Sparseland

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*SparselandSparseland***Dictionary Learning****Sparse Coding***Sparseland*

$x_i \in^m X = [x_1, x_2, \ldots, x_n] \in^{m \times n} nmn >> mD = [d_1, d_2, \ldots, d_k]$

α_i

l

basic pursuit $Lasso l_1 l_0 \alpha_i$

$l_0 x^{(t)} X = [x_1, \ldots, x_n]^{m \times n}$

$x^t \alpha^t$

• α^t

• $x^{(t)}$

• $D \in^{m \times k}$

• $\|x^{(t)} - D \alpha^{(t)}\|_2^2$

• $D \alpha^{(t)} \hat{x}^{(t)}$

• $\|\alpha^{(t)}\|_1$

$x^{(t)}$

$\alpha^{(t)}$

$\alpha^{(t)} x^{(t)}$

$\alpha(x^{(t)}) = arg \min_{\alpha^{(t)}} = \frac{1}{2}\|x^{(t)} - D \alpha^{(t)}\|_2^2 + \lambda\|\alpha^{(t)}\|_1$

?

$_c onverged : FixDMinimizealpha(1)//SparseCodingstepFixalphaMinimizeD(2)//UpdateDictionarystep$

$? \hat{x}^{(t)} = D \alpha(x^{(t)}) \sum_{k s.t. \alpha(x^{(t)})_k \neq 0} D_{.,k} \alpha(x^{(t)})_{k1}.png Example of reconstruction using sparse coding$

$D_{.,k} \alpha(x^{(t)})_k$

$k << nk > m$