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Solving a quadratic optimization problem by means of quantum computing using amplitude encoding

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Quantum computers have the potential to be faster at solving certain problems, such as optimization problems, than their conventional equivalents [1]. These speedups are made possible by the fact that quantum computers are based on quantum bits (qubits), which may use superposition or entanglement, two peculiar properties of quantum physics. In this work, we explore the quantum gradient descent method [2] and describe a modified version of it to find the minimum of a quadratic cost function. We simulate the algorithm using the so-called amplitude encoding technique, to approach the minimum of a quadratic cost function of 2 variables and of 8 variables and verify the result. We present the quantum circuit for one step and iterate it to find the optimal solution after several steps.

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