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Seminar

Balancing the stability-accuracy Trade-off in Neural Networks for Ill-conditioned Inverse Problems

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Abstract: Deep learning algorithms have recently become state-of-art in solving Inverse Problems, overcoming the classical variational methods in terms of both accuracy and efficiency. On the other hand, it is still unclear if neural networks can compete in terms of reliability and a rigorous complete analysis still lacks in the literature. Starting from the brilliant works of N.M.Gottschling, V.Antun (2020) and M.J.Colbrook, V.Antun (2021), we will try to understand the relationship between the accuracy and stability of neural networks for solving ill-conditioned inverse problems, deriving new theoretical results shedding light on the trade-off between accuracy and stability. Following the study of M.Genzel, J.Macdonald (2020), we will find that, under some conditions, neural networks can be more unstable the more they are accurate, and we will propose new regularization techniques with provable increase in stability and minumum accuracy loss.

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