	Method	Dataset					
		ASCADv1 (fixed)	ASCADv1 (random)	DPAv4 (Zaid version)	AES-HD	OTiAiT	OTP
	Random	-0.02 ± 0.04	0.00 ± 0.02	-0.01 ± 0.01	-0.02 ± 0.02	0.00 ± 0.02	0.00 ± 0.04
First-order parametric methods	SNR	0.031	-0.092	0.344	0.184	$\boxed{0.989}$	$\boxed{0.944}$
	SOSD	-0.253	0.272	0.259	0.063	0.886	0.803
	CPA	0.521	-0.095	$\boxed{0.420}$	$\boxed{0.303}$	0.630	0.945
Neural net attribution	GradVis	0.585 ± 0.009	0.34 ± 0.05	0.27 ± 0.01	0.03 ± 0.03	0.21 ± 0.05	0.58 ± 0.02
	Saliency	0.579 ± 0.009	0.34 ± 0.05	0.279 ± 0.009	0.03 ± 0.03	0.51 ± 0.03	0.57 ± 0.04
	Input $*$ Grad	0.58 ± 0.01	0.34 ± 0.05	0.278 ± 0.008	0.03 ± 0.03	0.61 ± 0.03	0.58 ± 0.04
	LRP	0.58 ± 0.01	0.34 ± 0.05	0.278 ± 0.008	0.03 ± 0.03	0.61 ± 0.03	0.58 ± 0.04
	1-Occlusion	0.59 ± 0.01	0.34 ± 0.05	0.282 ± 0.009	0.03 ± 0.03	0.61 ± 0.03	0.58 ± 0.04
	m-Occlusion†	0.60 ± 0.01	0.48 ± 0.06	$\underline{0.353 \pm 0.009}$	0.18 ± 0.10	0.77 ± 0.02	0.74 ± 0.02
	2$^{\text{nd}}$-order 1-Occlusion	0.625 ± 0.009	0.35 ± 0.05	0.29 ± 0.01	0.03 ± 0.03	0.71 ± 0.03	0.58 ± 0.03
	OccPOI	0.06 ± 0.03	0.05 ± 0.01	0.025 ± 0.003	0.03 ± 0.03	0.08 ± 0.01	0.10 ± 0.03
	OccPOI (Released result)	0.104	0.051	n/a	0.049	n/a	n/a
	OccPOI-Extended*	0.13 ± 0.05	0.091 ± 0.05	0.18 ± 0.02	0.05 ± 0.05	0.53 ± 0.05	0.37 ± 0.01
	GradVis (ZaidNet)	0.25 ± 0.03	n/a	0.19 ± 0.01	0.13 ± 0.02	n/a	n/a
	Saliency (ZaidNet)	0.25 ± 0.03	n/a	0.19 ± 0.01	0.13 ± 0.02	n/a	n/a
	Input $*$ Grad (ZaidNet)	0.25 ± 0.04	n/a	0.19 ± 0.01	0.13 ± 0.02	n/a	n/a
	1-Occlusion (ZaidNet)	0.24 ± 0.03	n/a	0.282 ± 0.009	0.13 ± 0.02	n/a	n/a
	2$^{\text{nd}}$-order 1-Occlusion (ZaidNet)	0.31 ± 0.03	n/a	0.19 ± 0.01	0.13 ± 0.02	n/a	n/a
	OccPOI (ZaidNet)	0.07 ± 0.02	n/a	0.09 ± 0.02	0.06 ± 0.01	n/a	n/a
	OccPOI-Extended* (ZaidNet)	0.11 ± 0.03	n/a	0.10 ± 0.04	0.11 ± 0.03	n/a	n/a
	GradVis (WoutersNet)	0.19 ± 0.03	n/a	0.21 ± 0.02	0.11 ± 0.03	n/a	n/a
	Saliency (WoutersNet)	0.19 ± 0.03	n/a	0.21 ± 0.02	0.11 ± 0.03	n/a	n/a
	Input $*$ Grad (WoutersNet)	0.18 ± 0.03	n/a	0.21 ± 0.02	0.11 ± 0.03	n/a	n/a
	1-Occlusion (WoutersNet)	0.18 ± 0.03	n/a	0.21 ± 0.02	0.11 ± 0.03	n/a	n/a
	2$^{\text{nd}}$-order 1-Occlusion (WoutersNet)	0.23 ± 0.02	n/a	0.21 ± 0.02	0.11 ± 0.03	n/a	n/a
	OccPOI (WoutersNet)	0.09 ± 0.04	n/a	0.056 ± 0.007	0.048 ± 0.002	n/a	n/a
	OccPOI-Extended* (WoutersNet)	0.13 ± 0.05	n/a	0.11 ± 0.03	0.07 ± 0.03	n/a	n/a
	ALL (ours)	$\boxed{\underline{0.787 \pm 0.007}}$	$\boxed{\underline{0.75 \pm 0.06}}$	0.293 ± 0.003	$\underline{0.21 \pm 0.03}$	$\underline{0.811 \pm 0.007}$	$\underline{0.887 \pm 0.002}$

Table 1: Performance of leakage localization algorithms according to the oSNR ('omniscient' signal to noise ratio) metric (**larger is better**). This metric is computed by first computing 'ground truth'-like per-timestep leakiness measurements using implementation knowledge and internal random variables which the baselines do not have access to, then computing the Spearman rank correlation coefficient between the 'ground truth' leakiness measurements and those estimated by the baseline. Best result is $\boxed{\text{boxed}}$ and best deep learning result is <u>underlined</u>. Results are reported as mean ± std. dev. over 5 random seeds. Observe that *our method outperforms all baselines by a large margin* on the ASCADv1 datasets, which are dominated by second-order leakage. On the remaining datasets, which in contrast are dominated by first-order leakage, *our method is the best deep learning method on AES-HD, OTiAiT, and OTP,* and is the second-best on DPAv4. *The algorithm as proposed in (Yap, 2025) is very time-consuming because it requires $O(T^2)$ non-parallelizable passes through the dataset. Due to time constraints, for ASCADv1 (random) and AES-HD we stop it early after 10× the runtime of ALL. †For each dataset, we use m in `np.arange(1, 51, 2)` which maximizes the oSNR metric for m-occlusion. Specifically, we use $m = 3$ for ASCADv1 (fixed), $m = 7$ for ASCADv1 (random), $m = 43$ for DPAv4, $m = 33$ for AES-HD, $m = 3$ for OTiAiT, and $m = 7$ for OTP.