

Introduction

- **Inverse convolution** estimation is required for the upsampling layers
- Generally, **transposed convolution** layers are used to approximate the results of inverse convolution
- Replace the transposed convolution layers with ones that estimate the inverse convolution while **sharing weights** of the trained convolution layers

Proposed Methodology

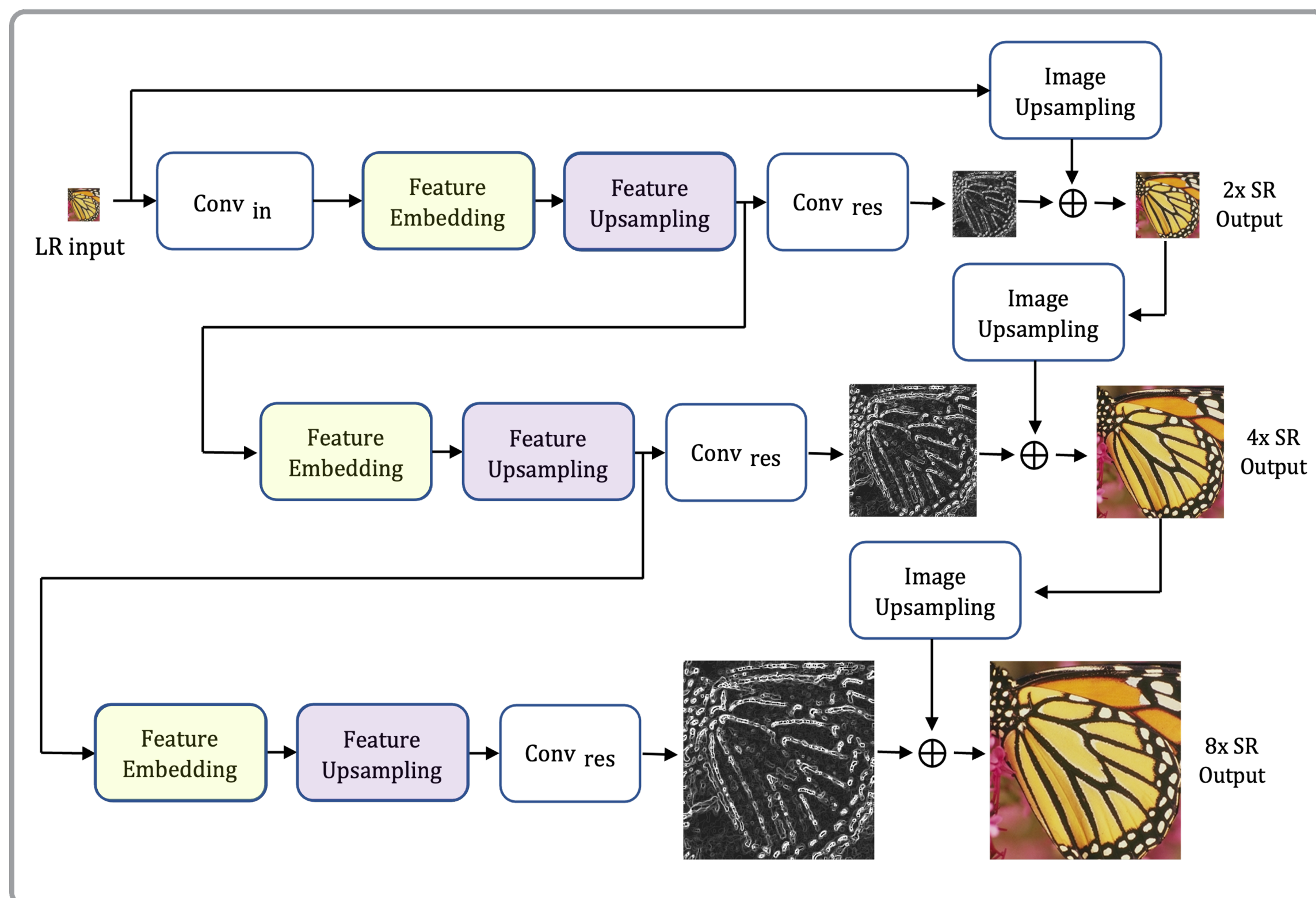


Figure 1. Architecture of the proposed CMS-LapSRN model

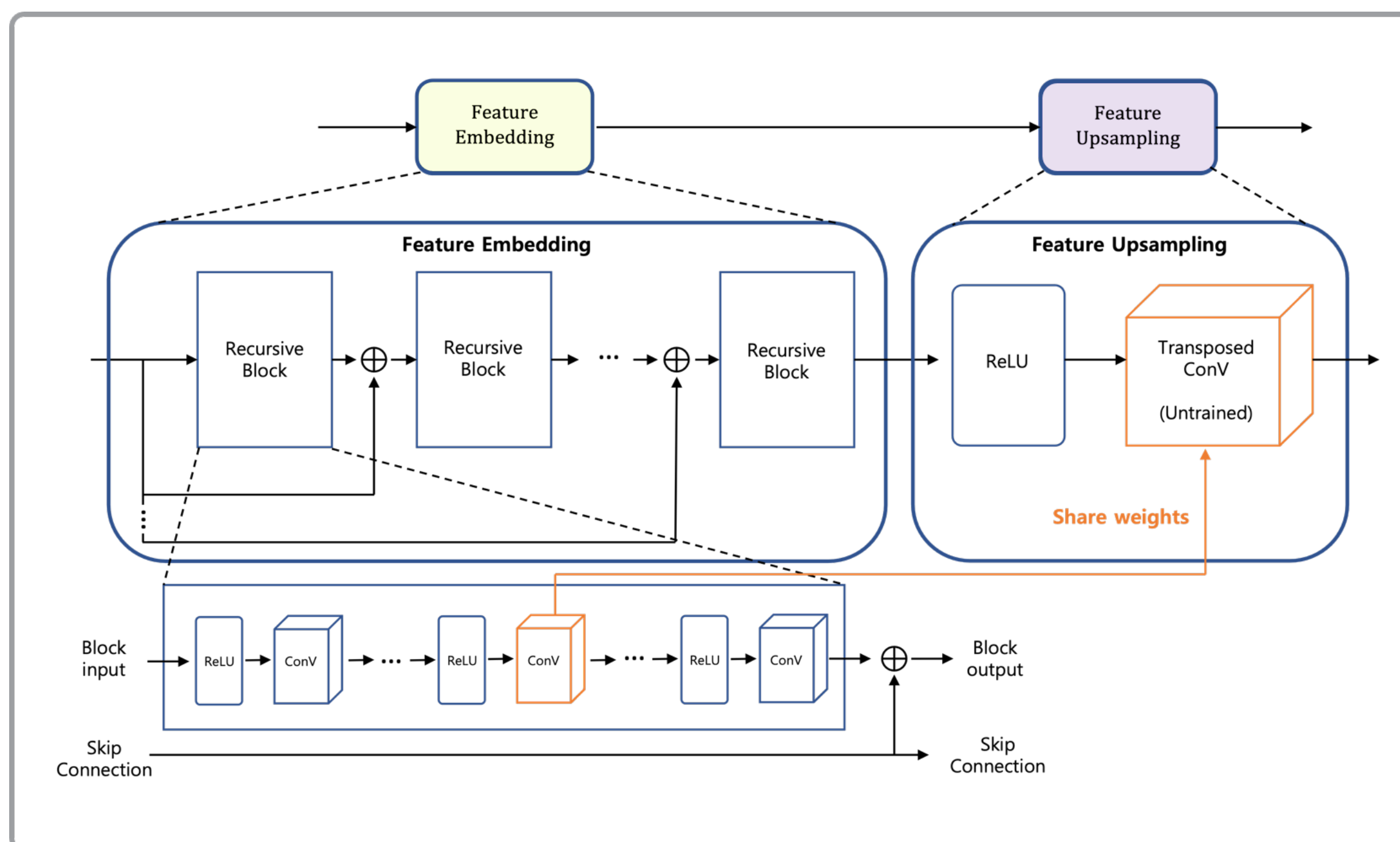
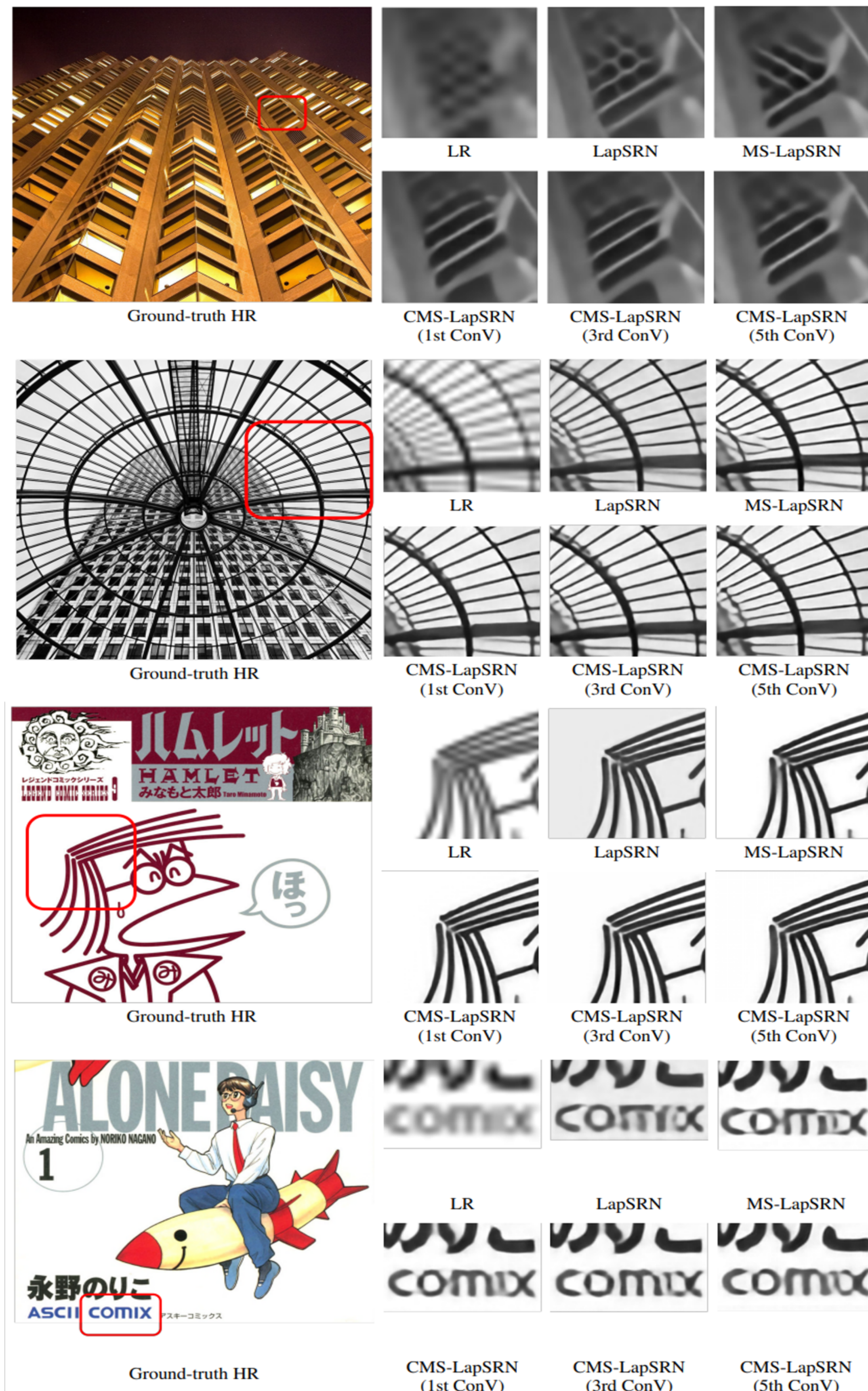


Figure 2. Weight-sharing method for model compression

Experimental Results



- Detects **topological structures** such as grids and orthogonal structures more precisely
- **Removes noise** between objects more effectively and captures the structure of letters more accurately

Table 1. Quantitative evaluation of LPF-based SR models

Model	Scale	SET5	SET14	BSDS100	URBAN100	MANGA109
		PSNR / SSIM	PSNR / SSIM	PSNR / SSIM	PSNR / SSIM	PSNR / SSIM
Bicubic	2x	33.69 / 0.931	30.25 / 0.870	29.57 / 0.844	26.89 / 0.841	30.86 / 0.936
LapSRN		37.24 / 0.957	32.78 / 0.910	31.78 / 0.892	30.60 / 0.911	36.73 / 0.971
MS-LapSRN		36.76 / 0.955	32.57 / 0.908	31.38 / 0.888	29.59 / 0.899	36.16 / 0.970
CMS-LapSRN (1st ConV)		36.65 / 0.954	32.50 / 0.906	31.31 / 0.886	29.44 / 0.895	36.04 / 0.967
CMS-LapSRN (3rd ConV)		36.88 / 0.955	32.61 / 0.908	31.44 / 0.888	29.61 / 0.898	36.31 / 0.970
CMS-LapSRN (5th ConV)		36.46 / 0.954	32.38 / 0.905	31.23 / 0.885	29.34 / 0.894	35.37 / 0.968
Bicubic	4x	28.43 / 0.811	26.01 / 0.704	25.97 / 0.670	23.15 / 0.660	24.93 / 0.790
LapSRN		31.33 / 0.884	27.80 / 0.769	27.31 / 0.724	25.26 / 0.757	29.03 / 0.886
MS-LapSRN		31.48 / 0.885	28.19 / 0.771	27.30 / 0.726	25.35 / 0.761	29.27 / 0.890
CMS-LapSRN (1st ConV)		31.44 / 0.884	28.20 / 0.771	27.31 / 0.726	25.36 / 0.761	29.26 / 0.890
CMS-LapSRN (3rd ConV)		31.51 / 0.884	28.19 / 0.770	27.32 / 0.726	25.38 / 0.762	29.37 / 0.891
CMS-LapSRN (5th ConV)		31.52 / 0.884	28.19 / 0.769	27.31 / 0.724	25.29 / 0.758	29.17 / 0.888
Bicubic	8x	24.40 / 0.658	23.10 / 0.566	23.67 / 0.548	20.74 / 0.516	21.47 / 0.650
LapSRN		26.19 / 0.750	24.29 / 0.624	24.61 / 0.585	21.97 / 0.589	23.72 / 0.741
MS-LapSRN		26.39 / 0.754	24.66 / 0.629	24.61 / 0.587	22.09 / 0.596	23.87 / 0.751
CMS-LapSRN (1st ConV)		26.34 / 0.753	24.60 / 0.627	24.61 / 0.587	22.08 / 0.596	23.86 / 0.751
CMS-LapSRN (3rd ConV)		26.40 / 0.756	24.68 / 0.629	24.60 / 0.587	22.12 / 0.598	23.92 / 0.754
CMS-LapSRN (5th ConV)		26.35 / 0.753	24.60 / 0.627	24.60 / 0.586	22.05 / 0.594	23.82 / 0.749



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