RenDetNet: Weakly-Supervised Shadow Detection with Shadow Caster Verification

Nikolina Kubiak, Elliot Wortman, Armin Mustafa, Graeme Phillipson, Stephen Jolly, Simon Hadfield

In this paper...

- ➔ We propose a weakly-supervised model for shadow detection
- ➔ We present an automated, caster-aware dataset generation pipeline with no human input
- ➔ We demonstrate that our RenDetNet compares favourably against SOTA

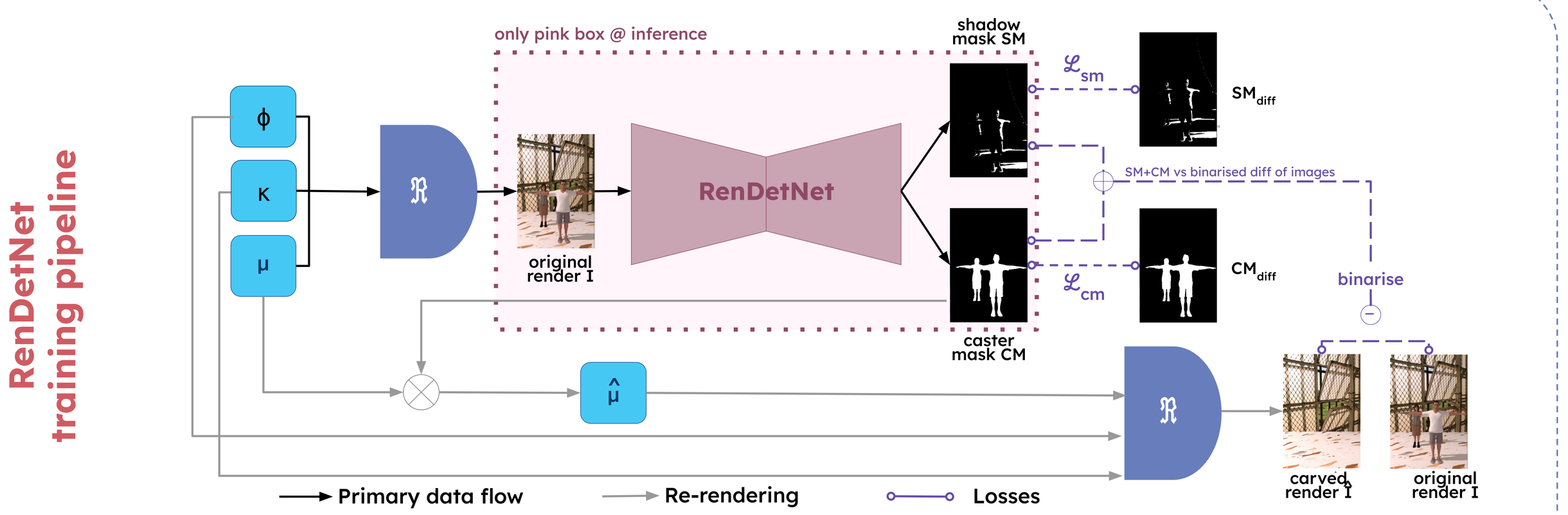
Shadow-Caster Verification

MOTIVATION

- ➔ Existing shadow detection models tend to confuse shadows with dark image regions
- ➔ The logic: real shadows will be cast by real objects (casters)

TRAINING PIPELINE

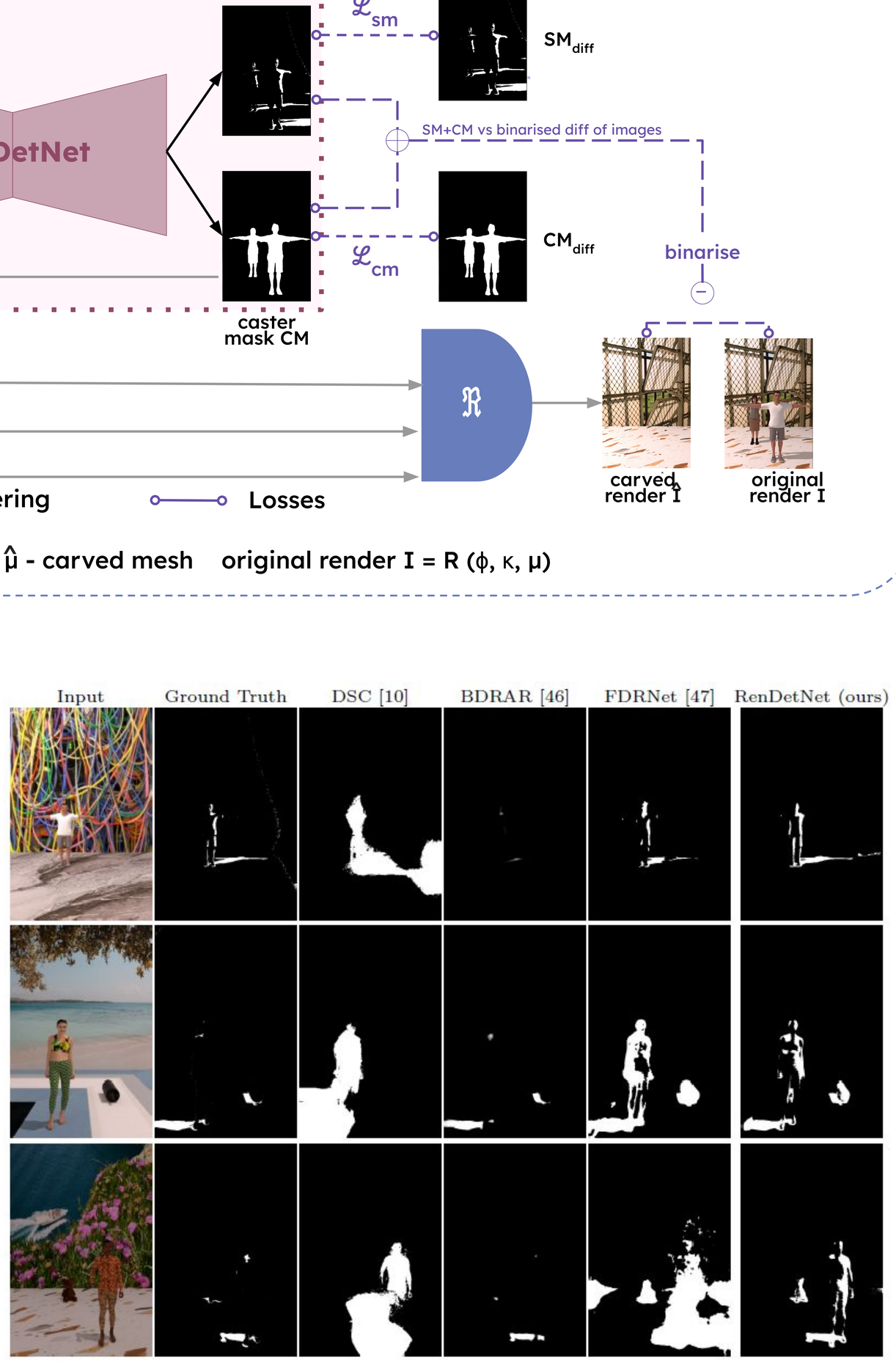
1. Observe a rendered 3D scene (1-3 meshes in an env)
2. Predict shadows and their casters (masks)
3. Use the caster mask to mask out the caster mesh
4. Re-render the scene & observe any differences
   a. If masking the caster also made the shadow disappear, the caster was causing this shadow → it was a real shadow!
   b. If masking the caster led to no difference in terms of shadows, the shadow was NOT cast by the caster → fake shadow (e.g. dark region)



Evaluations

We retrain DSC, BDRAR and FDRNet on our synthetic render datasets for these state-of-the-art comparisons.

Dataset	Model	BER ↓	BER(S) ↓	BER(NS) ↓
#1	DSC	14.716	19.256	10.176
	BDRAR	8.619	15.887	**1.352**
	FDRNet	7.276	**10.714**	3.839
	RenDetNet (ours)	**6.344**	11.010	1.679
#2	DSC	15.029	16.599	13.459
	BDRAR	15.415	30.359	**0.472**
	FDRNet	**11.634**	**14.449**	8.820
	RenDetNet (ours)	11.992	21.347	2.639



(row 1: Dataset #1; rows 2-3: Dataset #2)

email: n.kubiak@surrey.ac.uk

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