

NEURAL VERY WEAK FORMULATIONS ENABLING HARDWARE-ORIENTED DEEP PDE SOLVERS

Francisco Bersetche

DM-FCEyN-UBA / IMAS-CONICET, Argentina

bersetche@gmail.com

We show, as a proof of concept, that least-squares very weak formulations of elliptic problems can be effectively discretized by neural networks possessing low regularity, provided the test functions are drawn from appropriately smooth spaces. Apart from the immediate computational benefit of avoiding automatic differentiation, this approach, evaluated across various neural network spaces, demonstrates good performance even in challenging contexts, such as singular solutions and high dimensional settings. Particular attention is paid to trial functions based on step activations and one bit quantized linear functions, which are amenable to efficient hardware-oriented implementations.

Trabajo en conjunto con Gabriel Acosta (DM-FCEyN-UBA / IMAS-CONICET).