

| Methods | CIFAR-10 14-layer ResNet | | | | MNIST fully connected | | |
|-------------------|--------------------------|---------------|----------------|----------------|-----------------------|------------------|------------------|
| | $p = 0$ | sy. $p = 0.2$ | asy. $p = 0.2$ | asy. $p = 0.6$ | $p = 0$ | sy. $p = 0.2$ | asy. $p = 0.6$ |
| cross-entropy | 87.8 | 83.7 | 85.0 | 57.6 | 97.9± 0.0 | 96.9± 0.1 | 97.5± 0.0 |
| unhinged (BN) | 86.9 | 84.1 | 83.8 | 52.1 | 97.6± 0.0 | 96.9± 0.1 | 97.0± 0.0 |
| sigmoid (BN) | 76.0 | 66.6 | 71.8 | 57.0 | 97.2± 0.1 | 93.1± 0.1 | 96.7± 0.0 |
| savage | 80.1 | 77.4 | 76.0 | 50.5 | 97.3± 0.0 | 96.9± 0.0 | 97.0± 0.0 |
| bootstrap soft | 87.7 | 84.3 | 84.6 | 57.8 | 97.9± 0.0 | 96.9± 0.0 | 97.5± 0.0 |
| bootstrap hard | 87.3 | 83.6 | 84.7 | 58.3 | 97.9± 0.0 | 96.8± 0.0 | 97.4± 0.0 |
| backward | 87.7 | 80.4 | 83.8 | 66.7 | 97.9± 0.0 | 96.9± 0.0 | 96.7± 0.0 |
| forward | 87.4 | 83.4 | 87.0 | 74.8 | 97.9± 0.0 | 96.9± 0.0 | 97.7± 0.0 |
| cross-entropy | 87.9 | 82.4 | 85.5 | 56.2 | 98.0± 0.1 | 97.1± 0.1 | 97.6± 0.0 |
| improved baseline | 87.8 | 83.6 | 85.2 | 74.1 | 98.0± 0.1 | 97.1± 0.1 | 97.7± 0.0 |
| ours | 88.0 | 84.5 | 85.6 | 75.8 | 98.2± 0.1 | 97.7± 0.4 | 97.8± 0.0 |