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Dataset Preparation Software for Training a Neural Network to Determine the Boundaries of Full Energy Peaks in Gamma Spectra

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Gamma spectra processing is one of the most time-consuming stages of instrumental neutron activation analysis. Since spectra contain a large number of multiplets, their processing by classical mathematical methods leads to high uncertainty in the areas of full energy peaks. In this case, it is necessary to perform manual fitting of peak boundaries. This process is planned to be automated using a neural network. However, for its training dataset should be created.

The software for the boundaries of full energy peaks dataset preparation was designed. The development was carried out in the object-oriented programming language C# (.NET Framework 4.8.1) using API Windows Forms. To create a dataset, about 70000 gamma spectra were selected. In order to increase spectra processing performance, a flexible control system was introduced, allowing to work in the program in three modes: keyboard only, mouse only and keyboard + mouse. Additionally, vertical and horizontal zoom functions were added for more accurate processing. To access the application, the user authorization system was implemented *via* MS SQL Server, used to record the parameters of processed full energy peaks into the database.

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