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Master Thesis
Fluid Mechanics and Hydraulic Machinery

Supervisor: M.Sc. Rohit Raj, Dr.-Ing. Alexander Tismer
Begin: asap

Topic: **Sensitivity Analysis of Parametrization of Shape of a Hydraulic Machinery based on the Improved Garson Algorithm**

Background

The parameterization of the shape of a hydraulic turbomachinery has a huge impact on the output parameters such as power, efficiency, cavitation etc. Hence, it is must to perform sensitivity analysis over input parameter space to identify the most important input parameters, which is a complex task. With increasing dimensionality of the input space, this complexity of the sensitivity analysis multiplies. Neural network training can subsequently reduce the efforts for such task. One of the very well-known algorithms to perform sensitivity analysis through Artificial Intelligence is Garson algorithm[1]. However, the stability and accuracy of this algorithm is not too high.

Aim

Maozhan et.al[2] proposed an improved version of Garson algorithm. Within this research thesis / master thesis framework, the goal is to implement the Improved Garson Algorithm (IGarson), and perform benchmark testing simulation to compare the accuracy and stability of the evaluation of sensitivity coefficients with Garson Algorithm. Afterwards, use Improved Garson Algorithm to evaluate the sensitivity results of a hydraulic turbomachinery parameterization.

Contact

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[1]Garson, G. David. “Interpreting neural-network connection weights”. *AI Expert* 6, no. 4 (1991): 46-51.
[2]Maozhun, Sun, & Liu Ji. “Improved Garson algorithm based on neural network model.” In *2017 29th Chinese Control And Decision Conference (CCDC)*, pp. 4307-4312. IEEE, 2017.