A posteriori error estimation for Physics Inspired Neural Network solutions to partial differential equations

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R 3.07 Tue Z1 18:00-18:30

We present an a posteriori error estimator for solutions of partial differential equations represented with neural networks. We have in mind the different variants of Physics Informed Neural Networks, e.g. the *Deep Ritz* method of E and Yu or the *Deep XDE* approach according to Lu, Meng, Mao and Karniadakis.

The error estimator is based on dual solutions and can estimate errors in general objective functionals, e.g. point evaluation of the solution. We show the ease of implementation and high accuracy of the method. Besides measuring the actual error of the neural network solution, another possible application is to serve as stopping criterion while training the neural network.