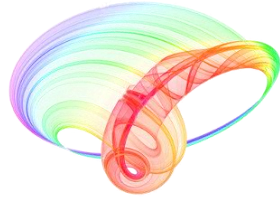


Book of abstracts



PHOTONICA2021

VIII International School and Conference on Photonics

& HEMMAGINERO workshop

23 - 27 August 2021,

Belgrade, Serbia

Editors

Mihailo Rabasović, Marina Lekić and Aleksandar Krmpot

Institute of Physics Belgrade, Serbia

Belgrade, 2021

ABSTRACTS OF TUTORIAL, KEYNOTE, INVITED LECTURES,
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Influence of data scaling and normalization on overall neural network performances in photoacoustics

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In our previous articles [1,2] we have shown that the application of artificial neural networks (ANNs) in photoacoustics could improve experimental procedures in many ways: better accuracy and precision in investigated sample parameters prediction, better control of the experimental conditions together with approaching to the real-time characterization of the investigated sample, etc. Here we will try to show why the different types of scaling and normalization procedures could be beneficial to the accuracy, precision and numerical stability of the network predicted parameters and network training speed. To do that numerical (Fig.1) or logarithmic scaling and min-max and max normalizations are applied on experimental input data used in the ANNs training process. At the same time, specific numerical scaling is used for network output data (predicted sample thermal and geometric parameters such as thermal diffusivity, linear coefficient of thermal expansion, thickness) to find possible benefits to ANNs performances. Our analysis of training, stability, and accuracy of network prediction will rely on the ANNs trained with or without scaling and/or normalization to find their influence on overall network performances.

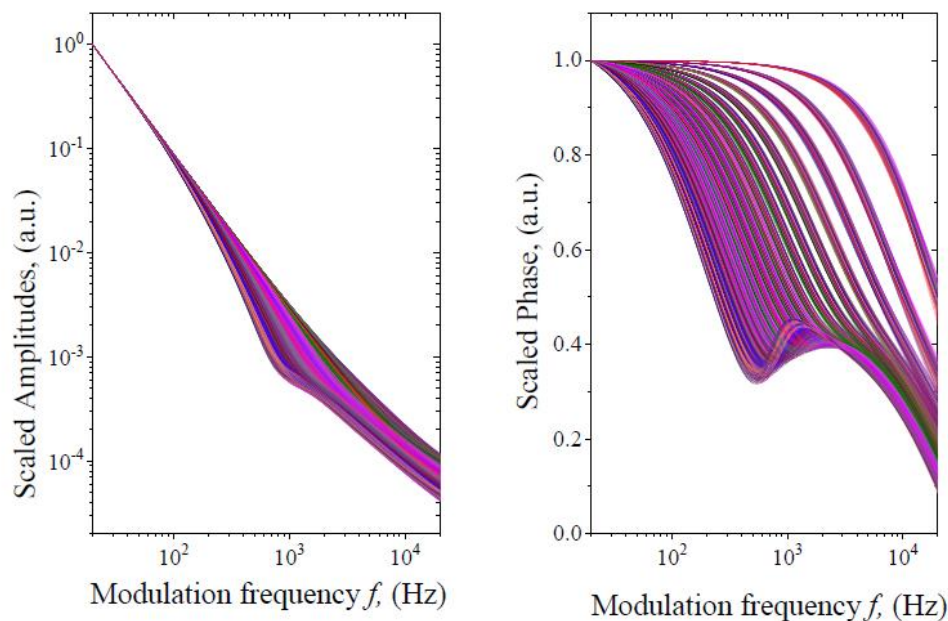


Fig.1. Numerically scaled a) amplitudes and b) phases of the photoacoustic signals used as an input data for network training base formation in frequency domain aimed for electronic parameters calculations.

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