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Bruno Després (mini-course 4): Neural Networks from the viewpoint of Numerical Analysis.

Friday, June 13, 2025 9:00 AM (1 hour)

Machine Learning, Neural Networks and Artificial Intelligence are words that one cannot escape from these times. What are some sound mathematical basis for this activity in view of applications to SciML (Scientific Machine Learning) ? This will be the general topic of the course.
- course 1: The compositional structure of NN functions will be analysed within a convenient functional framework inspired by the Murat-Trombetti Theorem. Approximations properties will be reviewed, such as the Cybenko Theorem, the Yarotsky Theorem and some basic analytical formulas.

- course 2: The previous material will be applied to the description of the DeepRitz method for the calculation of a numerical solution to the Poisson equation and to the measurement of the Lipschitz constant of given NN functions in view of stability estimation.