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Thomas Blumensath* (thomas.blumensath@ed.ac.uk), Room 2.02 AGB, The Kings Buildings, University of Edinburgh, Edinburgh, and **Mike E. Davies**. *Gradient Algorithms for Sparse Representations*.

In this talk we discuss two gradient based approaches to find sparse signal representations. The first class of algorithms is based on a greedy strategy and is akin to Matching Pursuit, while the second approach is an iterative thresholding method. In the greedy strategy, new elements are selected as in Matching Pursuit but the coefficients are updated using directional optimisation. Different directions can be used of which we discuss three; the gradient, the conjugate gradient and an approximate conjugate gradient. The first and last of these algorithms have a computational complexity comparable to Matching Pursuit, however, their performance is shown to be more akin to orthogonal Matching Pursuit. These methods are therefore applicable in situations where orthogonal Matching Pursuit and convex optimisation methods are too costly. In the thresholding based approach, different thresholding functions are possible. We here discuss the use of hard thresholding and show that the resulting algorithms are guaranteed to optimise two non-convex cost-functions commonly used as the starting point for sparse representations. Due to the non-convexity, the algorithms are not guaranteed to find the global optimum. We therefore discuss two different strategies for the use of these methods. (Received March 19, 2007)