

# Manifold Regularization for SIR with Rate Root-n Convergence



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- ▶ **Motivation:** using local geometric information to regularize the subspace selection of Sliced Inverse Regression

$$\max_B SIR_r(B) = \underbrace{Trace\left((B^T \Sigma B)^{-1} B^T \Gamma B\right)}_{\text{standard SIR}} - \eta \underbrace{Trace\left((B^T S B)^{-1} B^T Q B\right)}_{\text{Manifold regularization}}$$

- ▶ **Main Results:** 1) the objective function  $SIR_r(B)$  converges at rate root-n; 2)  $SIR_r(B)$  is optimized on the Grassmann manifold
- ▶ **Experimental Results**

Table 1 Evaluation on the USPS data set

Dim	7	9	11	13	15	17	19	21
SIR	86.35	87.94	---	---	---	---	---	---
RSIR	85.75	88.09	88.59	88.89	90.28	91.08	91.48	91.93
sRSIR	86.85	88.64	89.34	89.09	90.53	91.28	92.08	91.93
LSIR	83.01	84.21	85.35	87.24	87.89	89.49	89.89	90.03
sLSIR	85.26	86.75	87.95	88.26	89.14	89.54	90.38	90.63

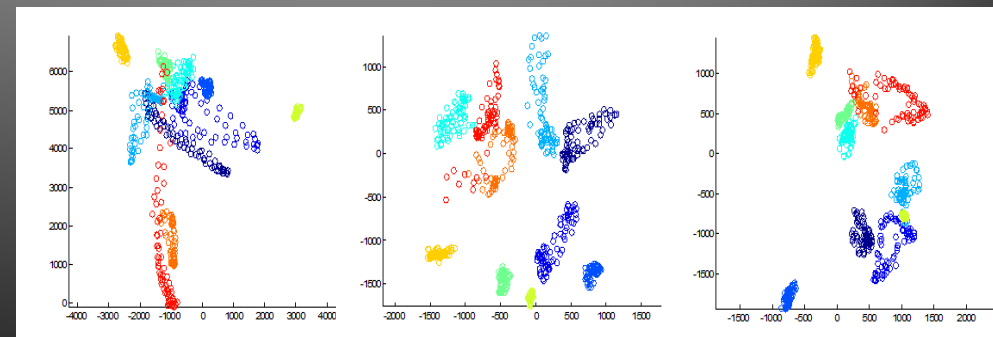


Fig. 1 Visualization of the first ten objects from the Coil-20 data set