

NUMERICAL ANALYSIS AND SCIENTIFIC COMPUTING
SEMINAR

*RISING: A stable and reliable approach to the solution of
Inverse Problems with Neural Networks*

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Abstract: Solving Inverse Problems usually requires inverting underdetermined and ill-conditioned linear operators. Classically, this is obtained by solving a regularized variational problem. Unfortunately, computing the solution usually requires a huge amount of time and computational resources. On the other hand, the use of data-driven approach such as Neural Networks permit to compute the solution of the Inverse Problems in a relatively small amount of time, since it does not require the explicit computation of the forward linear operator. Moreover, the results computed by Neural Networks show an extraordinary visual quality, usually order of magnitude greater than the state-of-the-art variational models. Unfortunately, it is known that classical Neural Network approaches are extremely unstable, and the quality of the obtained results can be easily reduced by adversarial examples. We propose RISING, an hybrid approach that permits stable and reliable solutions of Inverse Problems via Neural Networks.

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