Report for FedL-BG runtime

As Table 1 shows, the test has 5 sub tests which indicate 2-10 local server in Federated Learning procedure.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Paper runtime(min) | | Local runtime(min) | | Local CPU runtime(min) | |
| **K** | **LSA** | **AVG** | **LSA** | **AVG** | **LSA** | **AVG** |
| 2 | 1.7 | 2.4 | 2.6 | 4.6 | 1.7 | 3.0 |
| 4 | 3.6 | 5.1 | 5.2 | 9.1 | 3.4 | 5.9 |
| 6 | 5.9 | 8.6 | 7.8 | 13.8 | 5.0 | 8.7 |
| 8 | 8.5 | 12.3 | 10.6 | 18.4 | 6.9 | 11.6 |
| 10 | 10.9 | 16.8 | 13.2 | 23.2 | 8.1 | 14.1 |

Table 1: Without distributed computing power supports runtime.

Due to device limitations, like the number of cores/threads, or OS self-running processes, the performance of the Ray can be affected. Table 2 comparison for our local machine and different AWS server performance.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Local (16 Threads) Ray runtime (min) | | | Average transmission time (s) | | | | Total transmission data (bytes) | | | |
| **K** | **LSA** | | **AVG** | | **LSA** | | **AVG** | | **LSA** | | **AVG** |
| **2** | 0.6 | 0.98 | | 0.15 | | 0.24 | | 29052 | | 163692 | |
| **4** | 0.75 | 1.29 | | 0.3 | | 0.37 | | 55836 | | 309996 | |
| **6** | 1.01 | 1.69 | | 0.5 | | 0.55 | | 83484 | | 462924 | |
| **8** | 1.15 | 2.1 | | 0.66 | | 0.79 | | 110268 | | 609228 | |
| **10** | 1.26 | 2.28 | | 0.75 | | 0.86 | | 138780 | | 768780 | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Local (28 Threads) Ray runtime(min) | | Average transmission time (s) | | Total transmission data (bytes) | |
| **K** | **LSA** | **AVG** | **LSA** | **AVG** | **LSA** | **AVG** |
| 2 | 0.96 | 1.59 | 0.4 | 0.48 | 29052 | 163692 |
| 4 | 1.05 | 1.78 | 0.71 | 0.78 | 55836 | 309996 |
| 6 | 1.14 | 1.92 | 0.95 | 0.98 | 83484 | 462924 |
| 8 | 1.19 | 2.00 | 1.16 | 1.23 | 110268 | 609228 |
| 10 | 1.24 | 2.09 | 1.32 | 1.42 | 138780 | 768780 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | AWS 16 vCPU Ray runtime(min) | | Average transmission time (s) | | Total transmission data (bytes) | |
| **K** | **LSA** | **AVG** | **LSA** | **AVG** | **LSA** | **AVG** |
| 2 | 1.16 | 1.91 | 0.13 | 0.28 | 29052 | 163692 |
| 4 | 1.18 | 1.94 | 0.19 | 0.27 | 55836 | 309996 |
| 6 | 1.2 | 1.98 | 0.25 | 0.3 | 83484 | 462924 |
| 8 | 1.24 | 2.07 | 0.35 | 0.37 | 110268 | 609228 |
| 10 | 1.65 | 2.87 | 1.91 | 2.05 | 138780 | 768780 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | AWS 32 vCPU Ray runtime(min) | | Average transmission time (s) | | Total transmission data (bytes) | |
| **K** | **LSA** | **AVG** | **LSA** | **AVG** | **LSA** | **AVG** |
| 2 | 0.85 | 1.44 | 0.12 | 0.20 | 29052 | 163692 |
| 4 | 0.86 | 1.46 | 0.17 | 0.21 | 55836 | 309996 |
| 6 | 0.9 | 1.49 | 0.26 | 0.26 | 83484 | 462924 |
| 8 | 0.91 | 1.52 | 0.28 | 0.31 | 110268 | 609228 |
| 10 | 0.93 | 1.55 | 0.36 | 0.39 | 138780 | 768780 |

Table 2: Runtime for Ray framework under different hardware.