Attention-Aware Face Hallucination via Deep Reinforcement Learning

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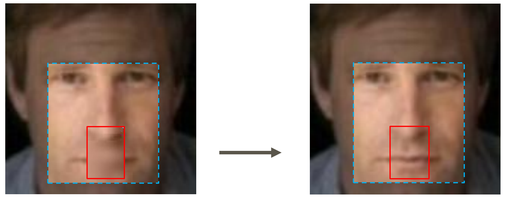
IEEE 2017 Conference on Computer Vision and Pattern Recognition
CVPR July 21-26 2017 HONOLULU

Motivation

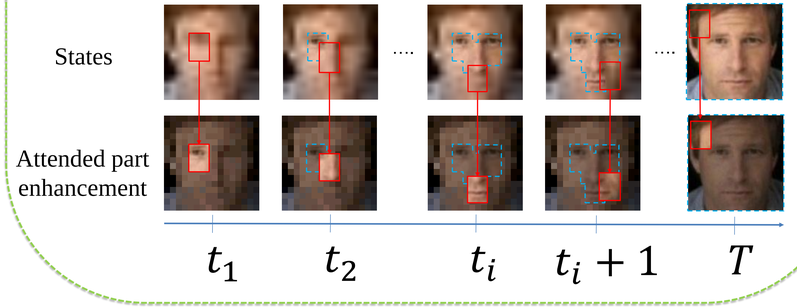
- Some patches are difficult to learn a patch-to-patch mapping from LR to HR.

- This process will be much easier if adjacent HR patches is given.



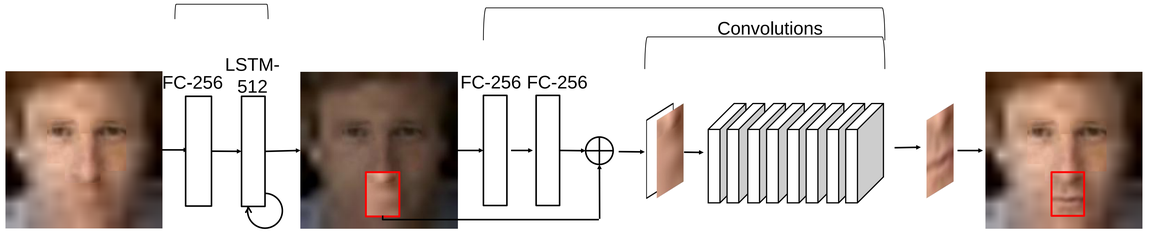
Goal: from easy to hard

- Hallucinate the easier patches first, then handle the others given previous enhancement results.



Method

Model at t_i: Policy Network



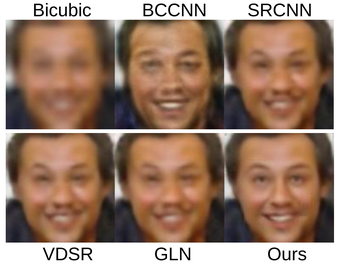
At each step t_i:

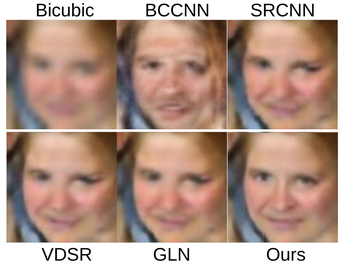
- Policy Network to attend a patch.
  - Trained with reinforcement learning with PSNR reward.
- Local Enhancement network to enhanced the patch.
  - Trained with step-wise patch supervision.

Key Idea: Employ reinforcement learning to train an agent with long-term global reward, and find the optimal enhancement route for each face.

Experiment

Methods	LFW-funneled 4x			LFW-funneled 8x		
	PSNR	SSIM	FSIM	PSNR	SSIM	FSIM
Bicubic	26.79	0.8469	0.8947	21.92	0.6712	0.7824
BCCNN	26.6	0.8329	0.8982	22.62	0.6801	0.7903
SRCNN	28.94	0.8686	0.9069	23.92	0.6927	0.8314
VDSR	29.25	0.8711	0.9123	24.12	0.7031	0.8391
GLN	30.34	0.8922	0.9151	24.51	0.7109	0.8405
Ours	**32.93**	**0.9104**	**0.9427**	**26.17**	**0.7604**	**0.863**





Conclusion

We propose a novel Attention-aware Face Hallucination framework and optimize it using deep reinforcement learning. We explicitly incorporate the rich correlation cues among different facial parts by finding the optimal accommodated enhancement route for each face.