# Selective Bokeh Effect Transformation

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Problem Statement

Bokeh effect transformation aims to convert bokeh effects from one camera lens to another. In this paper, we mainly consider the transformation of lens type and blur amount.
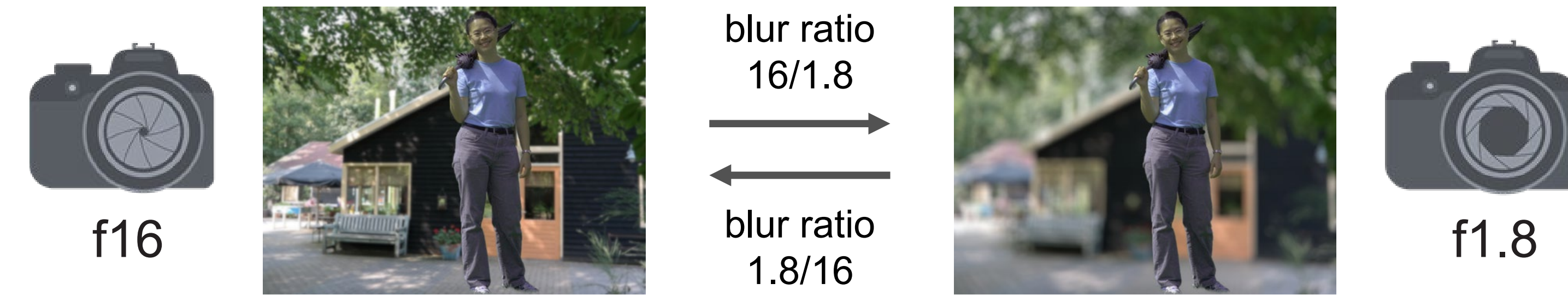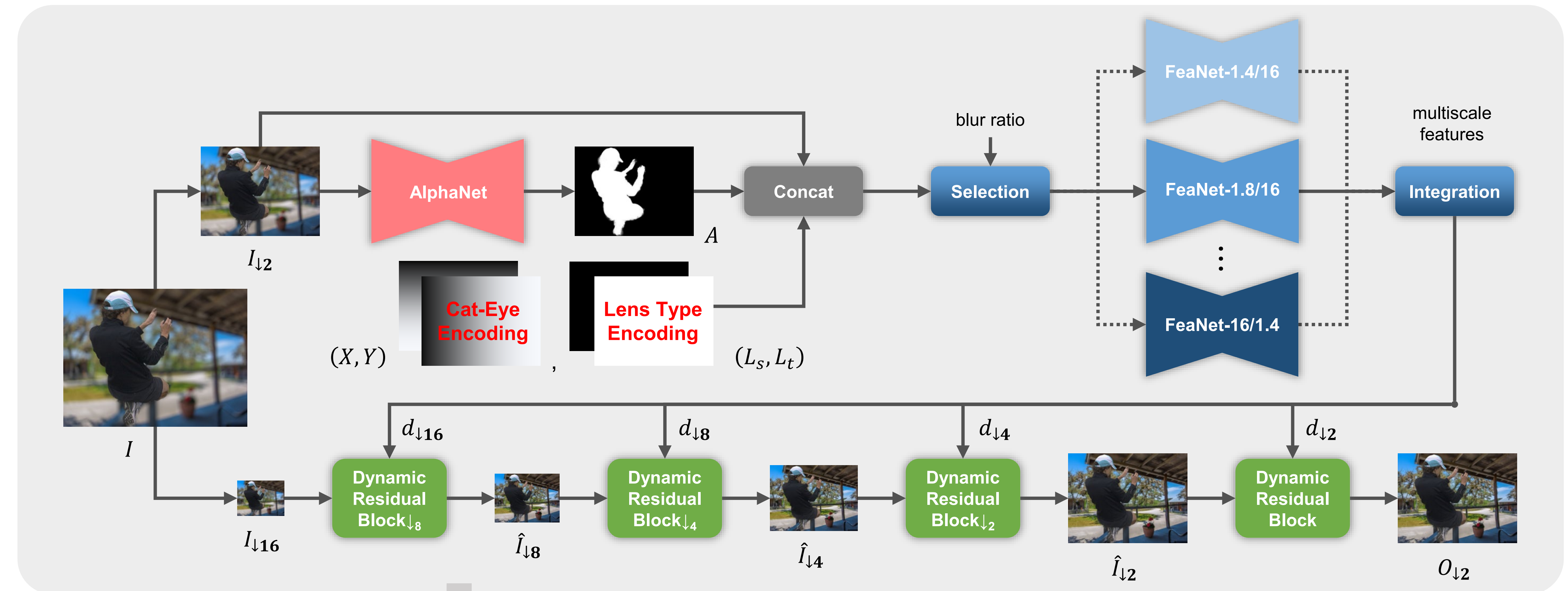

Transformation of **Lens Type** & **Blur Amount**

Canon50mmf1.4 → Sony50mmf16.0

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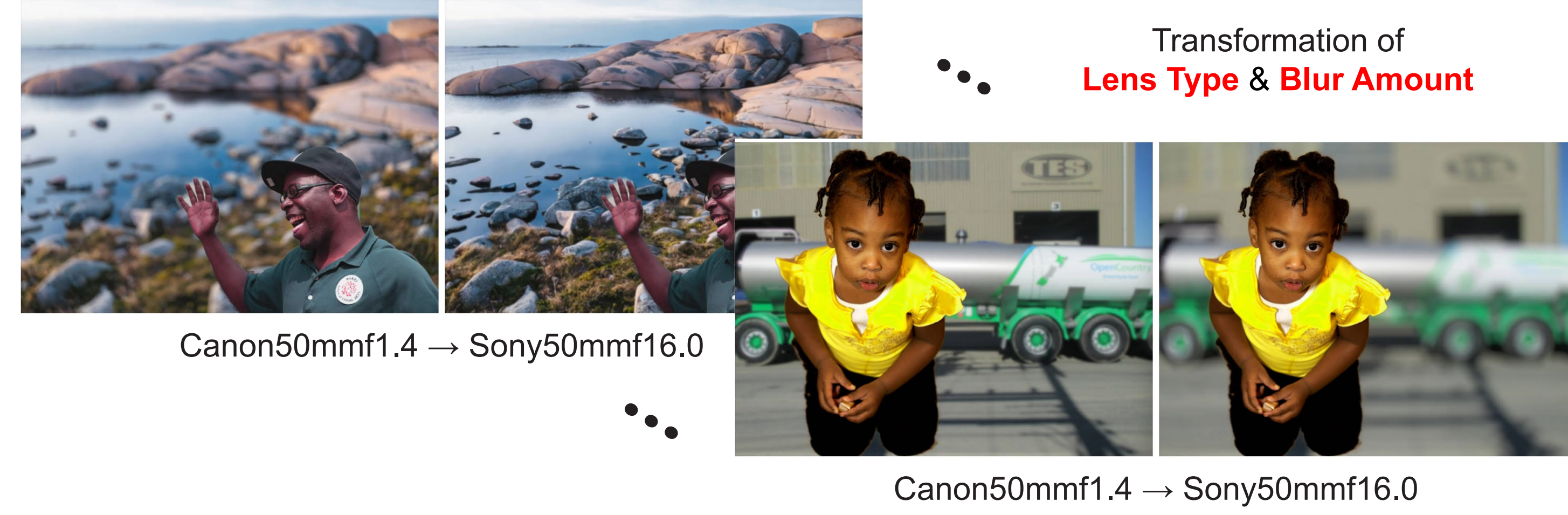
Blur Ratio

To perform blur amount transformation, we define blur ratio η:
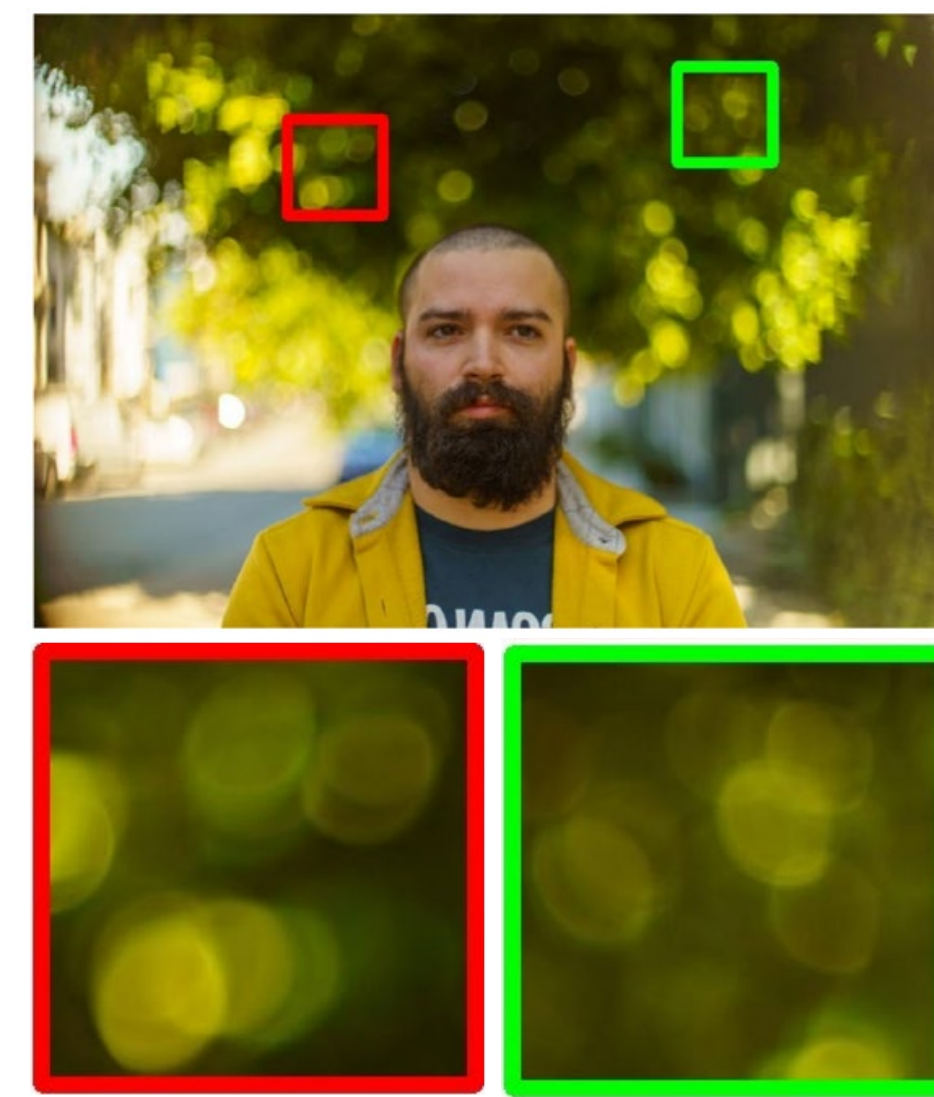
$$\eta = \frac{S_t}{S_s} = \frac{l_t^2 f_s}{l_s^2 f_t},$$

where subscript t and s denote target lens and source lens. S is defocus map. l is focal length. f is f-number.

f16   blur ratio 16/1.8   →
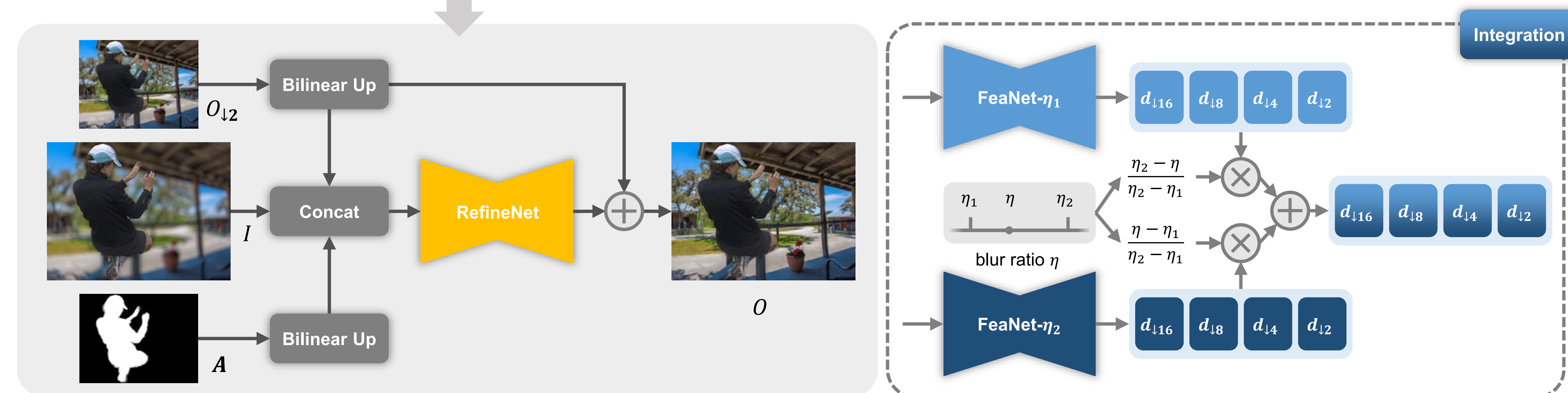   ←   blur ratio 1.8/16   f1.8

Method

Cat-Eye Encoding

Blurring pattern varies in different areas

Integration in feature level to implement **blur amount** transformation with an arbitrary blur ratio which may not exist in the training dataset

GitHub: https://juewenpeng.github.io/SBTNet/

Experiments

NTIRE 2023 Bokeh Effect Transformation Challenge Results:

Methods	Synthetic + Real			Real	
	PSNR↑	SSIM↑	LPIPS↓	PSNR↑	LPIPS↓
NAFBNET	**35.264**	**0.9362**	<u>0.0985</u>	0.8416	0.2186
SBTNet (Ours)	<u>34.572</u>	<u>0.9361</u>	**0.0966**	<u>0.8435</u>	0.2224
CBTNet	32.326	0.9333	0.1076	0.8420	0.2230
BokehOrNot	32.288	0.9327	0.1130	0.8423	0.2199
SGLMS	32.076	0.9324	0.1076	0.8419	**0.2161**
IR-SDE	30.866	0.9297	0.1301	0.8427	0.2387
BGNet	30.866	0.9297	0.1301	0.8427	0.2387
JiXiangNiu	27.970	0.9213	0.1542	**0.8455**	<u>0.2175</u>
EBokehNet-s (Organizers)	34.543	0.9350	0.1039	0.8414	0.2206
EBokehNet (Organizers)	35.521	0.9362	0.0993	0.8412	0.2208

Ablation Study on Cat-Eye Encoding:

Coordinate Map	PSNR↑	SSIM↑	LPIPS↓
w/o	43.567	0.9892	0.0352
w/	**45.627**	**0.9946**	**0.0331**

Integration in Image Level vs. in Feature Level:

Integration Mode	PSNR↑	SSIM↑	LPIPS↓
Canon50mmf1.8 → Sony50mmf16.0			
Image Level	35.755	0.9850	0.0684
Feature Level	**35.768**	**0.9851**	**0.0675**
Sony50mmf16.0 → Canon50mmf1.8			
Image Level	37.282	0.9894	0.0752
Feature Level	**38.005**	**0.9921**	**0.0555**

Qualitative Results:

Synthetic

Canon50mmf1.4 → Sony50mmf16.0   Canon50mmf1.8 → Sony50mmf16.0   Canon50mmf1.4 → Sony50mmf1.8

Sony50mmf16.0 → Canon50mmf1.4   Sony50mmf16.0 → Canon50mmf1.8   Sony50mmf1.8 → Canon50mmf1.4

Real

Canon50mmf1.4 → Sony50mmf1.8   Canon50mmf1.4 → Sony50mmf1.8   Canon50mmf1.4 → Sony50mmf1.8

Sony50mmf1.8 → Canon50mmf1.4   Sony50mmf1.8 → Canon50mmf1.4   Sony50mmf1.8 → Canon50mmf1.4