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Artificial intelligence methods applied for quantitative analysis of natural radioactive sources

M.E. Medhat

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Abstract

Artificial neural network (ANN) represents one of artificial intelligence methods in the field of modeling and uncertainty in different applications. The objective of the proposed work was focused to apply ANN to identify isotopes and to predict uncertainties of their activities of some natural radioactive sources. The method was tested for analyzing gamma-ray spectra emitted from natural radionuclides in soil samples detected by a high-resolution gamma-ray spectrometry based on HPGe (high purity germanium). The principle of the suggested method is described, including, relevant input parameters definition, input data scaling and networks training. It is clear that there is satisfactory agreement between obtained and predicted results using neural network.

Highlights

° Basic description of artificial neural networks. ° Natural gamma ray sources and problem of detections. ° Application of neural network for peak detection and activity determination.



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Keywords

Neural networks; Gamma-ray spectrometry; Natural radioactivity

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