|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **DS** | **System** | **#Train Samples** | **Train** | **Dev** | **Eval** |
| #08 | RBM +KNN | 60,000 | 8.18 | 16.10 | 25.86 |
| QRBM + KNN | 60,000 | 42.89 | 43.07 | 39.19 |
| QRBM | 60,000 | 49.12 | 49.07 | 49.07 |
| #09 | RBM +KNN | 80,000 | 8.17 | 15.76 | 25.17 |
| QRBM + KNN | 80,000 | 31.37 | 30.35 | 13.72 |
| QRBM | 80,000 | 49.82 | 49.84 | 49.84 |
| #10 | RBM +KNN | 100,000 | 7.22 | 25.11 | 30.12 |
| QRBM + KNN | 100,000 | 47.49 | 46.95 | 49.74 |
| QRBM | 100,00 | 45.30 | 46.10 | 46.08 |

**Table 1.** Error rate comparison of classical RBM and Quantum RBM.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DS** | **System** | **#Train Samples** | **Train** | **Eval** |
| Gaussian | SVM | 1,000 | 0.00 | 0.00 |
| QSVM | 1,000 | 3.00 | 4.00 |
| NN | 1,000 | 0.00 | 0.00 |
| QNN | 1,000 | 34.00 | 36.00 |
| OverlappingGaussian | SVM | 1,000 | 19.00 | 18.00 |
| QSVM | 1,000 | 20.00 | 21.00 |
| NN | 1,000 | 19.20 | 18.40 |
| QNN | 1,000 | 39.00 | 42.00 |
| Yin-Yang | SVM | 1,000 | 1.00 | 2.00 |
| QSVM | 1,000 | 10.00 | 13.00 |
| NN | 1,000 | 11.10 | 9.70 |
| QNN | 1,000 | 37.00 | 38.00 |
| Toroidal | SVM | 1,000 | 0.00 | 0.00 |
| QSVM | 1,000 | 0.00 | 0.00 |
| NN | 1,000 | 17.60 | 15.90 |
| QNN | 1,000 | 5.00 | 5.00 |
| TUBR v4.0.0 | ViT  | 6,324 | 2.00 | 28.93 |
| QViT |  6,324 | 38.19 | 46.17 |

**Table 2.** Error rate comparison of variational quantum circuit-based algorithms.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **#Samples** | **#Features** | **Cos-Sim** | **MLP** | **Q-Ent** |
| 10 | 10 | 50.00 | 100.00 | 100.00 |
| 10 | 50 | 50.00 | 50.00 |  50.00 |
| 10 | 100 | 100.00 | 50.00 | 100.00 |
| 10 | 1000 | 100.00 | 100.00 | 00.00 |
| 10 | 3000 | 100.00 | 50.00 | 100.00 |
| 10 | 5000 | 50.00 | 50.00 | 50.00 |
| 50 | 10 | 40.00 | 30.00 | 40.00 |
| 50 | 50 | 60.00 | 70.00 | 40.00 |
| 50 | 100 | 70.00 | 40.00 | 30.00 |
| 50 | 1000 | 60.00 | 60.00 | 40.00 |
| 100 | 1000 | 60.00 | 45.00 | 40.00 |
| 1000 | 100 | 42.86 | 42.86 | 42.86 |
| 1000 | 500 | 50.00 | 35.71 | 50.00 |
| 3000 | 10 | 38.83 | 48.33 | 51.67 |
| 3000 | 50 | 47.67 | 45.17 | 50.50 |
| 3000 | 100 | 44.00 | 48.67 | 54.17 |
| 10000 | 10 | 43.20 | 48.10 | 41.50 |

**Table 3.** Error rate comparison: cosine similarity, MLP-based and quantum entanglement entropy.