Idaho State University | Mathematics and Statistics

Colloquium

Learning a robust shape parameter for radial basis functions approximation with continual learning

Dr. Maria Han Veiga
Assistant Professor
Ohio State University

Radial basis functions (RBFs) play an important role in function interpolation, being suited to deal with arbitrary sets of interpolation nodes. The accuracy of the interpolation depends on a parameter called the shape parameter. Although there are many approaches in literature on how to choose this, finding the optimal shape parameter value in general remains a challenge.

In this talk, I will present a novel approach to determine the shape parameter in RBFs:

1. We construct an optimisation problem to obtain a shape parameter that leads to an interpolation matrix with bounded condition number
2. We introduce a data-driven method to learns the map between sets of interpolation nodes and a suitable shape parameter
3. We propose a fall-back procedure to enforce a strict upper bound on the condition number of the interpolation matrix, as well as a continual learning strategy that improves the performance of the predictor by learning from previously run simulations.

This methodology is accessed in a series of numerical tests in interpolation tasks and in a RBF based finite difference (RBF-FD) method, in one and two-space dimensions.

Tuesday, October 29
3:45 pm
PS 307
Zoom Meeting ID: 893 9607 9478

For colloquium guests, there will be refreshments beginning at 3:15