§ Dimensionality Reduction: Sub-Gaussian Matrices

Sub-Gaussian matrices : Low rank Tensor regression

Theorem [Dirksen]: Let $\mathcal{U}$ be the union of subspaces,

$$K = \sup_{\theta \in \Theta} \dim(S_\theta)$$

Let $\Phi : \Omega \times H \to \mathbb{R}^m$ be a sub-gaussian map on $\mathcal{U}$

Then $\exists\, c > 0$ such that for any $0 < \delta, \eta < 1$ we have

* Expand $\mathbb{P}(\delta_{\mathcal{U},\phi} \geq \delta) \leq \eta$ provided

$$m \gtrsim d^2 \delta^{-2} \max\{K + \gamma_2^2(\Theta, d_{Fin}), \log(\eta^{-1})\}$$

Applying this to our case:

Understanding the setup: Tensor - RIP

$\dim(K) = R^2 n_1$

does this work?

$$m \gtrsim d^2 \delta^{-2} \max\{\boxed{R^2 n_1 + \gamma_2^2(\Upsilon, d_{Fin})}, \log(\eta^{-1})\}$$

Put this in

$$\boxed{\left(R^2 n_1 + R(n_1 + n_2 \cdots + n_d) \log\left(\frac{(D-1) R^{D-1} \kappa(A)}{\varepsilon_0}\right)\right)}$$

$$* \lesssim \left(R^2 n_1 + R(n_1 + n_2 + \cdots n_d) \log\left(\frac{(D-1) R^{D-1} \kappa(A)}{\varepsilon_0}\right)\right)$$