

Exact Sciences Seminar
Monday 03.12.2018 on 16:00-17:00, Ficus 303

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**High order approximation to non-smooth multivariate
functions**

Abstract

One of the major difficulties in approximation theory is the handling of singularities. Indeed, common approximation tools are known to return low-order approximations in the vicinities of singularities. While most prior works solve this problem for univariate functions, we introduce a method for approximating non-smooth multivariate functions.

Given scattered (or uniform) data points in R^n , we investigate approximation by quasi-interpolation. We show that by modelling the errors of the quasi-interpolant, we may design a correction term, such that the corrected approximation achieves full approximation order on the entire domain. We also show that the correction term is the solution to a Moving Least Squares (MLS) problem, and as such can both be easily computed and is smooth. Last, we prove that the suggested method includes a high-order approximation to the locations of the singularities. Should time allow it, I will also explain how we may exploit this method to improve function approximations near the boundary of the domain of definition, where the approximations tend to be of a lower order; and how to similarly employ this method for the widespread problem of approximating functions with outlier singularities.

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