Fast algorithms for recovery of data irregularly subsampled from redundant representation

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Let we have a liner space of data $X = R^k$ and liner operator $F : X \mapsto Y = R^n$ defining a redundant ($n > k$) representation of elements from R^k, F^{-1} is an inverse operator. Let us assume that both operators F and F^{-1} admit fast implementation, i.e., the complexity is $o(kn)$. Typical examples of such operators F are the operator taking n regular samples of a polynomial of the order k and a wavelet frame transform. An oversampled representation of bandlimited functions is another more complicated (infinitely dimensional) example. Now we suppose that only part of the data vector $y = F(x)$ is available for the recovery procedure. We give a fast iterative algorithm for data recovery whose iteration complexity is the same as for the initial operators F and F^{-1}.

In particular, this algorithm may be applied for the recovery of data lost in a channel with erasures.