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Quantum Associative Memory Diagnos: Framework for computer assisted medical diagnosis

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This paper presents the framework QAM Diagnos (Quantum Associative Memory for the Diagnosis), a model of Quantum Associative Memory (QAM) that can be a helpful tool for physicians for the diagnosis of four tropical diseases (malaria, typhoid fever, yellow fever, and dengue) which have several similar signs and symptoms. The memory can distinguish between a single infection from a poly injection. Our model is a combination of improved versions of the original linear quantum search algorithm made by Ventura for QAM and the non-linear quantum search algorithm of Abrams and Lloyd. For the linear algorithm, we introduce a modification of the query that optimized data retrieval of correct multi-patterns simultaneously for any rate of the number of the recognition pattern states on the total basis states. For the non-linear algorithm, we propose a simplified and generalized version of Rigui Zhou *et al.* which includes the quantum matrix with the binary decision diagram put forth by David Rosenbaum in the Abrams and Lloyd's non-linear search quantum algorithm. The database of the QAM Diagnos application contains signs and symptoms of the four retained tropical diseases. A multi-platform graphical user interface (Android, Linux, MS Windows) has been developed to make QAM Diagnos user-friendly. From the given simulation results, it appears that the efficiency of recognition is good when particular signs and symptoms of a disease are inserted given that the linear algorithm is the main algorithm. The non-linear algorithm helps to confirm or correct the diagnosis or suggest some treatment advice to the physician. So, the QAM Diagnos framework is a tool for medical diagnosis sensitive and a low-cost that enables rapid and accurate detection of the four tropical diseases, and therefore a rapid and effective medical care.

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