# QCE24 Submission 949

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| Submission 949 | |
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| Title | Multi-Task Quantum Annealing for Rapid Multi-Class Classification |
| Paper: | (Jul 21, 17:31 GMT) |
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| Abstract | Quantum computing offers new paradigms in machine learning, notably through Quantum Annealing (QA), which offers promising approaches to optimization problems. This study introduces an application of Multi-tasking Quantum Annealing (MTQA) to enhance multi-class Support Vector Machines (SVMs). Traditional QA methods require multiple cycles to classify multi-class datasets, significantly increasing computational demands. In contrast, MTQA embeds multiple SVM classifiers in parallel on a quantum annealer, thereby reducing the number of required annealing cycles to a single cycle. Utilizing the D-Wave Advantage 6.4 system, we evaluated our method across three benchmark datasets: a synthetic dataset (Blob), subsets of handwritten digits, |

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| | and the Iris dataset with different feature focuses. Our findings demonstrate that MTQA achieves accuracy equivalent to that of classical Sequential Minimal Optimization (SMO), Simulated Annealing (SA), and standard QA methods while significantly improving computational efficiency. Despite the current limitations in quantum technology and the empirical selection of model parameters, these results highlight the emergent potential of quantum computing in machine learning. Further advancements in quantum algorithm optimization and parameter tuning are anticipated to enhance the efficacy of QA and MTQA, solidifying their practical application roles. |
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