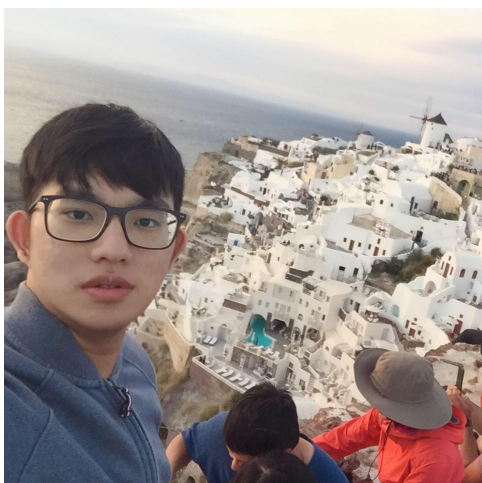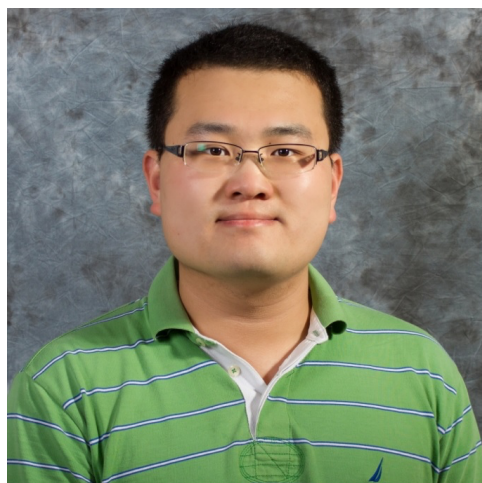# NAS-DIP: Learning Deep Image Prior with Neural Architecture Search
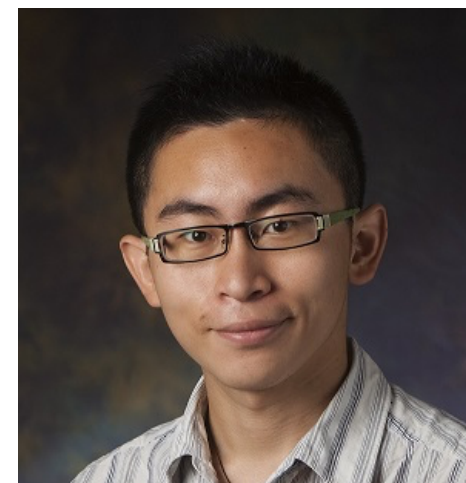
Yun-Chun Chen   Chen Gao   Esther Robb   Jia-Bin Huang
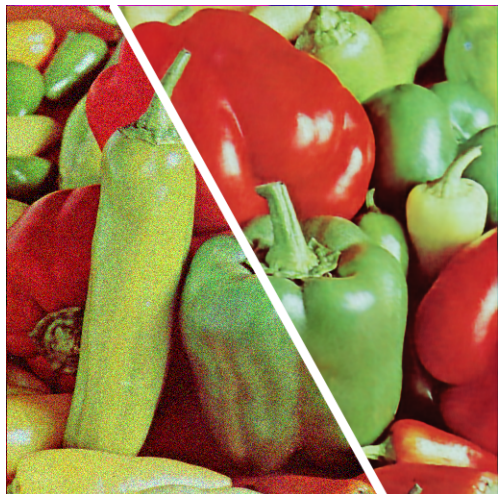
Introduction

Deep Image Prior (DIP)   ❤️   Neural Architecture Search (NAS)
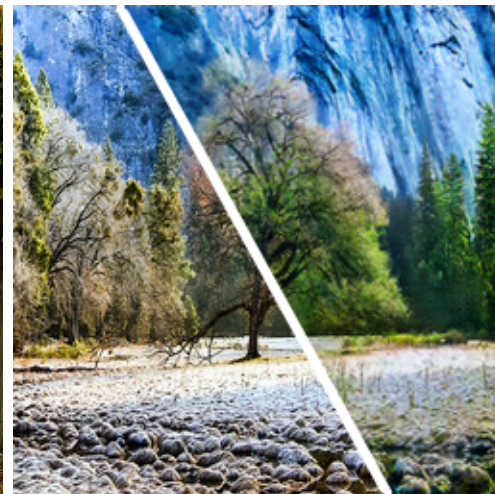

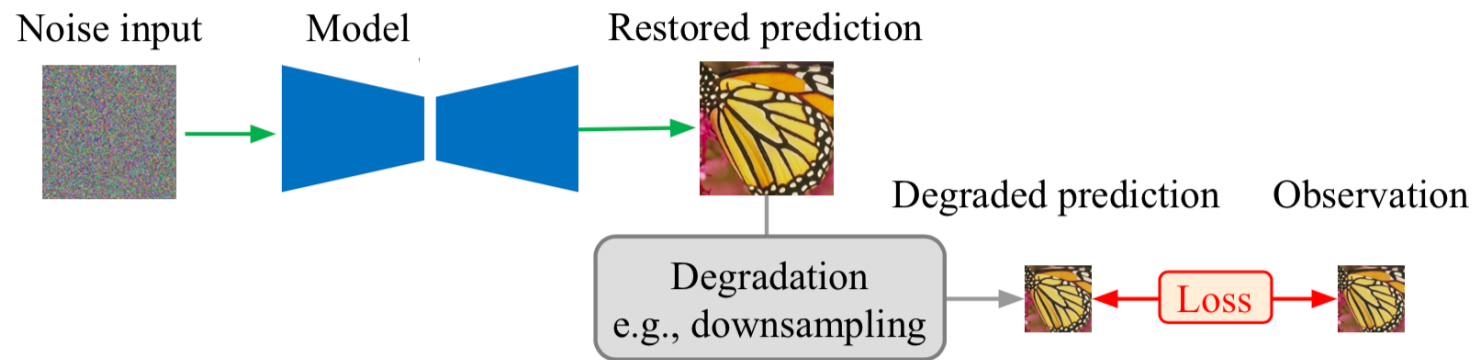Super-Resolution   Denoising   Inpainting   Dehazing   Translation

Deep Image Prior (DIP) [Ulyanov et al. CVPR 2018]

Noise input   Model   Restored prediction

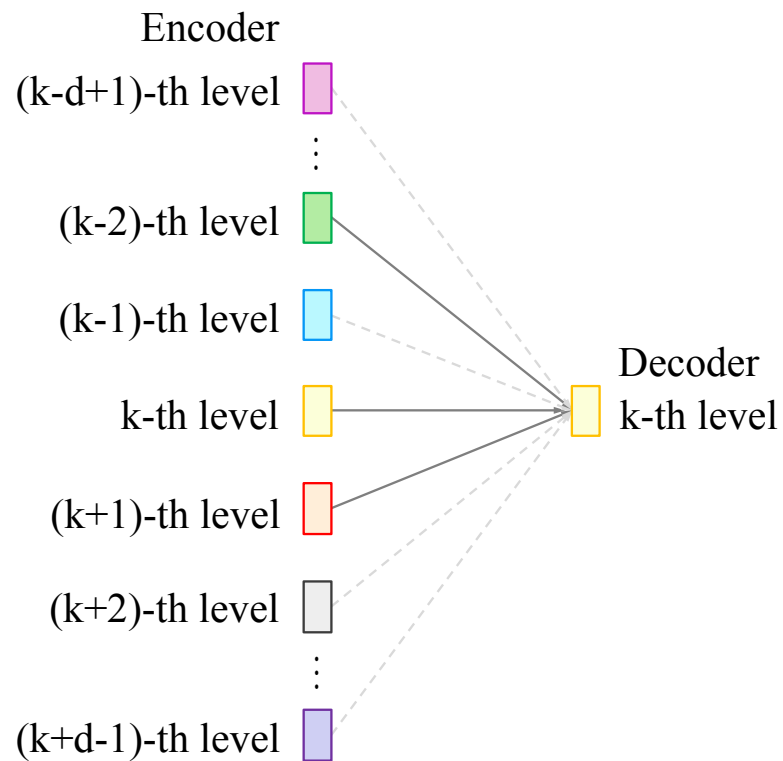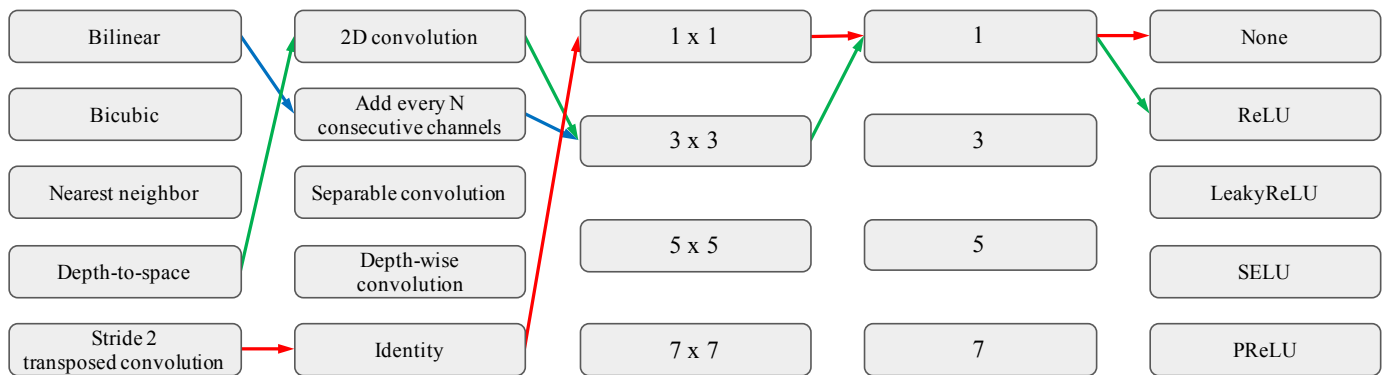Degradation e.g., downsampling → Degraded prediction ←→ Loss ←→ Observation

NAS-DIP (Ours)
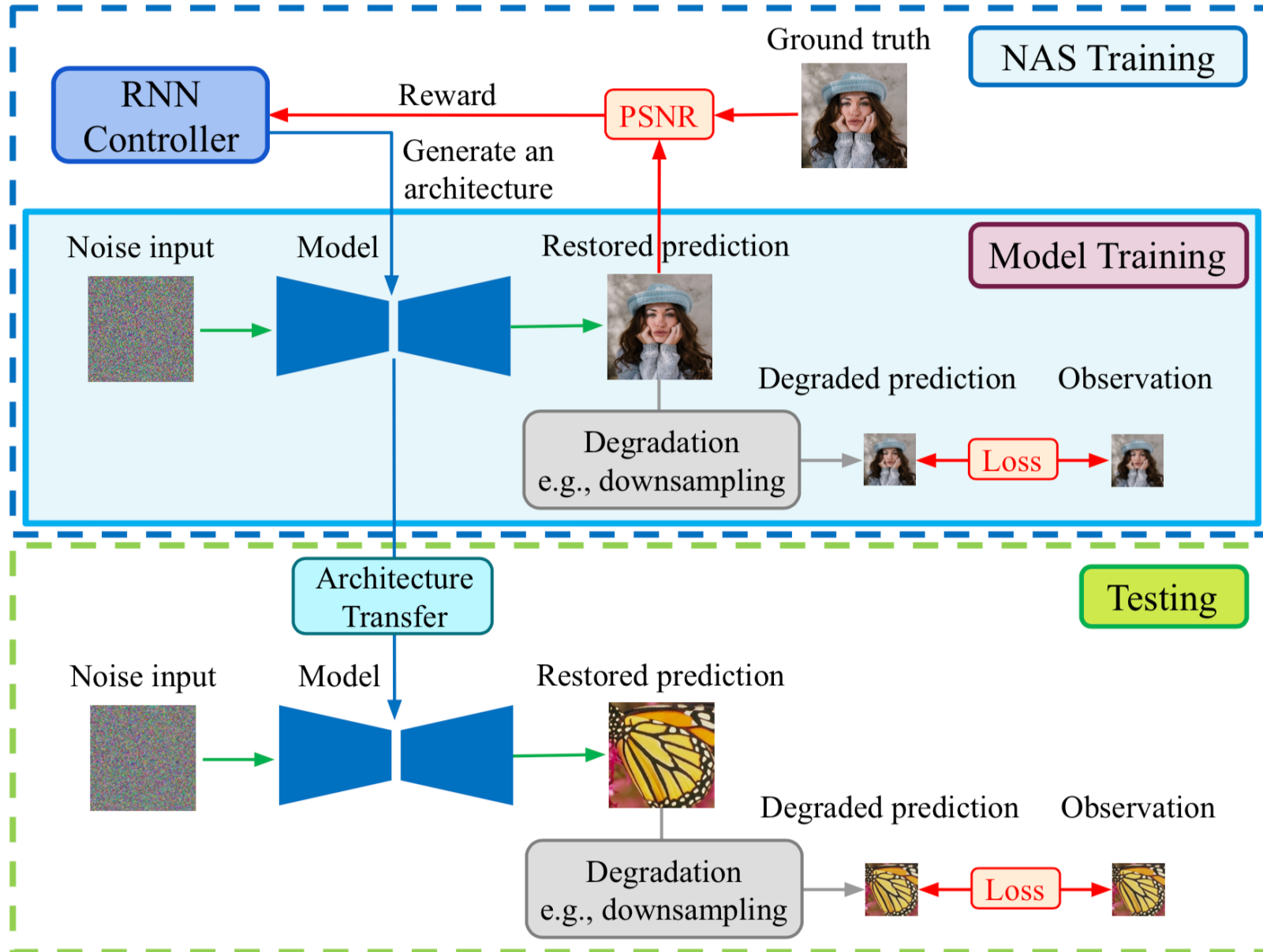
Proposed Method

- Search space for the upsampling cell.

- Search space for the cross-level residual connections.

Results

Method	Set5			Set14		
	2×	4×	8×	2×	4×	8×
Bicubic	33.66	28.44	24.37	30.24	26.05	23.09
Glasner et al.	-	28.84	-	-	26.46	-
TV prior	-	28.85	24.87	-	26.42	23.48
RED	-	30.23	25.56	-	27.36	23.89
DeepRED	-	30.72	26.04	-	27.63	24.28
SelfExSR	**36.60**	30.34	25.49	**32.24**	27.41	23.92
DIP	33.19	29.89	25.88	29.80	27.00	24.15
Ours	35.32	**30.81**	**26.41**	31.58	**27.84**	**24.59**

Method	Inpainting	Denoising
Papyan et al.	31.19	-
DIP	33.48	30.43
SGLD	34.51	30.81
Ours	**34.72**	**31.42**

Ground truth　　　Bicubic　　　DIP　　　LapSRN　　　Ours

Model Transferability
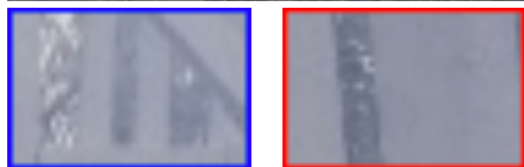
Hazy image | Ground truth | DoubleDIP (U-Net) | DoubleDIP (Ours)

Winter → Summer
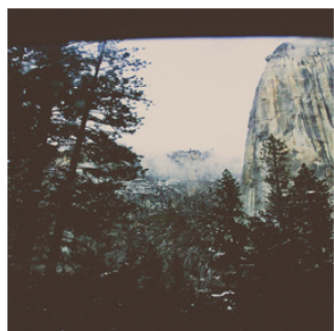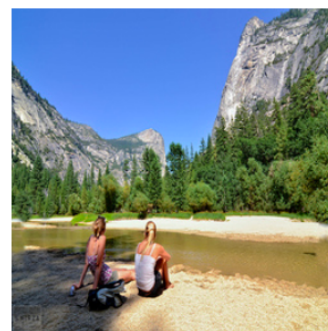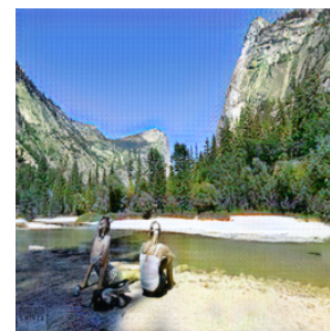
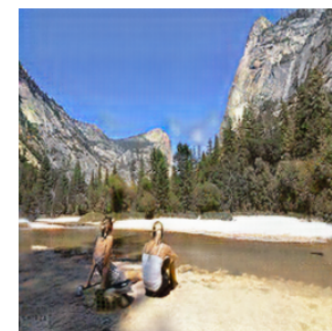Summer → Winter

Input | CycleGAN (U-Net) | CycleGAN (Ours) | Input | CycleGAN (U-Net) | CycleGAN (Ours)

For more details, please visit bit.ly/NAS-DIP