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Magnet Design Optimisation with Supervised Deep Neural Networks

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Recent years have shown that more and more tasks can be effectively aided by AI. Often supervised learning methods, which are based on labelled data, lead to excellent results. Artificial neural networks, that were trained on this data, allow to make accurate predictions, also for cases, that were not explicitly covered by the training data potentially leading to a more optimal solution for a problem. This comes at the cost of generating a large dataset for the training, which often becomes the bottleneck of this method. However, with the radically decreasing simulation time needed to perform Finite Element Method simulations of vector fields — such as magnetic fields — it now becomes feasible to generate vast datasets within a reasonable amount of time. This development now allows engineers to use supervised learning techniques to aid them in the initial design phase of magnets. We introduce a method for optimising the design parameters of magnets using Deep Neural Networks and showcase it with an example.

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