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Approximation by Penalized Least Squares

Consider a compact Riemannian manifold and a set of scattered points lying on it. In this talk we are interested in the following problem.

Problem: Given vectors $\mathbf{x}_1, \dots, \mathbf{x}_p$, find a vector-valued function defined on the manifold which approximates the data

$$f(x_i) \approx \mathbf{x}_i.$$