Towards Bringing Together Numerical Methods for Technology Partial Differential Equation and Deep Neural Networks

Progress Update, Supervisor - Markus Hoffmann Stanislav Arnaudov | September 26, 2019

CHAIR FOR COMPUTER ARCHITECTURE AND PARALLEL PROCESSING

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Basic idea: Perform numerical simulation with ML-models





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 Concrete problem: Flow around an object according to the Navier–Stokes equations.





Basic idea: Perform numerical simulation with ML-models

Solutions of the simulation can be represented as images.





Basic idea: Perform numerical simulation with ML-models

Or ML-model primarily use images as input and output.





Several cases to investigate

- Constant model
- Fluid speed model
- Fluid viscosity and density model
- Object in space model



Data Generation



- Use of numerical solver for real simulation data generation.
- The simulation has several adjustable parameters
 - inflow speed
 - fluid viscosity
 - fluid density
- Reynolds Number in the range of [90, 350]



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Models





Evaluating the results





Evaluation cases





Thank you for your attention.

Data



Description

Results 0000

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Questions?

