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Quantum walk-based associative memories.

Associative memories are mathematical models of computation well suited for data search purposes. Associative memories have been used to design (classical and quantum) pattern recognition algorithms potentially useful in the field of Image Processing, a pervasive and cross-disciplinary field of computer science and engineering that focuses on storing, manipulating and retrieving visual information in computer systems.

The field of quantum walks was born as a quantum-mechanical counterpart of random walks, a branch of Markov processes extensively used for the development of stochastic algorithms. Recently, it has been proved that a universal model for quantum computation can be built upon both continuous and discrete models of quantum walks. Moreover, significant efforts have been made over the last few years to harness the computational properties of quantum walks in theoretical and applied computer science.

In this talk we shall present some preliminary results on the development of quantum walk-based algorithms to store and retrieve patterns on associative memories. This approach is important because it would allow faster pattern recognition and matching in data intensive and noisy applications. (Received September 15, 2014)