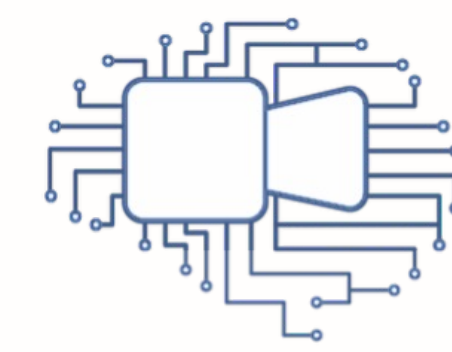


Local Feature Extraction from Salient Regions by Feature Map Transformation

Yerim Jung, Nur Suriza Syazwany, Sang-Chul Lee

Department of Electrical and Computer Engineering, Inha University, South Korea



BMVC
2022



COMPUTER VISION LAB.,
School of Artificial Intelligence,
Inha University

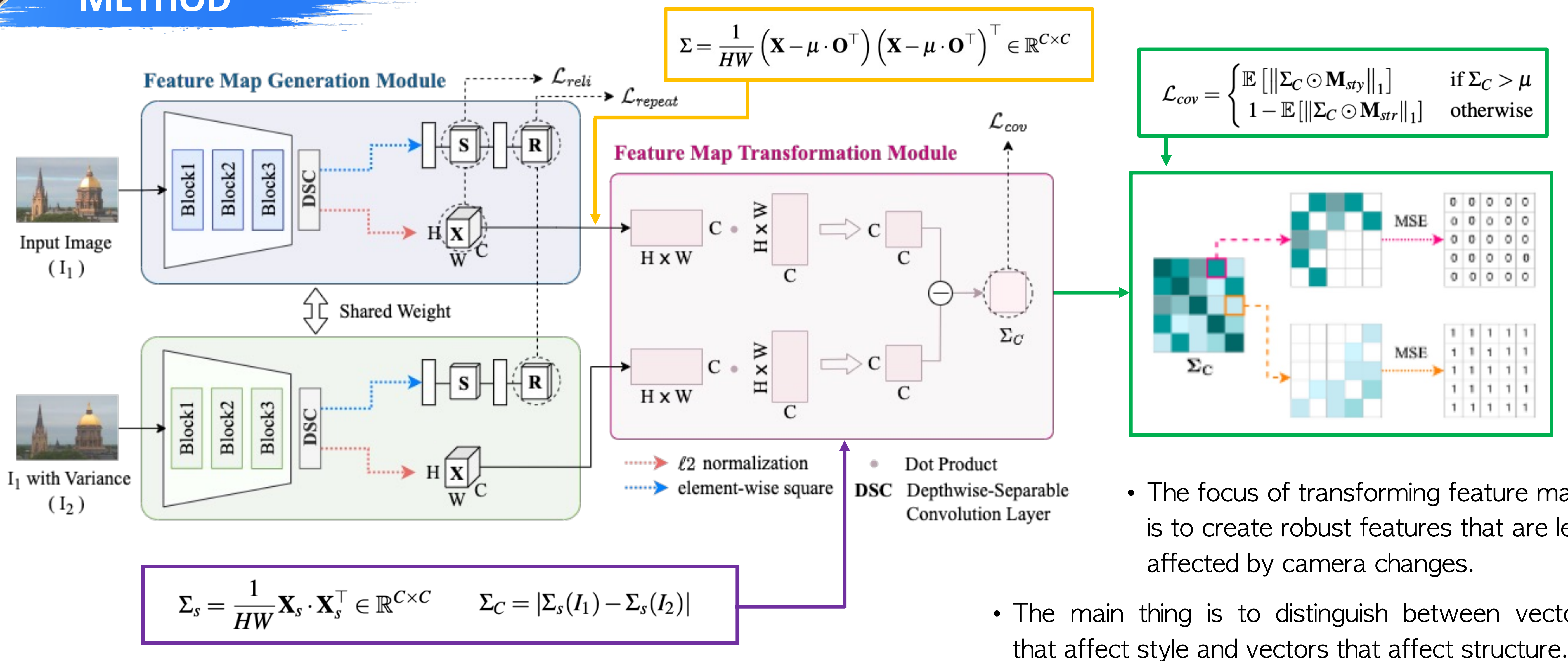
INTRODUCTION

- Local feature matching is essential for many applications, such as localization and 3D reconstruction.
- However, it is challenging to match feature points accurately in various camera viewpoints and illumination conditions.
- We propose a framework that robustly extracts and describes salient local features regardless of changing light and viewpoints.

CONTRIBUTION

- Overcome the limitation of feature matching in image variance by distinguishing between structure- and style-dependent features and transforming the feature maps.
- Feature Map Transformation module exploits an existing style transfer concept that concentrates only on style components, to transform the feature map to make it focus on salient features.

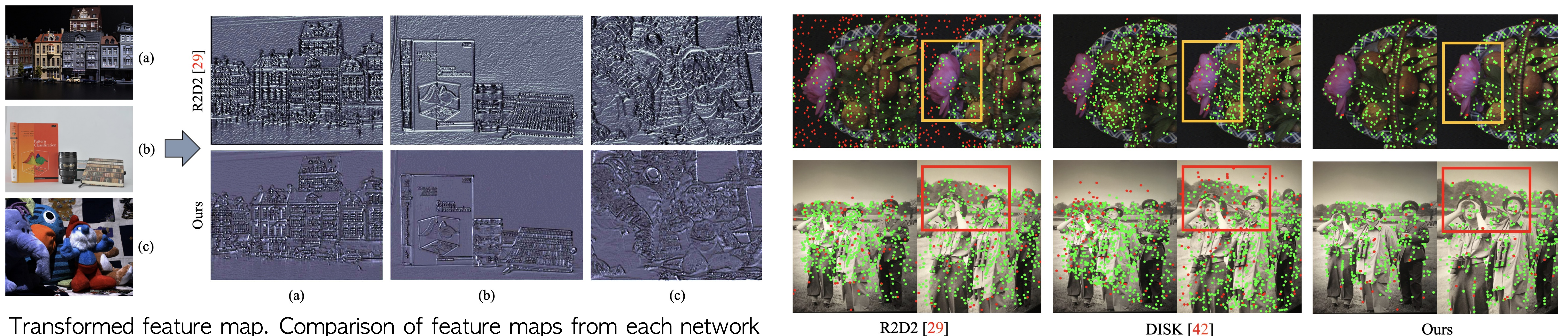
METHOD



- The focus of transforming feature maps is to create robust features that are less affected by camera changes.

- The main thing is to distinguish between vectors that affect style and vectors that affect structure.

QUALITATIVE RESULTS



Transformed feature map. Comparison of feature maps from each network indicates the tendency in which we change the feature map; eliminates style information refers to noise, while structure complexity enlarges.

Qualitative Results on Hpatches.

QUANTITATIVE RESULTS

Aachen Evaluation

	Day			Night		
	0.5m, 2°	1m, 5°	5m, 10°	0.5m, 2°	1m, 5°	5m, 10°
SuperPoint [7]	85.3	91.9	94.5	58.6	74.3	85.9
D2-Net [8]	81.6	89.3	96.2	62.8	80.6	92.7
R2D2 [29]	89.9	95.4	98.4	69.6	85.9	96.3
DISK [42]	-	-	-	72.3	86.4	97.9
Ours	90.4	96.1	98.9	72.3	89.0	96.9
LoFTR* [38]	-	-	-	72.8	88.5	99.0
Patch2Pix* [45]	86.4	93.0	97.5	72.3	88.5	97.9

MMA@3 on Hpatches

	MMA@3		
	Overall	Illum.	Viewp.
Hes.Aff. [28]	56.24	51.35	60.79
DELFF(new) [24]	49.43	89.73	12.02
SuperPoint [7]	64.45	69.38	59.88
LF-Net [25]	53.01	57.31	49.02
D2-Net [8]	39.76	44.99	34.91
R2D2 [29]	70.06	75.56	64.96
ASLFeat [22]	72.28	75.47	68.28
DISK [42]	75.34	79.43	71.53
Ours	78.41	83.22	73.94

Ablation Studies

	HPatches			Aachen (Day)			Aachen (Night)		
	Overall	Illum	Viewp	0.5m, 2°	1m, 5°	5m, 10°	0.5m, 2°	1m, 5°	5m, 10°
w/o \mathcal{L}_{sty} & \mathcal{L}_{str}	70.06	75.56	64.96	89.9	95.4	98.4	69.6	85.9	96.3
w/o \mathcal{L}_{sty}	72.08	78.04	66.55	89.8	96.1	98.7	73.3	88.5	95.3
w/o \mathcal{L}_{str}	76.53	81.43	71.99	89.7	95.8	98.5	69.6	84.8	96.3
w/o DSC	76.89	81.95	72.19	89.9	95.3	98.2	69.1	85.9	93.7
w/ All	78.41	83.22	73.94	90.4	96.1	98.9	72.3	89.0	96.9