| Dataset | Evaluation metric | Value of $\overline{\gamma}$ hyperparameter | | | | |
|---|---|---|---|---|---|---|
| | | 0.05 | 0.1 | 0.5 | 0.9 | 0.95 |
| ASCADv1 (fixed) | oSNR↑ | $0.751 \pm 0.009$ | $0.764 \pm 0.009$ | $0.779 \pm 0.007$ | <u>$0.81 \pm 0.01$</u> | $0.75 \pm 0.04$ |
| | Rev-DNNO↑ | <u>$125.5 \pm 0.3$</u> | <u>$125.6 \pm 0.3$</u> | <u>$125.5 \pm 0.5$</u> | $124.1 \pm 0.3$ | $123.9 \pm 0.3$ |
| | Fwd-DNNO↓ | <u>$105.8 \pm 0.4$</u> | <u>$105.9 \pm 0.4$</u> | $107.5 \pm 0.3$ | <u>$106.1 \pm 0.3$</u> | <u>$106.1 \pm 0.3$</u> |
| ASCADv1 (random) | oSNR↑ | $0.52 \pm 0.04$ | $0.56 \pm 0.04$ | <u>$0.76 \pm 0.07$</u> | $0.34 \pm 0.07$ | $0.14 \pm 0.03$ |
| | Rev-DNNO↑ | <u>$127.4 \pm 0.9$</u> | <u>$127.5 \pm 0.95$</u> | <u>$127.7 \pm 0.3$</u> | $126.7 \pm 0.97$ | $125.6 \pm 1.6$ |
| | Fwd-DNNO↓ | <u>$99 \pm 2$</u> | <u>$99 \pm 2$</u> | <u>$101 \pm 2$</u> | $103 \pm 3$ | $104. \pm 4$ |
| DPAv4 | oSNR↑ | $0.41 \pm 0.02$ | $0.42 \pm 0.02$ | <u>$0.519 \pm 0.001$</u> | $0.34 \pm 0.02$ | $0.16 \pm 0.02$ |
| | Rev-DNNO↑ | $121 \pm 1$ | $121 \pm 1$ | <u>$124.5 \pm 0.9$</u> | $120 \pm 1$ | $113.7 \pm 0.8$ |
| | Fwd-DNNO↓ | $11.4 \pm 0.5$ | $11.8 \pm 0.3$ | $12.2 \pm 0.4$ | $9.0 \pm 0.5$ | <u>$8.0 \pm 0.2$</u> |
| AES-HD | oSNR↑ | $0.28 \pm 0.06$ | $0.30 \pm 0.07$ | $0.1 \pm 0.2$ | <u>$0.41 \pm 0.03$</u> | <u>$0.40 \pm 0.04$</u> |
| | Rev-DNNO↑ | <u>$128.2 \pm 0.4$</u> | <u>$128.1 \pm 0.6$</u> | $127 \pm 1$ | <u>$128.4 \pm 0.4$</u> | <u>$128.4 \pm 0.4$</u> |
| | Fwd-DNNO↓ | <u>$126 \pm 2$</u> | <u>$126 \pm 2$</u> | <u>$127 \pm 2$</u> | <u>$126 \pm 2$</u> | <u>$126 \pm 2$</u> |
| OTiAiT | oSNR↑ | $0.866 \pm 0.002$ | $0.851 \pm 0.004$ | <u>$0.914 \pm 0.005$</u> | $0.863 \pm 0.006$ | $0.871 \pm 0.008$ |
| | Rev-DNNO↑ | <u>$4.6 \pm 0.1$</u> | <u>$4.6 \pm 0.1$</u> | <u>$4.6 \pm 0.1$</u> | $3.9 \pm 0.1$ | $3.69 \pm 0.07$ |
| | Fwd-DNNO↓ | $1.40 \pm 0.02$ | $1.43 \pm 0.03$ | $1.39 \pm 0.03$ | $1.44 \pm 0.04$ | <u>$1.14 \pm 0.03$</u> |
| OTP | oSNR↑ | $0.67 \pm 0.02$ | $0.737 \pm 0.005$ | <u>$0.911 \pm 0.001$</u> | $0.30 \pm 0.08$ | $0.08 \pm 0.03$ |
| | Rev-DNNO↑ | $1.32 \pm 0.04$ | <u>$1.34 \pm 0.05$</u> | <u>$1.38 \pm 0.04$</u> | $1.11 \pm 0.04$ | $1.05 \pm 0.01$ |
| | Fwd-DNNO↓ | <u>$1.0119 \pm 0.0006$</u> | $1.0120 \pm 0.0004$ | $1.0165 \pm 0.0007$ | $1.016 \pm 0.004$ | <u>$1.021 \pm 0.003$</u> |

Table 1: Performance of ALL (ours) for varying hyperparameter $\overline{\gamma}$. Recall that $\overline{\gamma}$ is a reparameterization of our budget hyperparameter $C$ which is more robust to varying data dimension, defined so that our erasure probability vector $\boldsymbol{\gamma}$ satisfies the budget constraint in equation 4 when $\gamma_t = \overline{\gamma}$ for all $t$. Here we vary $\overline{\gamma}$ while leaving all other hyperparameters fixed at their optimal values chosen through random hyperparameter search as described in Appendix C.3.3. oSNR denotes the Spearman rank correlation coefficient ('agreement') between the per-timestep leakiness estimates from ALL, and those from the 'omniscient' signal to noise ratio measurement (roughly 'ground truth'). Rev-DNNO and Fwd-DNNO refer respectively to the area under the curve produced by the reverse and forward DOO occlusion tests, which measure the rate at which the performance of a trained DNN degrades as we occlude its input features in order of their leakiness estimates from ALL. Underlining denotes the best result. ↑ means *larger is better*. ↓ means *smaller is better*. Results are reported as mean ± std. dev. over 5 random seeds.