Honchar, Alex**.** 2017. Neural Networks For Solving Differential Equations.

See https://becominghuman.ai/neural-networks-for-solving-differential-equations-fa230ac5e04c. Accessed 29 March 2023.

We quote from the opening by the author,

“We mostly know neural networks as big hierarchical models that can learn patterns from data with complicated nature or distribution. That’s why we see lot of successful applications to images, sound, video, sequential actions processing. But we usually don’t remember, that NNs are also universal function approximators (Cybenko theorem), therefore, they can be applied to more “classical” mathematical problems as numerical analysis tool. In this post I want to show how I applied simple feed-forward NNs to different differential equations with increasing complexity: ODEs, second order ODEs, and, finally, PDEs.

”This article can be interesting not only for mathematicians, who are interested in some fiuid dynamics modelling, but for computer scientists, because there will be shown computational properties of neural networks and some useful computational differentiation tricks. You can extend approach described here to solve other modelling 2D diffusion equation that can be solved with neural networks problems with DEs, linear to non-linear equation systems and almost everywhere, where robust numerical solution is preferred.”

Several examples are then offered.

Keywords: differential equations, solutions, neural networks