

**Subject**

Sensitivity analysis for deep neural networks.

**Supervisors, contact, place of research**

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**Project Description**

The subject of the research will be the innovative development Sensitivity Analysis (SA) for Deep Neural Networks in particular Convolutional Neural Network. The main task of the SA algorithms will be to reduce the individual components of deep neural networks, aimed at examining both the impact (substantiality) of individual components and the simplification of the structure.

SA approaches can be categorized into the following two groups: Local Sensitivity Analysis (LSA) and Global Sensitivity Analysis (GSA). LSA explores the changes of model response by varying one parameter while keeping the other ones constant. The simplest and most common LSA approach is based on partial derivatives of the output functions with respect to the input parameters. In GSA, the influence on models' outputs can be evaluated using regression methods, screening approaches and the variance-based techniques, e.g., Sobol, the Fourier amplitude sensitivity test (FAST) or the extended FAST (EFAST).

In this investigation, the following approaches for the structure simplification of the considered network will be proposed: (i) an algorithm reducing solely the number of input neurons, (ii) an algorithm decreasing solely the number of convolutional neuros, and (iii) an algorithm removing neurons in fully connected layers and (iv) finally all above procedures will be merge for removing input and convolutional and fully connected neurons simultaneously.

**Bibliography**

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