Dataset資訊

|  |  |  |
| --- | --- | --- |
|  | Cifar10 | MNIST |
| train數量/ | 50000 | 60000 |
| test數量 | 10000 | 10000 |

FL 參數配置

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | FL(Non-IID)/ FL(IID) | | FL(Non-IID)Heuristic/ILP | |
|  | Client數量 | 各Client data數量 | Client數量 | 各Client data數量 |
| Cifar10(CNN) | 100 | 500 | 100=>20 | 500=>2500 |
| MNIST(CNN) | 600 | 600=>3000 |
| MNIST(MLP) |

Non-IID分配(MNIST)

Sorting the data by digit label, divide it into 200 shards of size 300, and assign each of 100 clients 2 shards.

Non-IID分配(Cifar10)

Sorting the data by digit label, divide it into 200 shards of size 250, and assign each of 100 clients 2 shards.

total rounds = (total\_users / users\_per\_round) \* epochs

AVG KL

|  |  |  |
| --- | --- | --- |
|  | FL(Non-IID-Heuristic) | FL(Non-IID-ILP) |
| Cifar10(CNN) | 0.18 | 0.622646625 |
| MNIST(CNN) | 0.003246 | 0.594106753 |
| MNIST(MLP) | 0.182934 | 0.543369379 |

AVG KL

|  |  |  |  |
| --- | --- | --- | --- |
|  | FL(Non-IID) | FL(IID) | Single Machine |
| Cifar10(CNN) | 2.451928 | 0.012471 | 0 |
| MNIST(CNN) | 2.416302 | 0.008551 | 0.002057 |
| MNIST(MLP) | 2.383302 | 0.008551 | 0.002057 |

Accuracy(300個Epochs)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | FL(Non-IID-Heuristic) | | FL(Non-IID-ILP) | |
|  | 執行時間(Second) | Accuracy | 執行時間(Second) | Accuracy |
| Cifar10(CNN) | 0 | 65.94% | 2.50007 | 64.77% |
| MNIST(CNN) | 0 | 99.37% | 2.43859 | 99.21% |
| MNIST(MLP) | 0 | 98.25% | 2.38432 | 98.23% |

Accuracy(300個Epochs)

|  |  |  |  |
| --- | --- | --- | --- |
|  | FL(Non-IID) | FL(IID) | Single Machine |
| Cifar10(CNN) | 64.51% | 70.94% | 65.6% |
| MNIST(CNN) | 99.26% | 99.21% | 98.95% |
| MNIST(MLP) | 98.3% | 98.35% | 96.64% |

Best Accuracy

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | FL(Non-IID-Heuristic) | | FL(Non-IID-ILP) | |
|  | Round | Accuracy | Round | Accuracy |
| Cifar10(CNN) | 102 | 65.94% | 57 | 64.77% |
| MNIST(CNN) | 37 | 99.37% | 96 | 99.21% |
| MNIST(MLP) | 289 | 98.25% | 228 | 98.23% |

Best Accuracy

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | FL(Non-IID) | | FL(IID) | | Single Machine | |
|  | Round | Accuracy | Round | Accuracy | Round | Accuracy |
| Cifar10(CNN) | 92 | 64.51 | 31 | 70.94 | 112 | 68.75% |
| MNIST(CNN) | 43 | 99.26 | 50 | 99.21 | 14 | 98.96% |
| MNIST(MLP) | 229 | 98.3 | 254 | 98.35 | 15 | 96.64% |





