CRUNCH Seminars at Brown, Division of Applied Mathematics

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A Physics-Informed Neural Network to model COVID-19: Infection and Hospitalization Scenarios

Sarah Treibert and Matthias Ehrhardt, Bergische Universität Wuppertal

In this talk we apply an unsupervised physics-informed neural network (PINN) for estimating parameters in a epidemiological model for the corona virus. This neural network requires only an undetermined vector of time instances as input to learn the underlying parameters of the model, which are used for the loss calculations. Further, we illustrate how this PINN approach can also be used for di fferential equation-based models such as the proposed extended SIR model, called SVIHDR model. In a validation process, we investigate the performances of the numerical technique of non-standard finite di fferences (NSFD) as well as the exclusively data-driven recurrent neural network method, especially the long short term memory (LSTM), in generating future COVID-19 scenarios based on the parameters identified by the PINN.