Distraction-aware Shadow Detection

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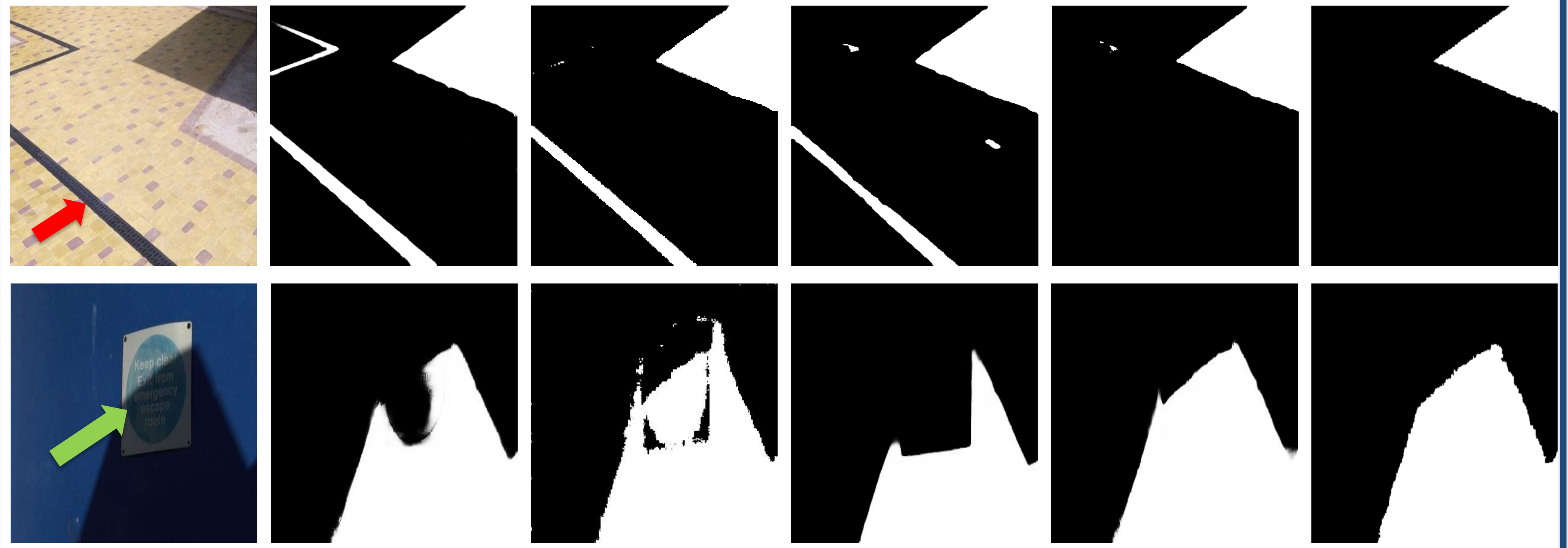
1 Introduction

Motivation



Existing methods easily mis-detect in the *Distraction* regions, i.e., the non-shadow region that appears like shadow (indicating by the red arrow in the top row) and the shadow region that appears like a non-shadow pattern (indicating by the green arrow in the bottom row).

Contributions

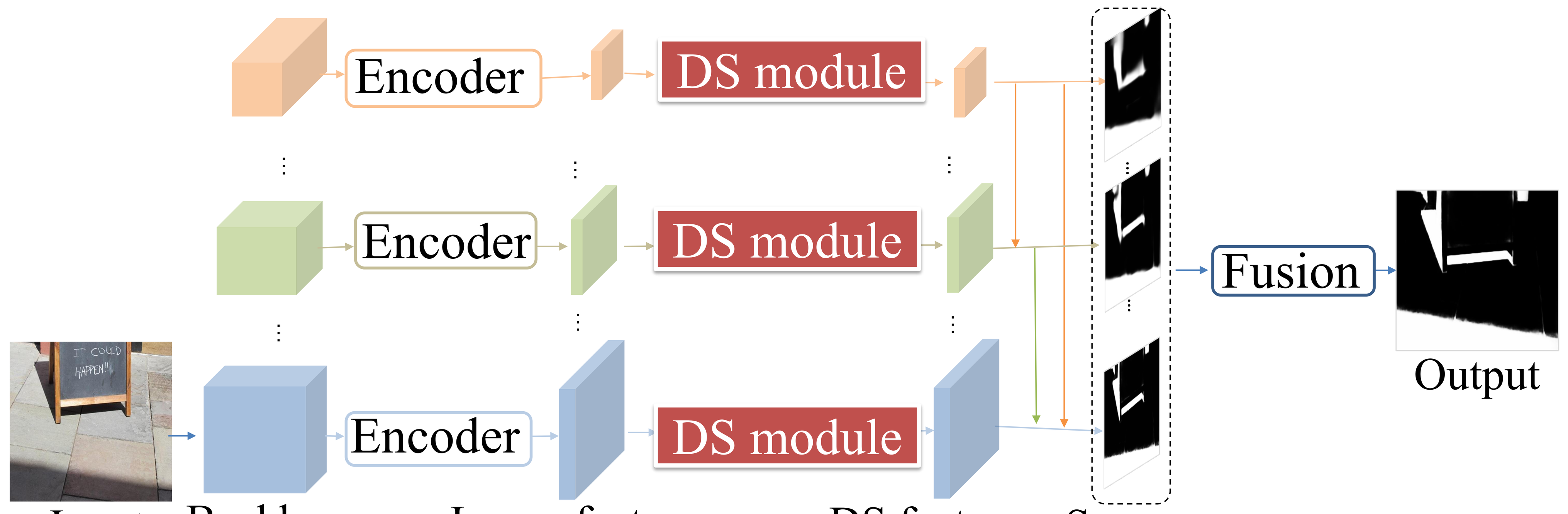
- ✓ We introduce the concept of distraction to the shadow detection problem, allowing more accurate detection of shadows.
- ✓ We propose a distraction-aware shadow module to integrate the distraction semantics into our end-to-end multi-scale shadow detection framework.
- ✓ We experimentally demonstrate that our model achieves the state-of-the-art shadow detection performance

Distraction Concept

We refer to these ambiguous regions as distraction, and consider two types of distractions: false positive distraction (FPD) - shadow-like non-shadow regions, and false negative distraction (FND) - shadow regions with non-shadow patterns.

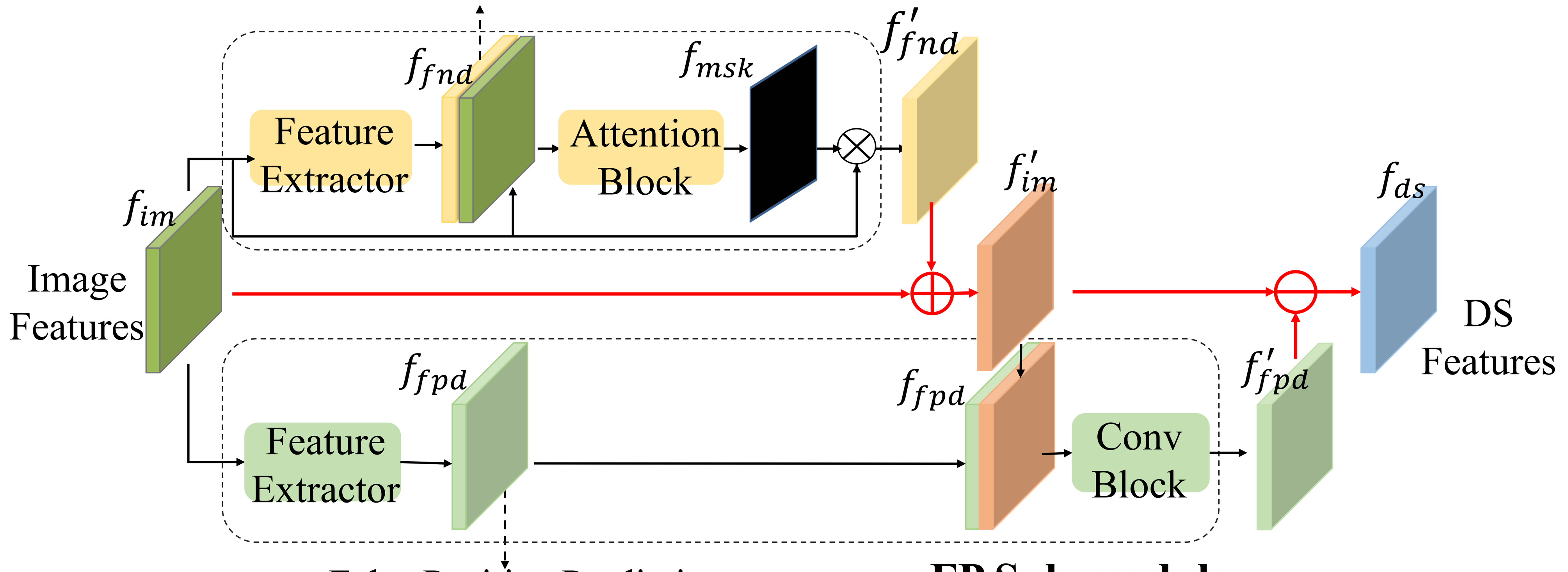
2 Approach

Architecture



We propose a multi-scale **distraction-aware** framework for shadow detection.

Distraction-aware (DS) Module



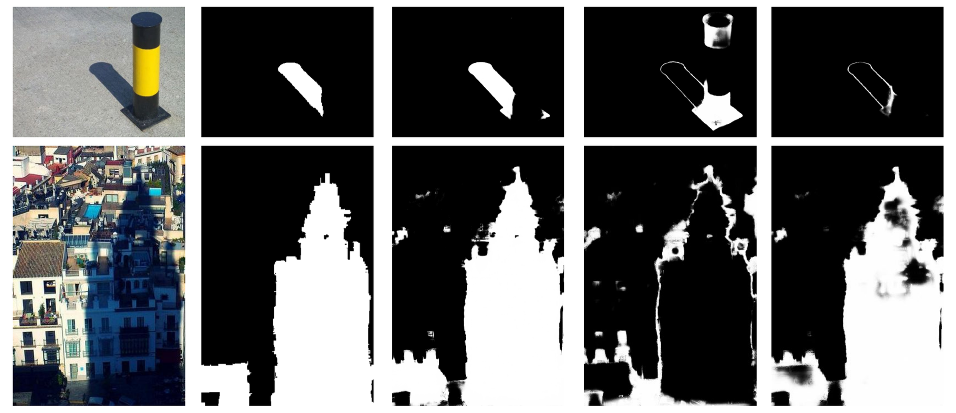
The DS module aims to learn distraction-aware, discriminate features by explicitly predicting false positives and false negatives.

3 Evaluation

Deriving Distraction Supervision

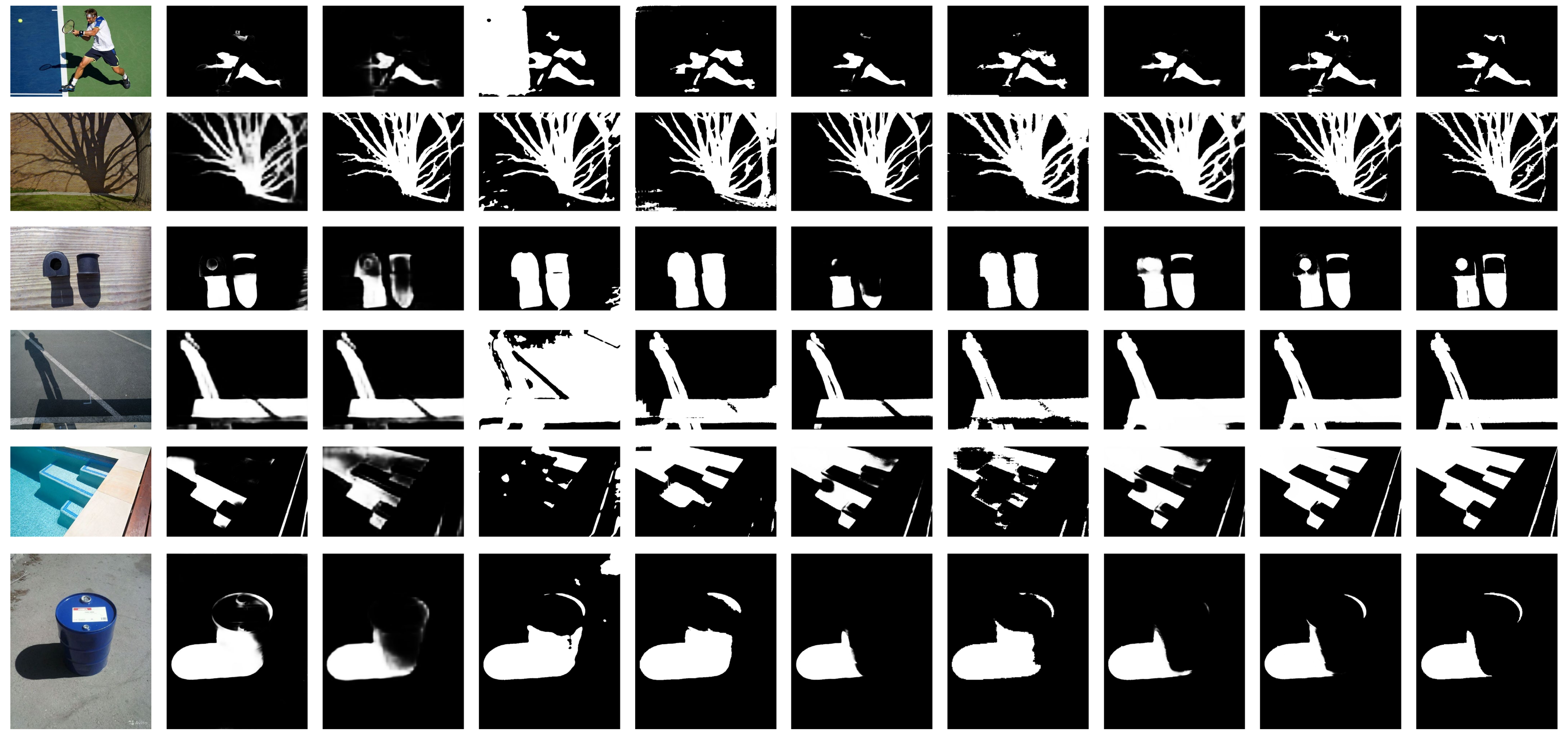
	SBU	UCF	ISTD
No supervision	3.84	7.60	2.23
Single model	3.75	8.73	2.74
Our model	4.04	8.37	2.90
Multiple models	**3.45**	**7.59**	**2.17**

Results of different strategies for generating distraction supervision.



Effects of Distraction Semantics.

Qualitative Results



Quantitative Results

	SBU			UCF			ISTD		
methods	BER	Shadow	Non Shad.	BER	Shadow	Non Shad.	BER	Shadow	Non Shad.
DSDNet (Ours)	**3.45**	**3.33**	3.58	**7.59**	9.74	5.44	**2.17**	1.36	2.98
BDRAR [42]	3.64	3.40	3.89	7.81	9.69	5.94	2.69	**0.50**	4.87
ADNet [21]	5.37	4.45	6.30	9.25	8.37	10.14	-	-	-
DSC [12]	5.59	9.76	**1.42**	10.54	18.08	**3.00**	3.42	3.85	3.00
ST-CGAN [34]	8.14	3.75	12.53	11.23	**4.94**	11.23	3.85	2.14	5.55
scGAN [24]	9.04	8.39	9.69	11.52	7.74	15.30	4.70	3.22	6.18
Stacked-CNN [32]	10.80	8.84	12.76	13.0	9.0	17.1	8.60	7.96	9.23
RAS [1]	7.31	12.13	2.48	13.62	23.06	4.18	11.14	19.88	2.41
SRM [35]	6.51	10.52	2.50	12.51	21.41	3.60	7.92	13.97	**1.86**