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Coping with noise in programmable quantum annealers ALEJANDRO PERDOMO-ORTIZ, NASA/Ames Res Ctr — Solving real-world applications with quantum annealing algorithms requires overcoming several challenges, ranging from translating the computational problem at hand to the quantum-machine language, to tuning several other parameters of the quantum algorithm that have a significant impact on performance of the device. In this talk, we discuss these challenges, strategies developed to enhance performance, and also a more efficient implementation of several applications. For example, in http://arxiv.org/abs/1503.05679 we proposed an method to measure residual systematic biases in the programmable parameters of large-scale quantum annealers. Although the method described there works from a practical point of view, a few questions were left unanswered. One of these puzzles was the observation of a broad distribution in the estimated effective qubit temperatures throughout the device . In this talk, we will present our progress in understanding these puzzles and how these new insights allow for a more effective bias correction protocol. We will present the impact of these new parameter setting and bias correction protocols in the performance of hard discrete optimization problems and in the successful implementation of quantum-assisted machine-learning algorithms.

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