Table 16: Comparison of our DP-RandP with methods using public data. CIFAR10 task.

| Method | Model | Public Data | $\varepsilon = 1$ | $\varepsilon = 2$ | $\varepsilon = 4$ | $\varepsilon = 6$ | $\varepsilon = 8$ |
|---|---|---|---|---|---|---|---|
| Nasr et al.[1] | WRN164 | 4% ID | 72.10% | 75.10% | 77.9% | 80.0% | – |
| Mehta et al.[2] | ViT-B/16 | ImageNet | 95.10% | 95.10% | 95.10% | – | 95.20% |
| Mehta et al.[3] | ViT-G/16 | JFT | 98.80% | 98.80% | 98.83% | – | 98.84% |
| DP-RandP | WRN164 | Synthetic | 72.32% | 77.25% | 81.88% | 84.01% | 85.26% |

Table 17: The importance of phases in DP-RandP evaluated on CIFAR10.

| Phases | $\varepsilon = 1$ | $\varepsilon = 2$ | $\varepsilon = 3$ | $\varepsilon = 4$ | $\varepsilon = 6$ | $\varepsilon = 8$ |
|---|---|---|---|---|---|---|
| DP-RandP | 72.32% | 77.25% | 79.99% | 81.88% | 84.01% | 85.26% |
| DP-RandP w/o Phase II | 69.03% | 75.31% | 78.44% | 80.56% | 82.96% | 84.45% |
| Phase III only (De et al.[13]) | 56.8% | 64.9% | 69.2% | 71.9% | 71.0% | 79.5% |

Table 18: Different contrastive learning method in Phase I. CIFAR10 task.

| Method for Phase I | Phases | $\varepsilon = 1$ | $\varepsilon = 2$ | $\varepsilon = 3$ | $\varepsilon = 4$ | $\varepsilon = 6$ | $\varepsilon = 8$ | $\varepsilon = \infty$ |
|---|---|---|---|---|---|---|---|---|
| Wang and Isola[18] | DP-RandP | 72.32% | 77.25% | 79.99% | 81.88% | 84.01% | 85.26% | 91.69% |
| | DP-RandP w/o Phase II | 69.03% | 75.31% | 78.44% | 80.56% | 82.96% | 84.45% | 91.69% |
| MoCo[19] | DP-RandP | 72.79% | 76.26% | 78.32% | 79.78% | 81.64% | 82.84% | 90.84% |
| | DP-RandP w/o Phase II | 69.48% | 73.82% | 76.60% | 78.89% | 80.56% | 82.64% | 90.84% |

Table 19: CIFAR10 $\varepsilon = 2$. 1125 steps. 94 epochs in total.

| Epochs for Phase II | 0 | 1 | 4 | 8 | 12 | 16 | 20 | 50 | 94 |
|---|---|---|---|---|---|---|---|---|---|
| Accuracy | 75.30% | 76.31% | 77.03% | 77.35% | 76.74% | 77.05% | 77.10% | 75.06% | 63.10% |

Table 20: CIFAR10 $\varepsilon = 3$. 1593 steps. 133 epochs in total.

| Epochs for Phase II | 0 | 1 | 4 | 8 | 12 | 16 | 20 | 50 | 100 | 133 |
|---|---|---|---|---|---|---|---|---|---|---|
| Accuracy | 78.34% | 79.20% | 79.71% | 79.74% | 79.48% | 80.27% | 80.04% | 79.21% | 75.47% | 63.93% |

Table 21: CIFAR10 $\varepsilon = 4$. 1687 steps. 141 epochs in total.

| Epochs for Phase II | 0 | 1 | 4 | 8 | 12 | 16 | 20 | 50 | 100 | 141 |
|---|---|---|---|---|---|---|---|---|---|---|
| Accuracy | 80.63% | 81.24% | 81.76% | 81.46% | 81.61% | 82.01% | 81.56% | 81.36% | 78.07% | 64.41% |

Table 22: CIFAR10 $\varepsilon = 6$. 1843 steps. 154 epochs in total.

| Epochs for Phase II | 0 | 1 | 4 | 8 | 12 | 16 | 20 | 50 | 100 | 150 | 154 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Accuracy | 82.93% | 83.73% | 84.04% | 83.75% | 83.86% | 84.17% | 83.94% | 83.41% | 81.13% | 65.43% | 64.89% |

Table 23: CIFAR10 $\varepsilon = 8$. 2468 steps. 206 epochs in total.

| Epochs for Phase II | 0 | 1 | 4 | 8 | 12 | 16 | 20 | 50 | 100 | 150 | 200 | 206 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Accuracy | 84.37% | 84.84% | 85.43% | 85.17% | 85.21% | 85.37% | 85.08% | 85.08% | 83.84% | 82.74% | 69.17% | 64.85% |