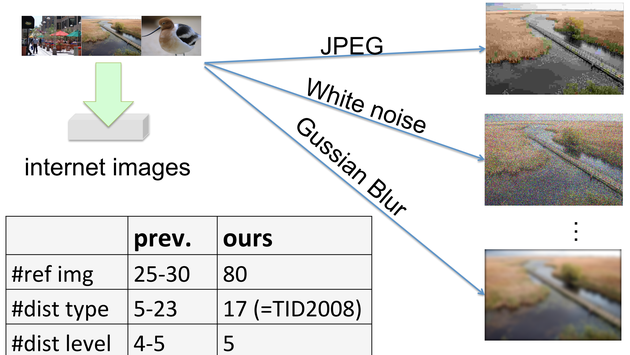
- Requires highly expressive kernel
  difficulty: kernels for IQA are mostly linear to hand-crafted features

- Requires sufficient data for generalization power
  difficulty: subjective scores are expensive to gather

Dataset	#ref img	#dist type	#dist level
LIVE	29	5	4-5
TID2008	25	17	5
TID2013	25	23	5
CSIQ	30	6	4-5

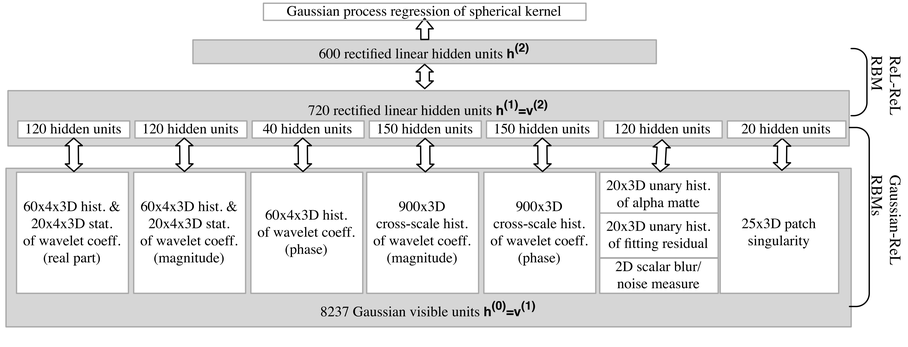
Our approach

- Generate large ***unlabeled*** dataset (automatic and cheap)



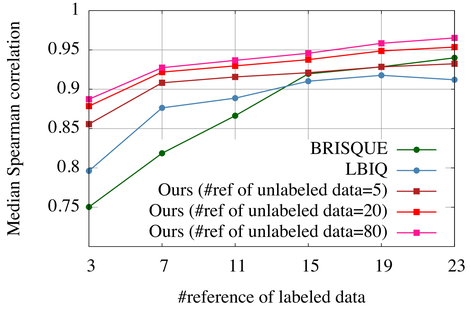
	prev.	ours
#ref img	25-30	80
#dist type	5-23	17 (=TID2008)
#dist level	4-5	5
labled	yes	no

- Define regression kernel with deep belief network of rectifier units
  Advantage: flexible, good generalization, semi-supervised
  Semi-supervised training scheme:
  1. Pre-train with ***unlabeled*** data
  2. Fine-tune with ***labeled*** data

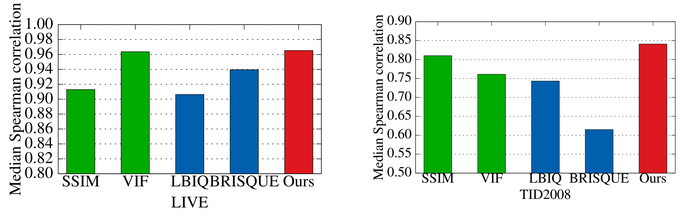


Results:

- Performance deteriorates gracefully with decreasing labeled data

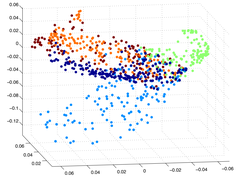


- Outstanding overall performance on both LIVE and TID (outperforms non-blind IQA measures)

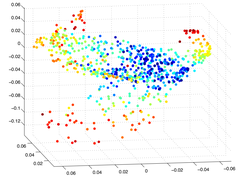


- Leave-one-distortion-type out performance (generalization power to similar distortion types)

color encodes distortion



color encodes quality



Dist. type	corr.
JP2K	0.958
JPEG	0.951
WN	-0.488
GB	0.970
FF	0.944