

IMI Distinguished Lecture Series

Fall 2017



Optimal sampling in weighted least-squares methods- Application to high-dimensional approximation

Professor Albert Cohen

Laboratoire Jacques-Louis Lions, Université Pierre et Marie Curie,

TUESDAY

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21

4:15 - 5:15 PM

LeConte College

Room 312

Least squares methods are of common use when one needs to approximate a function based on its noiseless or noisy observation at n scattered points by a simpler function chosen in an m dimensional space with m less than n . Depending on the context, these points may be randomly drawn according to some distribution, or deterministically selected by the user.

This talk will survey some recent results on the stability and approximation properties of weighted least squares method, in relation with the spatial distribution of the sampling. One of our main findings is that an optimal random sampling strategy can be defined by means of the Christoffel function associated with the space where the approximation is searched. Here, optimal means that near-best approximation properties are achieved at the price of a number of samples n larger than m only by a logarithmic factor.

One principal motivation is the application to high-dimensional approximation problems, such as solving PDEs with random input parameters. Motivated by this setting, we also discuss how the optimal sampling can be practically generated and incrementally updated when the approximation spaces are adaptively selected.

This is a joint work with Giovanni Migliorati.

Brief Bio

Albert Cohen earned his PhD in 1990 under the supervision of Yves Meyer. Since 1995 he has been a full professor at Laboratoire Jacques-Louis Lions, Sorbonne Université, Paris. He is the author of over 100 papers in journals and 3 books. He was an invited speaker at ICM 2002 and plenary speaker at ICIAM 2006. He received the Vasil Popov, Jacques Herbrant, and Blaise Pascal prizes. He is currently a member of the Institut Universitaire de France. His interests include approximation theory, statistics, signal-image-data processing, and numerical analysis.

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