

Clifford dictionary learning for color image processing

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The sparse representation model of signals (including images), where the goal is to represent the signal with only a few nonzero elements (called atoms) from a redundant dictionary, is extensively used. The recent trend is to introduce quaternions into a dictionary construction. Even though the quaternions are used for more than two decades in computer vision and computer graphics, they are also being used in color image processing, because three imaginary units are well suited for representing three color channels.

Since the quaternion algebra is an example of a Clifford algebra, in this talk we will explain a new approach where three imaginary units will be represented as pure vectors in the Clifford algebra. We will explain how three channels can be mutually connected and which properties this representation has. Also, the possibility of higher-dimensional generalization of this model will be explained.