INSTRUCTIONS TO PREPARE AN ARTICLE ACCORDING TO THE AMCA-STYLE

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Abstract.

300 words

Solving finite element simulations can be computationally expensive, particularly in solid mechanics field. This is a challenge in applications such as biomechanics and the design process, where the same problem may need to be solved in real time for different configurations or input data. In this paper we combined finite element analysis (FEA) and neural networks (NN) to improve the speed and efficiency of solving mechanical problems. A pipeline to generate databases of FEM solutions was developed interacting with an in-house open source software ONSAS.[85]

Our experiments showed that our approach was effective, with the neural network achieving low losses on both the training and test datasets, and closely matching the theoretical curve for the first validation example. Moreover, our implementation has the potential to be extended to more complex mechanical problems, as shown by our evaluation on a cantilever model.

One advantage of our implementation is its simplicity and scalability. By using a relatively simple mechanical problem, we were able to develop a pipeline that can be easily scaled to more complex problems. Additionally, the use of a neural network allows for faster computation times than the traditional FEM method. This has the potential to significantly reduce computational costs on any numerical processes that rely on FEM simulations, such as material identification algorithms for tissue disease diagnostics problems and stress CAD for manufacturing.

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