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Some ideas in multivariate approximation

I will demonstrate the construction of an algorithm for scattered data multivariate approximation using the desired properties of the resulting approximant. Evaluating the approximant is done by checking the same properties used for deriving the algorithm and not by applying the algorithm to some test functions. The result is a quasi-interpolation approximation, also known as the Moving Least-Squares approximation (MLS). Two applications of MLS will be presented:

1. Approximation of non-smooth multivariate functions from scattered data.
2. Approximation of a low dimensional manifold from noisy scattered data in high dimension.